CONTENTS

Nano Technologies, Computer Modelling And Information Communication Technologies

ISMA
ANNO 1994
INFORMĀCIJAS SISTĒMU MENEDŽMENTA AUGSTSKOLA

Information Technologies, Management and Society

The 20th International Scientific Conference
Information Technologies and Management
2022 April 21 – 22

ISMA University,
Riga, Latvia

Poltava National Technical Yurii Kondratuyk University,
Poltava, Ukraine

SATBAYEV UNIVERSITY
Almaty, Republic of Kazakhstan

Kiev, Ukraine

Erasmus+

AESYRI

Riga, 2022

Supporting Organizations	ISMA Scientific Research Institute (Computer Technology and Business Laboratories) ERASMUS+ Advanced Centre for PhD Students and Young Researchers in Informatics, ACeSYRI, reg.no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP
ISSN 1691-2489	***Information Technologies, Management and Society*** The 20th International Scientific Conference ***Information Technologies and Management 2022*** April 21 - 22, 2022. Theses. Editors V. I. Gopejenko. ISMA, Riga, 2022
Copyright©isma2022	1 Lomonosova Str., Bld.6, LV-1019, Riga, Latvia e-mail: isma@isma.lv

Construction of the model for *ab initio* calculations of chalcopyrites

A. Gopejenko*[1], J. Grechenkov[1], D. Bocharov[1], A.I. Popov[1], M. G. Brik[2], S. Piskunov[1]

[1]*Latvijas Universitātes Cietvielu fizikas institūts*

[2]*Fizikas institūts, Tartu universitāte*

**Corresponding author's e-mail: agopejen@inbox.lv*

Abstract

Chalcopyrites are ternary semiconductors that are used in the production of the solar cells. Within the framework of this study a model of the calculations of chalcopyrite materials has been developed based on $CuGaS_2$, $AgGaS_2$, $CuGaSe_2$, $CuInS_2$ chalcopyrites. The influence of the atomic positions of different ions inside the crystal lattice of solid solutions on structural and optical properties of chalcopyrites has been studied. The calculations of defects have been performed using the supercell model. The effects of the defects on the structural and optical properties of the chalcopyrites have been analysed.

Keywords: density functional theory, ab initio calculations, chalcopyrite, photovoltaic materials

1 Introduction

Increasing world population and reduction of the available oil resources as well as increasing levels of atmospheric pollution lead to the development of the new ways for the production of sustainable energy. To overcome the possible energy crisis, the use of alternative energy sources is being extensively applied around the world. One of the possible and perspective pathways is the direct conversion of the solar energy into electricity. In addition to photovoltaic (PV) applications on the Earth, the solar panels are the primary source of electricity for the space missions.

Chalcopyrites (CP), are ternary semiconductors with the general chemical formula I-III-VI_2 (I=Cu, Ag, III=In, Ga, Al, VI=S, Se, Te, etc.) or II-IV-V_2 (II=Be, Mg, Zn, Cd, IV=C, Si, Ge, Sn, V=N, P, As, Sb, etc.). CP possess a highly symmetrical crystal structure and a direct band gap that are preferred in solar cells (Figure 1). CP crystallize in the $I\bar{4}2d$ space group, No. 122, with four formula units in one unit cell and have tetragonal crystal structure. Partial or complete substitution of cations or anions allows fine-tuning of the structural and physical properties of CP solid solutions due to the high flexibility of chemical composition.

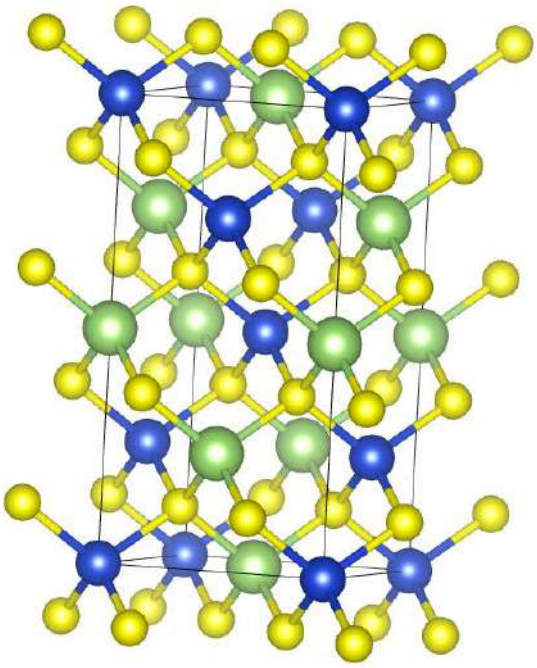


Figure 1. The model of chalcopyrite

2 Computational details

CRYSTAL17 computer code [1,2], which employs Gaussian-type functions centred on atomic nuclei as the basis sets (BS) for an expansion of the crystalline orbitals has been used to perform hybrid DFT calculations. The following BSs have been used in the calculations: Cu –

Cu_pob_TZVP_rev2, Ga – Ga_pob_TZVP_rev2, S - S_pob_TZVP_rev2, Se - Se_pob_TZVP_rev2, Ag - Ag_POB_TZVP_2018, In - In_POB_TZVP_2018.
Heyd-Scuseria-Ernzerhof hybrid exchange–correlation functional (HSE06) [3], which uses a screened hybrid functional and includes the exact nonlocal Fock exchange has been used in the calculations.
The calculations were performed using the exchange-correlation hybrid HSE06 functional The Brillouin zone has been sampled by 8×8×8 Pack-Monkhorst net [4] resulting in 59 k-points in total for bulk calculations, 260 k-points in total for ideal 2 x 2 x 1 supercell, and 868 k-points in total for 2 x 2 x 1 supercell containing a single defect.

3 Results

The model for the first principle DFT calculations of CP materials has been created based on $CuGaS_2$ and $CuGaSe_2$.
Series of test calculations have been performed to choose the most suitable exchange-correlation functionals for further modelling of CP materials. The values of the lattice constants and band gaps received using Heyd-Scuseria-Ernzerhof hybrid exchange-correlation functional (HSE06) was found to be in the best agreement with experimental data compared with other hybrid exchange-correlation functionals.
The results of quantum-chemical computations for various chalcopyritic compounds ($CuGaS_2$, $AgGaS_2$, $CuGaSe_2$, $CuInS_2$) and their respective solid solutions are presented in this work.
Theoretical predictions of optical properties are provided for these materials. Special care has been taken into consideration of atomic position of different ions inside the crystal lattice of a solid solutions and its effect on the resulting properties.
Models for V_{Cu} and V_{Ga} have been constructed using a supercell with 2×2×1 extension.
The model for the first principle DFT calculations of CP materials has been created based on $CuGaS_2$ and $CuGaSe_2$.

4 Conclusions

HSE06 hybrid exchange-correlation functional has been chosen for the calculations of $CuGaS_2$ and $CuGaSe_2$. Optimized lattice constants are in a good agreement with the experimental data. While the values of the band gaps are overestimated they are in qualitative agreement with experimental data. Substitution of Cu atom with Ag atom leads to the increase of the band gap, while substituting Ga atom with In atom leads to the decrease of the band gap, which is in a good agreement with the experimental data.

Acknowledgements

Financial support provided by Scientific Research Project for Students and Young Researchers *"Ab initio calculations of defective ternary chalcopyrites for photovoltaic applications"* realized at the Institute of Solid State Physics, University of Latvia is greatly acknowledged.

References

[1] http://www.crystal.unito.it/.
[2] R. Dovesi, F. Pascale, B. Civalleri, K. Doll, N.M. Harrison, I. Bush, P. D'Arco, Y. No¨el, M. R´erat, P. Carbonni`ere, M. Caus`a, S. Salustro, V. Lacivita, B. Kirtman, A. M. Ferrari, F.S. Gentile, J. Baima, M. Ferrero, R. Demichelis, M. De La Pierre, The CRYSTAL code, 1976–2020 and beyond, a long story, J. Chem. Phys. 152 (20) (2020) 204111, https://doi.org/10.1063/5.0004892.
[3] J. Heyd, G.E. Scuseria, M. Ernzerhof, Erratum: "Hybrid functionals based on a screened Coulomb potential" [J. Chem. Phys. 118, 8207 (2003)], J. Chem. Phys. 124 (21) (2006) 219906, https://doi.org/10.1063/1.220459
[4] H.J. Monkhorst, J.D. Pack, Special points for Brillouin-zone integrations, Phys.Rev. B 13 (1976) 5188–5192Theoretical modelling of nanodevices in the frameworks of embedded molecular cluster model: Problems and perspectives

Modern Threats to Human Security in the Global Dimension

Nataliya Kuznetsova

PhD in Economics, Associate Professor of Economic, Entrepreneurship and Marketing Department, Cherkasy State Business College, Ukraine

Corresponding author's e-mail: nataliya.kuznetsova14@gmail.com

Abstract

The author examines the global challenges and threats to human security that exist in the modern world and have a negative effect on human development. The main sources of threats to human security are investigated. It is determined that the basis of their occurrence is the factor of interaction of the physical system with the living and social ones, as well as the man with the biological sphere. The author describes such types of threats to human security as the COVID-19 pandemic, famine, poverty, climate change, digital technology risks, violent conflicts, confrontations, wars. It is pointed out that every sovereign country, regional and international alliances need to strengthen the security component of human protection in terms of its protection based on progressive partnership and security dialogues between all stakeholders: states, international organizations, business sector, civil society organizations, academics globally. Because of Russia's unjustified aggressive war against Ukraine, there is a need to form a new world security system to ensure peace and protect people in the future.

Keywords: human security, threats, sources of threats, protection of life and property, world security system, the COVID-19 pandemic.

Introduction

The modern world is full of many dangers and threats of various kinds that accompany people throughout their lives. Man-made disasters, natural disasters, epidemics, poverty, violent conflicts, wars cause significant economic downturns, destroy economic goals, worsen human standards of living, increase threats and dangers to their lives and health, encouraging people to new migrations in search of safer places to live and work. Everything that endangers human existence is a threat to its security.

The term of human security is widely used today in the context of global development, because the more globalized the world is, the more threats and dangers accompany a person, hinder the development and realization of his/her potential.

The 1994 Human Development Report defined human security as freedom from fear and freedom from want. In a 2012 UN resolution, the term was interpreted as "the right of people to live in freedom and dignity, free from poverty and despair" and another component was added to the previous two – freedom from humiliation. In 2022 Special Report on Human Security "New Threats to Human Security in the Anthropocene: Demanding Greater Solidarity" a new approach to human security links security with development and protection, with the empowerment of individuals and societies [1].

Throughout life, a person may encounter many dangers that can be a threat to his/her existence (survival), well-being and dignity. The sources of these threats can be physical, living (biological sphere) and social systems (Fig. 1).

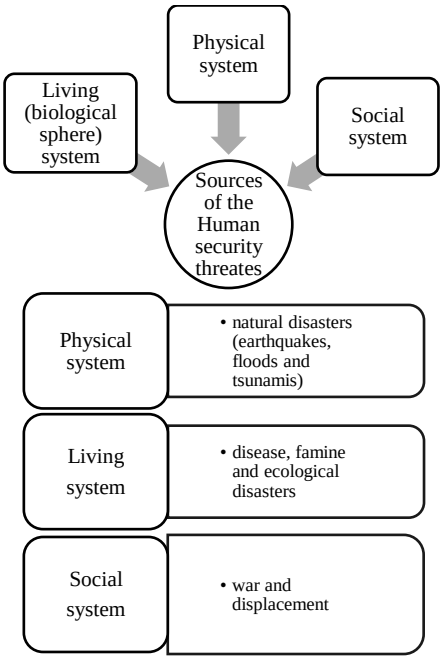


Figure 1. Sources of threats to human security

Source: developed by the authors by source [2],

The decisive factor in the emergence of threats is the interaction of the physical system with the living and social ones, as well as a person with the biological sphere.

Today, the most common threats to human security that hinder opportunities for development are:

- *real health threats posed by COVID-19* because of the impact of the virus on mental health of people, which
- causes a risk of increased stress level and impaired mental well-being. The population living in low-income countries are especially affected by the pandemic. Thus, according to a McKinsey analysis, COVID-19 could lead to a potential 50 percent

increase in the prevalence of mental health disorders. Mental health is also a problem of diversity and inclusiveness. Because of the pandemic, the human capital development index has decreased in the world for the first time since 1990: from 0.737 in 2019 to 0.724 in 2021. This could become a global problem in the world, creating the need for both employers and governments to implement and fund human capital conservation measures [3];

- *hunger* as a global threat continues to grow due to the economic, social and environmental crises that are accumulating in the world, undermining the foundations of food security. Thus, according to the report by the United Nations Development Program in 2020, 800 million people in the world suffered from hunger; today, about 2.4 billion people suffer from food insecurity. This growing trend over the last two years (2020-2021) has been driven further by the COVID-19 pandemic [1];
- *the problem of poverty* is exacerbated by the deepening of socio-economic inequality between countries and is manifested in the limited access of the poor to the main livelihood resources (education, health, nutrition, work), which causes many social problems, high unemployment rate, especially among young people, rising crime, violence, discrimination);
- *climate change* because of frequent natural disasters also continues to threaten human life. Thus, there is a potential threat of increasing mortality caused by complex pollution-related diseases. Up to 40 million people could die from mitigating greenhouse gas emissions by the end of the century.
- *digital technology risks* can be considered from the standpoint of impact on people's health, their lives and well-being. Thus, the deepening of computer addiction, especially among young people, as a pathological addiction, forms a process of addiction and is a prerequisite for unstable psyche, deteriorating health, reduced cognitive abilities, provokes addictive behavior (bad habits), which limits the potential of people. . On the other hand, the rapid pace of digital expansion is accompanied by new threats that could exacerbate current problems, such as inequality and violent conflict. Along with the digital shifts in the productive sector of the economy, accelerated by the pandemic, there has been a rapid increase in cybercrime with projected annual costs of $ 6 trillion by the end of 2021, creating new risks and dangers for people [1];
- *existing conflicts, confrontations, wars, violent crimes, gender inequality*, weak system of protection of life and property from the side of human rights and freedoms by international security institutions endowed with the responsibilities of international guarantors of their provision are the causes of underutilization of their own labor potential intensification. It results in forced migration of the population, forms disparities in the international movement
- of human capital, limits and hinders personal and professional development. Various forms of violent conflicts are spreading, affecting a significant number of people. Thus, according to [1], today approximately 1.2 billion people in the world live in conflict-affected areas, 560 million of them outside stable conditions. Today, more than ever, the threat to the lives of civilians in democracies is growing because of aggressive hostilities on their territory. An example is Ukraine, which is currently facing military aggression by Russia, whose bullets and missiles are killing civilians in Ukrainian cities and towns, including women and children, destroying domestic critical infrastructure and social facilities in violation of all norms and rules of international law. Russia, which is still a member of the UN Security Council !!! and the OSCE, a leading partner in peace and security in Eastern Europe in the Global Partnership for the Prevention of Armed Conflict, publicly demonstrates contempt for all international institutions for peace and security in the world; grossly violates the UN Charter, all its obligations commitments signed within the OSCE and the UN norms of international law, international humanitarian law and human rights, undermined its obligations as a guarantor of the territorial integrity and security of Ukraine. It is a real threat to security and peace not only for Ukraine and European countries, but also for millions of people around the world.

Conclusions

That is why the progressive world must unite and consolidate joint efforts to review outdated approaches to the global security system, develop effective measures to prevent the manifestation of confrontation, and violation of the international law on peace and security in the regions and the world. It is necessary to intensify the security dialogue and strengthen cooperation between all stakeholders to ensure and guarantee peace and security in the world. In addition, each sovereign country must review the overall security component of its economy and people, develop new security concepts for the protection of life and property of its citizens to ensure their physical protection and provide opportunities for human development within the overall national security system. Reducing threats to human security is the responsibility and obligation of the governments of each country, regional and global alliances, which work to maintain and ensure world peace and security.

References

[1] New Threats to Human Security in the Anthropocene: Demanding Greater Solidarity. Special Report 2022. URL: https://hs.hdr.undp.org/pdf/srhs2022.pdf

[2] Tanaka, Akihiko Human Security: A stronger framework for a more secure future. URL: https://hdr.undp.org/en/content/human-security-stronger-framework-more-secure-future

[3] Jeffrey Pfeffer, Leanne Williams Mental health in the workplace: The coming revolution. URL: https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/mental-health-in-the-workplace-the-coming-revolution

Sustainable Restaurant Business: Study of the Models Implementation.

Stanislavs Miscenko

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: stanislavs.miscenko@isma.lv

Abstract

Contemporary models of organisation in restaurant business pay more and more attention to the issue of sustainable development. Nevertheless, restaurant business, mainly represented by small and medium size enterprises, very seldom pays attention to systems of sustainable development which are research based. The present paper aims at conducting a research, based on scientific methodology. Another aim of the paper is to analyse factors, which support sustainable development in restaurant business.

Keywords: sustainability, green restaurant, result, smart innovations, motivation, opportunity, preference

1 Introduction

This research aims at introducing principles of sustainable development in restaurant business by applying tests and analysis of complex models and additional contexts which shape the way how sustainable development can be achieved.

The author of the research undertook the analysis of both positive and negative scenarios for fostering sustainable development in the business field in question. The issue has been analysed from the point of view of entrepreneurs and their clients, who are directly involved into the process of sustainable development. Various obstacles on the way of implementing the sustainable development and the issues of competitiveness which could develop out of the new approach, as well as issues of intensifying output and income have been taken into consideration. Research conducted earlier on the issue have clearly proven a positive effect on the issues of environment protection, efficiency of business, on issues of cost, safety and future development. Nevertheless, a sort of anxiety and scepticism create obstacles and hinder obvious advantages. The author analyses possible scenarios of achieving the goal and shows various examples of how the ideas of sustainable development are possible in the catering industry in Latvia.

2 General

Contemporary restaurant business develops in the frame of growing uncertainty, dynamic environment and is forced to rapidly change its strategies of development. [11].

The research carried out by the Global Resources Institute in twelve countries showed that each euro invested into the system of sustainable development will return about eight euros as profit to the companies which were ready to invest and will positively affect their business, strengthen competitiveness and become another important indicator to satisfy their clients [1].

Sustainable development surrounds our clients not only in restaurant business, but also in everyday life, at work etc. As of February 1st, 2022 the deposit service of packaging was introduced in Latvia. This will affect the way of thinking towards mainstreaming sustainable development, by implementing money issues into sustainable economy. Those clients, who participate in depositing will not only gain money, but will also actively participate in the global campaign of «zero waste» and will choose more sustainable restaurants thus developing the new direction of business [1, 2].

The system consisting of supplier, restaurant and clients' needs to be reshaped in its form and content. Many questions arise in this field. Are local suppliers capable of providing all the restaurants need in sufficient amounts? Can other suppliers make advantage of the shortest distance to a certain restaurant? Can they provide products which will be in high demand by using less package, fuel and at the same time to ensure the organic products are available? After all, we can often see the entire geography of the world in a single document that comes with fruits and vegetables (and not just in this category of products). Can a certain restaurant allow itself to buy organic goods? As a negative example the story of an egg with number 3 on it, meaning the lowest category, being preferred over a bio-egg (numbered zero) can be mentioned. And this is despite the fact that many restaurants and clients are well aware of the meanings of numbers on eggs. Are clients ready to pay more for an ecodish or a drink? Many still give preference to lower price over quality, despite large scale studies on how quality of food affects our health [10]. This should surprise no one. Study results and the personal experience of the author of this paper show that small and medium size restaurant business are limited in their opportunities to follow the principles of sustainable development. Many businessmen are more interested in the price of the products and the menu is being calculated as the summary of all costs. The market

dictates its own rules. Salaries are getting higher, delivery costs too. So are utilities and rent costs [7]. Another issue is lack of management knowledge. Lack of planning strategies and shortage of finances are among obstacles on the way to sustainable development [8].

Smart technologies are closely linked to the sustainable development of restaurant business. The author identified experience based smart system of flexible intellectual manufacturing, which takes into account technical expertise of the staff for modernisation and quick accountancy, for implementing smart tools for certain elements of the process [11]. Certain problems of supply networks, as well as allocation and storage of products should be mentioned. The author considers the main problem to be unstable connection between production and storage, including the issue of goods of a certain season [4]. Sustainable development in the restaurant business is "efficient method of production, using processes and systems, which do not harm the environment, keep the non-renewable energies and resources, are safe for the staff, communities and consumers and do not endanger the needs of future generations" [5]. Smart production is an approach, based on usage of technologies which apply modern tools for monitoring of the production. The major aim of the smart production is to identify modes of automatisation and to use data analysis for higher efficiency of production [6]. In addition to that, modern technologies should not be left aside, artificial intellect and cloud data storage in the classical ABC analysis can help improving the whole monitoring of the process of production. The author has previously suggested in his research that the system of Modern Management Methods in the Restaurant Business: Holographic Model of the Enterprise Structure may lead to improvement of implementation of sustainable development in food industry. The Holographic Model, when based on smart technologies, can be developed successfully and create a stable financial basis for a business. The implementation of a model of sustainable development can foster new profits. [11].

3 Conclusions

To sum up, the author would like to suggest some practical tool-kits which can be implemented right now and which take into consideration principles of sustainable development.

A system of certificates for restaurant business can be applied, based on the example of hotels certificates in the Netherlands, so-called Green Key-certified. This system would observe principles of sustainable development.

Such system would stimulate the owners to speed up the implementation of the system of «zero waste». One may be sure, that most advanced of the businesses in the field actively support the shift to more sustainable business.

A website zerowastelatvia.lv can be developed. It would be accessible by everyone who would be eager to support the idea. The website can publish a manifesto of restaurant owners in Latvia to tackle the issue of waste and help joining the «zero waste» principle.

Life cycle assessment (LCA), which states criteria for the impact on environment can be implemented as well. The author suggests that this methodology can be applied when environmental scores of a dish takes place, although not all the dishes and not every single restaurant can be evaluated according to this model. Still environmental scores of certain ingredients can be produced [9]. Results of such analysis can be applied in marketing strategies.

It would be useful to conduct such studies, which would reflect upon the latest developments in the area of sustainable development in restaurant business. Pupils and students can get involved into such studies, becoming supporters of ideas of sustainable development. Latest academic literature and developments should find their place on the bookshelves of libraries, as this supports the mainstreaming of sustainable development. There are many studies, dedicated to the sustainability of products in general, but there are almost no studies on how these products are used in restaurant business [3].

The author hopes that studies and analysis he has conducted in the field of sustainable development would get more actors involved and interested in studying factors of sustainability which would thus positively affect the catering industry.

References

[1] Miscenko, S. (2022). Sustainable Development of the Restaurant Business Within the Framework of the Reasonable "Zero Waste" Consumption Philosophy. The 20th International conference Open Learning and Distance Education, Riga. Latvia

[2] Miscenko, S, (2022). Принципы устойчивого развития в ресторанном бизнесе и повседневной жизни. Радио эфир Baltkom Программа «Культпросвет» https://fb.watch/bZqazPwCVz/ (03.25.2022)

[3] Legrand, W., Sloan, P., Simons-Kaufmann, C., & Fleischer, C. (2010). A review of restaurant sustainable indicators. Advances in Hospitality and Leisure, 6, 167–183. doi:10.1108/ S1745-3542(2010)0000006013.

[4] R. Cioffi, M. Travaglioni, G. Piscitelli, A. Petrillo, A. Parmentola (2020) Smart manufacturing systems and applied industrial technologies for a sustainable industry: A systematic literature review Applied Sciences, 10 (8)

[5] S. Ren, Y. Zhang, Y. Liu, T. Sakao, D. Huisingh, C.M. Almeida (2019), A comprehensive review of big data analytics throughout product lifecycle to support sustainable smart manufacturing: a framework, challenges and future research directions Journal of cleaner production, 210, pp. 1343-1365

[6] H. Chang, D. Thusdy, T. Collins (2013) Undergraduate kinetics laboratory experiment: The catalytic degradation of common food dyes using the Fe-III-TAML system In abstracs of papers of the american chemiacl society (Vol. 245). 1155 16TH ST, AMER CHEMICAL SOC, NW, WASHINGTON, DC 20036 USA

[7] Garay, L., & Font, X. (2012). Doing good to do well? Corporate social responsibility reasons, practices and impacts in small and medium accomodation enterprises. International Journal of Hospitality

[8] Klewitz, J., & Hansen, E. G. (2013). Sustainability-oriented innovation of SMEs: A systematic review. Journal of Cleaner Production, 65, 57–75. doi:10.1016/j.jclepro.2013.07.017

[9] Tyszler, M., Kramer, G., & Blonk. H. (2014). Comparing apples with oranges: On the functional equivalence of food products for comparative LCAs. International Journal of Life Cycle Assessment, 19(8), 1482–1487. doi:10.1007/s11367-014-0762-x.

[10] Dr. T. Colin Campbell (2006). The China Study: The Most Comprehensive Study of Nutrition Ever Conducted And the Startling Implications for Diet, Weight Loss, And Long-term Health

[11] Miscenko S 2021 Modern Management Methods in the Restaurant Business: Holographic Model of the Enterprise Structure. The 19 International Scientific Conference "Information Technologies and Management"2021 April 22-23. Riga. Latvia

Loyalty methodology design

Dina Kelsina

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: d.kelsina@gmail.lv

Abstract

The relevance of this study is that Knowledge of the effects of overlapping new projects on an entire activity, allows to improve the management system within a specially designed methodology. Such methodology, focused on tracking multiuser loyalty, provides monitoring of the set goal on the basis of justified-assigned norms. As a result, the implementation of activities that contribute to the value of the system has an impact on the accumulation of new knowledge of the organization's maintenance

Keywords: illusions, doubt, misalignment, failure, deviations, output, sustainability

1 Introduction

Considering that numerous suggestions for improving the business is contrary to the prevailing view of the invariability of the principles of management systems, the research problem was expressed in the following formulation: "It is impossible to conduct effective improvement of the organization in terms of recognizing the system theory outdating".

2 An Approach

The object of the study is the set of means of examination. Such means are described from the imposition of the new project on the full activities reasonably carried out over the whole distance of the final goal. The aim of the study is to develop a full-scale procedure of renewal of the organization, providing reliable evidence of the effectiveness of its activities in the long term. In accordance with the goal, the following objectives were formulated:

1. Conducting a current analysis of the position of the organization under study, taking into account the identification of the influence group of critical attributes in the context of the removal of illusions of self-confidence.
2. Choosing the option of introducing new proposals not for the purpose of maintaining functioning, but to improve performance.
3. Implementation of a medium-term scenario of system loyalty transformation as part of corrective actions to eliminate deviations.
4. Development of guidelines for system operation in the special conditions of overcoming the negative impact of large-scale circumstances.

3 Conclusions

As practical results, it should be noted that the activities aimed at identifying deviations that cause a decrease in efficiency, forms the basis for the development of new proposals to improve the management system. The novelty of the research lies in the fact that the development of multi-user loyalty system contributes to the accumulation of new knowledge about sustainable functioning in conditions of constant renewal. The transformations carried out in the course of updating the management system are carried out with the management principles unchanged, which creates an objective prerequisite for sustainable growth of the organization. Such growth is studied from the position of means of measurement of multiuser loyalty.

Business model complementarity and the factors that determine it in tourism industry

Remigijus Kinderis

Klaipeda State University of Applied Sciences Jaunystes Str. 1, LT-91274, Klaipeda, Lithuania

**Corresponding author's e-mail: r.kinderis@kvk.lt*

Abstract

The article analyzes the expression of business models complementarity and factors that determine it in inbound tourism. Article presents the results of empirical research, by revealing the characteristics of complementarity, characteristics of identification and determining factors in the inbound tourism. The obtained results of the qualitative research allowed to supplement and partially check the theoretical presumptions that were set in the article, formulate the conclusions of the research, and provide the further research directions.

Keywords: business model, complementarity, inbound tourism.

1. Introduction and research methodology

The research that would reveal the essence of the complementarity and the factors that determine it in the tourism business through the systemic approach, is missed. The research that would examine the factors that determine the business model complementarity, identify the nature, intensity, orientation, and identification, is missed. Therefore, it is intended in the article to research the aforementioned problematic aspects systemically, by employing theoretical approaches of business model, connection between organisations and complementarity [1], [2], [3], [4].

Object of the scientific research – business model complementarity and the factors that determine it in inbound tourism.

Research objective – to determine the complementarity of business models and the factors that determine it in the inbound tourism.

Research is based on the methodological approach of the qualitative research using semi structured interview method. Research subjects (experts) were selected according to two criteria: documentary and self-evaluation of the expert [5], [6]. The obtained research data were analysed and compared in line with the quasistatic and model approaches. Research data was presented in accordance with the linear-analytical method.

2. Analysis of survey results

Complementary business models create complex adaptive business system due to the interaction of their similarities and differences, and form a distinctive configuration for the generating of the social and economic value.

Certain properties are characteristic to the business model complementarity in the context of strategic choices (nature, orientation and intensity) and the characteristics of identification. Business model complementarity is affected by the changes of external environment – external factors, as well as by the internal environments of the organisation – internal factors.

The research of traits and identification properties of the business model complementarity in inbound tourism companies showed that intensity of business model complementarity most strongly manifested between the following units of analysis: essential partnerships, value proposition, distribution/accessibility, consumer segment and the analysis of resources and abilities.

The research of the factors that determine the complementarity in inbound tourism company business models showed that the groups of internal factors determine the complementarity of business models more strongly than groups of external factors.

Conclusions

1. Complementarity is a result of an interaction of homogeneous or heterogeneous units or their elements, when mutual relations of individual units or their evolution creates higher value than their individual functioning. Bidirectional orientation (symmetrical interaction) is characteristic to complementarity, but the intensity of orientation depends on the importance to the certain side. Complementary business models create complex adaptive business system due to the interaction of their similarities and differences, and form a distinctive configuration for the generating of the social and economic value.

2. The research of traits and identification properties of the business model complementarity in inbound tourism companies showed that:

- intensity of business model complementarity can be classified as average;
- business model complementarity is more intensive, when the same strategic choices are dominating:

- the nature of business model complementarity is "accumulative" due to the similarities of the dominating elements and the strategic choice compatibility in the business model;
- the following business model complementarity identification characteristics presented themselves: increased number of consumers, quicker decision-making speed and higher competence, as well as increased economy of activity.

3. The research of the factors that determine the complementarity in inbound tourism company business models showed that the groups of internal factors determine the complementarity of business models more strongly than groups of external factors. The following groups of internal factors are active and determine business model complementarity: financial factors, creation of high added value, effective use of resources; human factors, improvement of competences; management factors; physical-technological factors; organisational culture factors. Factors that did not manifest in the aforementioned groups: financial risk reduction, financial efficiency of the activity, economies of scale, human resource acquisition and maintenance, development of a new activity, structure of organisation management, duration of organisation activity, adherence to the behavioural norms, size and status of the organisation. The following groups of external factors are active and determining business model complementarity: technological factors, socio-cultural factors, economic. The following factors of the aforementioned groups did not manifest: technological changes in the industry, general development of ICT, changes of consumer community, changes of cultural environment and resources, market growth rates, and fiscal policy of the country.

References

[1] [1] Ennen E. and Richter A. 2010 The Whole is More Than the Sum of Its Parts – Or is It? A Review of the Empirical Literature on Complementarities in Organizations Journal of Management 36 (1) 207-233.

[2] [2] Schallmo, D.R.A. and Brecht, L. 2010 Business Model Innovation in Business-to-Business Markets – Procedure and Examples The Proceedings of the 3rd ISPIM Innovation Symposium. Canada: Quebec.

[3] [3] Wirtz, B., Pistoia, A., Ullrich, S. & Göttel, V. (2015 Business models: Origin, development and future research perspectives Long Range Planning, forthcoming: 1-19.

[4] [4] Kinderis R. 2018 Business model complementarity in inbound tourism "European Journal of Tourism Research" Vol. 19 140-144.

[5] [5] Yin, R.K. 2003 Case study research: Design and methods (3rd ed.). Thousand Oaks, CA: Sage.

[6] [6] Lueg, K., Lueg, R., Andersen, K. and Dancianu, V. 2016 Integrated reporting with CSR practices: a pragmatic constructivist case study in a Danish cultural setting Corporate Communications: An International Journal 21 (1) 20-35.

Innovative directions of the T&CS market development

Perminov Stanislav*, Valentina Djakona

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: psb70@protonmail.com*

Abstract

A significant number of market participants can act as a securities trustee, but each of them has a restriction on working with certain types of assets or property. Banks occupy a special place in the system of trustees.
The current trend and innovative element in the development of the trust management and custody services market is the management of cryptocurrency wallets. Crypto asset management is a fairly new service in custody management.
In the presented article, the author analyzes the participants in these relations, and also identifies the main problems in the provision of a new service.

Keywords: trust manager, trust management market, crypto asset management, innovations, legal package of regulatory acts

1 Introduction

Determination of the essence and characteristics of trust management, the practice of its implementation requires the identification of the main participants and elements of this process. It is worth identifying the main subjects and objects that do not change depending on the characteristics of the country's economic activity:

- the founder of the management
- asset manager
- the beneficiary

First of all, the functions of the manager are implemented through:

- identification of risks of investment activity and their assessment, impact on financial instruments selected for capital;
- expansion of the investment portfolio and its diversification;
- relative independence of decision-making on relative capital in trust;
- systematic and regular decision-making in the process of capital management;
- the manager acts for a certain fee or commission specified in the contract.

Thus, we can note that a significant number of market participants can act as a trustee, but each of them has a restriction for working with certain types of assets or property. Banks in the system of trustees occupy a special place, since, on the one hand, they have a more reliable organizational form in the eyes of the population, on the other hand, they are rather limited in the types and number of trust management operations, which is regulated by the general legislation on banking and the specifics of the work itself.

The current trend and innovative element in the development of the trust management and custody services market is the management of cryptocurrency wallets. It should be noted that this service is formed not only in relation to cryptocurrencies, but also to other values, however, it is the management of cryptoassets that is a fairly new service in custody management.

This innovative form of trust management is formed as a result of changes in the rules for the functioning of the financial market as a whole, the emergence of cryptocurrency as a separate structural element. As a result, using a separate wallet for cryptocurrencies is justified, since the wallet is a digital storage (MyEtherWallet, Electrum, MyCrypto, Bitcoin.com, BTC.com, Jaxx, Coinomi, Atomic Wallet and others).

The development of managed crypto wallets is a consequence of the development of the cryptocurrency market itself. In general, as a result of research, it was determined that 0.3% of the world currency is crypto money and, according to forecasts, the growth of the total mass of cryptocurrency in general and among bank deposits will be observed at an average annual level of more than 32% by 2024. However, now only 9% of the total investment is in crypto money.

In developed countries, custody services are a separate market. At the same time, developing countries have not yet developed a legal package of regulatory acts and this market is outside the scope of government regulation. This allows for a wider set of tools, but also means a lower level of client protection.

Overview

This paper discusses the issues of trust management of securities:

- trustees,
- cryptocurrency as an innovative form of trust management,
- problems of legal regulation in the field of trust management of crypto wallets

Decision

In general, such trends are supported by other global banks as well. American banks are also joining this initiative, which became especially active after the permission of the United States Foreign Exchange Office (OCC) to store and manage client's virtual assets. However, it should be noted that the management of cryptocurrencies is still at the stage of formation of regulatory and regulatory support and

causes a lot of disputes and misunderstandings in both legal and economic aspects.

Conclusion

In general, we can note that the subject-object structure of the market for financial services and trust management services may differ depending on the history and practice of its implementation in the economic relations of a particular country, within which both the structure of market participants and their rights, and the main objects can be determined. In general, we can note that the management of crypto wallets is a new direction in the development of the T&CS market, has great prospects and requires the development of a regulatory framework on the scale of the market.

References

[1] Gorlovskaya I.G., Lyuts Ye.V. Soderzhaniye i osobennosti predprinimatel'skoy deyatel'nosti po doveritel'nomu upravleniyu na rynke tsennykh bumag // Vestnik OmGU. Seriya: Ekonomika. 2012. №1. C.168-173. URL: https://cyberleninka.ru/article/n/soderzhanie-i-osobennosti-predprinimatelskoy-deyatelnosti-po-doveritelnomu-upravleniyu-na-rynke-tsennyh-bumag

[2] Leading UK bank will start storing cryptocurrencies in 2021. 2020. https://beincrypto.ru/vedushhij-bank-velikobritanii-nachnet-hranit-kriptovalyuty-v-2021-godu/

[3] Cryptocurrency Market Report: Trends, Forecast and Competitive Analysis. 2021. https://www.researchandmarkets.com/reports/5002945/cryptocurrency-market-report-trends-forecast

[4] We've partnered with Northern Trust to launch Zodia, a cryptocurrency custodian for institutional investors. 2020. https://www.sc.com/en/media/press-release/weve-partnered-with-northern-trust-to-launch-zodia-a-cryptocurrency-custodian-for-institutional-investors/

Theoretical modelling of nanodevices in the frameworks of embedded molecular cluster model: Problems and perspectives

E K Shidlovskaya

Institute of Aeronautics, Riga Technical University, Kalku iela 1, Riga LV-1658, Latvia

Corresponding author's e-mail: shidlovska@inbox.lv

Abstract

Applicability of cluster embedding method with non-orthogonal wave functions for theoretical study of processes in nanodevices is studied. We demonstrate that our cluster embedding method is compatible with quantum transport theory based on time-dependent DFT. We conclude that quantum transport theory methods may be applied if we use one-electron approaches both with orthogonal and non-orthogonal wave functions. Possibilities to generalise quantum transport theory methods on the case of temperature-dependent electron transitions and theoretical modelling of temperature-dependent processes in nanodevices are discussed.

Keywords: embedded molecular cluster model, non-orthogonal wave functions, quantum transport theory, current in nanodevices

1 Introduction

When we theoretically describe nanodevice we have to treat the whole quantum system as two subsystems: small finite fragment of the system containing nanodevice (cluster) and the rest of the system containing electrodes. Problem "cluster in the field of the rest of system" is successfully solved in the frameworks of embedded molecular cluster (EMC) model with *orthogonal* wave functions. We have modified EMC model treating cluster embedding problem in the frameworks of one-electron approximation with *non-orthogonal* wave functions. We have proposed new cluster embedding scheme based on this approach [1].

Our present aim is further development of cluster embedding method with non-orthogonal wave functions for quantum-chemical modelling of processes in nanodevices. We study possibilities to combine our cluster embedding method with quantum transport theory approaches. Our goals are calculation scheme for theoretical treatment of processes in nanosystems and calculation of electric current in nanodevices.

2 Cluster embedding equations

Our cluster embedding scheme [1] is based on Hartree-Fock (HF) method. In the last years HF one-electron equations are rarely used. Calculations usually are carried out in the frameworks of density functional theory (DFT) with one-electron Kohn-Sham equations. Besides that, for theoretical modeling of nanodevices we are planning to apply quantum transport theory based on DFT. Therefore, we should find cluster embedding equations our variation procedure gives when we use DFT Kohn-Sham approach.

Total energy of many-electron system described by non-orthogonal one-electron wave functions on the both HF and DFT Kohn-Sham levels may be written in the same way. Varying expression for the total energy and analyzing our variation procedure we demonstrate [2] that our cluster embedding method based on HF calculation scheme is compatible with DFT Kohn-Sham calculation scheme. Cluster embedding equations remain the same if instead of Fock operator we use Kohn-Sham Hamiltonian. Therefore, there exists possibility to use quantum transport theory based on time-dependent DFT (TDDFT) and our cluster model (with non-orthogonal one-electron wave functions). We came to conclusion that our embedding scheme may be combined with TDDFT if electron transitions are described correctly: occupied and vacant cluster states are localized in the cluster region in the same manner. Our initial embedding equations [1] are established to give localized in the cluster region occupied states while vacant ones are delocalized [3]. To get occupied and vacant states of the same localization degree, we have modified [3] our initial cluster embedding equations.

3 Quantum transport theory and cluster model

One of the approaches for calculation of electrical properties of nanodevices is quantum transport theory method developed by Gross with co-workers [4]. We study possibility to combine our cluster approach with approach of Gross et al. Method of Gross implies that wave functions of nanodevice central part are orthogonal to the wave functions of the electrodes. We show [2] that approach for electric current calculation developed for orthogonal wave functions may be applied for non-orthogonal wave functions if we transform initial equations assuming that overlaps between wave functions are small ($S^2 << S$). Using this assumption we may combine our cluster embedding method with approach of Gross et al. and calculate electric parameters of nanodevices.

We conclude [2] that our cluster embedding method is

compatible with electric current calculation method based on TDDFT [4]. Using our cluster embedding method and combining it with electric current calculation methods based on TDDFT we propose calculation scheme for electric parameters of nanodevices.

4 Conclusions

We demonstrate that our cluster embedding method is compatible with DFT Kohn-Sham method. We conclude that our embedding scheme may be combined with TDDFT. It means that we can use electric current calculation method based on TDDFT and obtain electric parameters of nanodevices from the first principles. We use TDDFT based quantum transport theory method of Gross et al [4] and propose approach for calculation of electric parameters of nanodevices. Consideration of calculation procedures and derivation of corresponding formulas leads us to the following conclusions.

Quantum transport theory methods for electric current calculation may be applied if we deal with one-electron approaches. In this case we can easily construct one-electron density and get continuity equation for electric current.

To treat processes in nanodevices, we should consider temperature-dependent electron transitions. In the frameworks of one-electron approach we can define temperature-dependent occupation numbers for vacant and occupied one-electron states. One-electron density may be constructed and continuity equation for electric current may be obtained using these occupation numbers.

Situation is more complicated if we want to overcome limitations of one-electron approximation using approaches like configuration interaction (CI) or perturbation theory (PT) methods. Our cluster embedding scheme is compatible with PT or CI methods because occupied and vacant cluster states are localized in the cluster region in the same manner. One-electron density may be constructed for these methods, too. But possibility to get continuity equation and expression for electric current in general form requires further study.

References

[1] Shidlovskaya E K 2002 Improved embedded molecular cluster model *Int J Quantum Chem* 89 349
[2] Shidlovskaya E K 2012 in *Nanodevices and Nanomaterials for Ecological Security, Series: NATO Science for Peace and Security Series B – Physics and Biophysics* ed Yu N Shunin and A E Kiv Springer Verlag: Heidelberg 191-202
[3] Shidlovskaya E K 2006 Problem of cluster embedding in crystalline lattice *Computer Modelling and New Technologies* 10(4) 17
[4] Kurth S, Stefanucci G, Almbladh C-O, Rubio A, Gross E K U 2005 Time-dependent quantum transport: A practical scheme using density functional theory *Phys Rev B* doi: 10.1103/PhysRevB.72.035308

An Approach of Define Open Organization's Productivity

Romans Dyakons, Vsevolods Karajevs, Dina Kelsina, Rostislav Kopitov

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: romāns.djakons@isma.lv, karajevs@inbox.eu, d.kelsina@gmail.lv, rostislavs.kopitovs@isma.lv

Abstract

An approach is proposed that makes it possible to calculate the limits of process knowledge based on well-defined standards without reference to tolerances. As a result, the spread of false knowledge is suppressed by preventing the organization from falling into an unnatural state, in which destructive forces, such as mismatch and complacency, experiencing external influences, progress dramatically.

Keywords: procedure, search, potential, path, transformation, problem, user.

1 Introduction

The study is devoted to developing unique professional qualities that ensure timely identification of a weak link in the organization and remove the negative consequences that pose a threat to the organization. The fact is that the absence of established norms for recognizing violations contradicts the reliability of confirming the loss of quality during the transition of the system to an unstable state.

2 Chain of Knowledge Processing

The study's challenge lies in the formulation: "It is impossible to carry out a steady movement, without bifurcation of progress between the two vices over the entire distance without confirming the reliability of the results of the proposed corrective measures." This formulation makes it possible to describe the object of research, the construction of which is carried out based on measures to correct the control system. Such actions allow eliminating the source of destruction by controlling the crisis from the beginning and along the entire length of the path before and after clarifying the organization's boundaries being in an unstable state.

3 Beyond System

The study's objective is to develop a full-scale procedure for assessing the organization's position in the system of given coordinates. For achieving the goal, it will be necessary to conduct an ongoing analysis that will allow the process to fix violations and prevent the spread of negative knowledge about them. After that, it is essential to choose an option to improve the organization by corrective measures to get out of an unstable state. The chosen way will allow implementing the medium-term scenario for the development of the organization by utilizing cost management under the conditions of objectively specified standards. In the course of execution and completion, there is a development of a method of control of technique of the management in the conditions of the crisis on all life cycle of the organization.

4 Conclusions

Practical results of consideration in searching for opportunities for hasty implementation make it possible to accompany the control system in a working state and, if necessary, bring the organization out of an unstable state, returning it to a given state route. These sensors allow you to identify diagnoses in discussing the goals of the newly updated conference.

The novelty of research leads to systems for setting objectively specified standards, including concepts. Within the framework of this system, the reasons for the increased interest of participants in an objective assessment of the assessment of public opinion, the evaluation of value propositions for getting out of an unstable state, and collecting funds to identify not getting into crises are revealed.

Diarylfluorene compounds containing different substituents: problems of DFT simulation

Alytis Gruodis[1]*, Renata Karpicz[2]

[1] Institute of Chemical Physics, Faculty of Physics, Vilnius university, *Saulėtekio Ave. 3, LT-10257,* Lithuania

[2] *Center for Physical Sciences and Technology, Saulėtekio Ave. 3, LT-10257, Vilnius, Lithuania*

**Corresponding author's e-mail: alytis.gruodis@ff.vu.lt*

Abstract

Three diarylfluorene derivatives with phenyl, biphenyl, and naphthyl fragments (which can form amorphous layers with glass transition temperatures of 31–74 °C) were analysed by means of quantum chemistry methods. Simulations of diarylfluorene compounds in the framework of the molecular charge redistribution processes allows concluding that a partially broken π-conjugated system of the core is related to the rotation motion of substituents which effectively modified the π-conjugated properties of fluorene core.

Keywords: diarylfluorene; OLED; spectroscopic properties; quantum chemistry simulations.

1 Introduction

Electroactive photostable molecular compounds with high quantum yield play an important role in manufacturing of different devices: contemporary solid-state lighting as well as digital displays. Organic light-emitting diodes (OLEDs) represent a technical solution where the film of organic compound emits the light stream, where stream parameters depend on the current between electrodes [1]. The development of such devices requires extremally stable core molecular material with well-defined π-conjugated properties. Fluorene derivatives (core) belong to class of stable dyes, where additional substituents to core could be useful for managing the donor/acceptor properties [2,3].

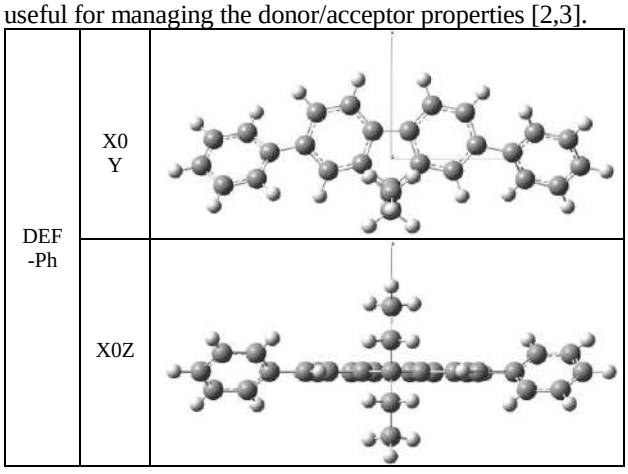


Figure 1 Projections of **DEF-Ph** conformer with optimized geometry. Simulations using B3LYP/6-31G(d) method with solvent impact (chloroform) in the framework of PCM.

This work is devoted to systematic analysis of the influence of core substituents on optical and electro-luminescent properties related to the molecular charge redistribution processes.

2 Object of quantum chemistry simulation

Three most promised fluorene derivatives – 2,7-diaryl-9,9-diethylfluorenes (**DEF-Ar**), where **Ar** represents phenyl (**Ph**), biphenyl (**BPh**), and naphthyl (**Naph**), substituents, were investigated by means of quantum chemistry simulations. Molecular geometry optimization of **DEF-Ph**, **DEF-BPh** and **DEF-Naph** molecular structures was provided using *Gaussian16* package [4] by means of exchange-correlation functional B3LYP and 6-31G(d) basis set including polarization functions. The *Polarizable Continuum Model* (PCM) was used for evaluation of the solvent environment (in that case chloroform). Electronic excitation energies, oscillator strengths and corresponding HOMO-LUMO electronic charge distributions were obtained by means of semiempirical TD-DFT method for singlet transitions only. Fig 1 represents two projections of **DEF-Ph** conformer with optimized geometry. First problem of simulation is related with the big number of possible conformers due to rotational moieties of substituents (four conformers of **DEF-Ph** and **DEF-BPh** and sixteen of **DEF-Naph**), where changes of fragment-to-core dihedral angle p1, p2 takes place. Fig 2 represents the three-dimensional distribution of total energy *E* of **DEF-Naph** on two reaction coordinates: p1 and p2.

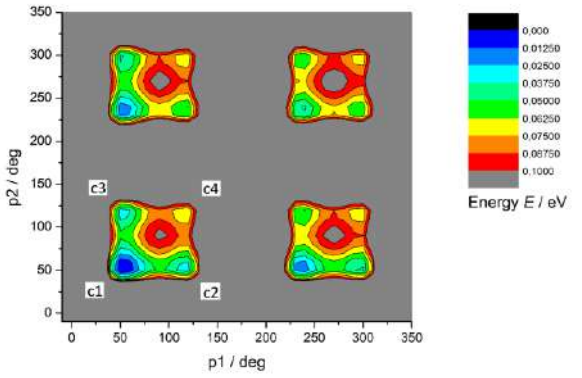


Figure 2 Distribution of total energy E of **DEF-Naph** on two reaction coordinates: p1 (dihedral angle of the left naphthyl fragment on core) and p2 (dihedral angle of the right naphthyl fragment on core). Energy (in colours) is presented in interval [0.0; 0.1] eV to cover the value of 3kT (for room temperature T= 300 K, kT=0.03 eV)

Second problem is related to the molecular charge redistribution in core-substituent system, when substituents could play the role of significant key. Parameters of simulated electronic excitations of **DEF-Ar** compounds are presented in Table 1. Fig 3 represents molecular charge distributions at HOMO and LUMO for pure Franck-Condon transition.

Discussion

All "spectroscopic" transitions $S_0 \rightarrow S_1$ (which are allowed in all three structures, oscillator strength >1, see Table 1) are of HOMO→LUMO type and dominate in all cases.

	DEF-Ph	**DEF-BPh**	**DEF-Naph**
Transition energy, $S_0 \rightarrow S_1$, eV (nm)	3.71 (334)	3.44 (361)	3.56 (346)
Oscillator strength for $S_0 \rightarrow S_1$	1.45	2.20	1.10
Potential barrier at ground state S_0, eV	0.12	0.12	0.05
Potential barrier at excited state S_1, eV	0.43	0.46	0.31
Dihedral angle φ_M at the ground state energy minimum, deg	40	40	50
Dihedral angle ψ_M at the lowest excited state energy minimum, deg	20	20	40

Table 1. Parameters of simulated electronic excitations of **DEF-Ar**

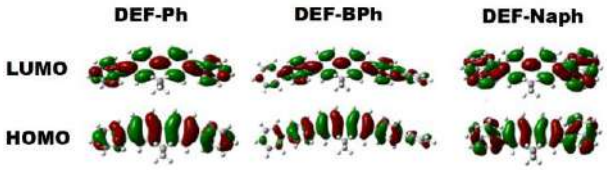


Figure 3 Molecular charge distributions at HOMO and LUMO in X0Y projection for pure Franck-Condon transition at minimum of ground state energy distribution: φ_M =~40 deg for **DEF-Ph** and **DEF-BPh** and φ_M =~50 deg for **DEF-Naph**. Simulations using semiempirical TD (singlets) method with solvent impact (chloroform) in the framework of PCM.

Bathochromic shift for **DEF-BPh**, **DEF-Naph** (in comparison with **DEF-Ph**) might be explained by the presence of two rings in different orientations (increasing of π-conjugated system in core-substituents system). Transition $S_0 \rightarrow S_1$ could be estimated as partially or fully allowed, and most probable conformations occur, when dihedral fragment-to-core angle φ is presented in interval 40-50 deg. High energetic barrier (>5 eV) at ground state for **DEF-Naph** could be explained by steric effects [5].

Conclusion

According to DFT simulations, partially broken the π-conjugated system of the core is related to the rotation motion of substituents. Fixing of molecule in the space (by placing into matrix or in amorphous film) allows avoiding the termination of chaotic fragment orientation. Planarity of whole molecular system allows the effective charge redistribution by excitation, unfortunately, rotation of fragments complicates this process. According to that, 1-naphthyl- substituent (for **DEF-Naph**) could be titled as the most effective substituent for modification of π-conjugated properties of core [6].

Acknowledgements

Computations were performed on resources at the High-Performance Computing Center "HPC Saulėtekis" in Vilnius University Faculty of Physics.

References

[1] Grigalevicius S, Ma L, Xie Z and Scherf U 2006 J. Polym. Sci., Part A: Polym. Chem. 44 5987- 5994.
[2] Krotkus S, Kazlauskas K, Miasojedovas A, Gruodis A, Tomkeviciene A, Grazulevicius J V, Jursenas S 2012 J. Phys. Chem. C 116 7561-7572.
[3] Baronas P, Kazlauskas K, Gruodis A, Jankauskas V, Tomkeviciene A, Simokaitiene J, Grazulevicius J V and S. Jursenas S 2016 Journal of Luminescence 169 256-265.
[4] Frisch M J, Trucks G W, et al 2019 Gaussian 16, Revision C.01, Gaussian, Inc.
[5] Shunin Y, Bellucci S, Gruodis A, Lobanova-Shunina T 2018 Classification and Operating Principles of Nanodevices. Ch.6, in: Nonregular Nanosystems. Theory and Applications. - Springer, 147-206.
[6] Krucaite G, Beresneviciute R, Tavgeniene D, Grigalevicius S, Zhang B, Gruodis A, Chernyakova K, Karpicz R 2021 Optical Materials 119 111345.

Modern indicators of the efficiency of the agricultural enterprise

Vasyl Grydnyov

ISMA University of Applied Science, Latvia

Corresponding author's e-mail: gridnyov@ukr.net

Abstract

In the abstracts, an analysis of modern indicators of the effectiveness of the agricultural enterprise was carried out. Theoretical approaches to modern indicators of the effectiveness of the agricultural enterprise are considered. The methodologies for increasing the efficiency of the enterprise are analyzed. problems of determining the efficiency of the agricultural enterprise.

Keywords: agricultural enterprise, productivity, profitability level, efficiency index

1 Introduction

This paper discusses the advantages, disadvantages and conclusions on the following issues:

- Theoretical approaches to modern indicators of the effectiveness of the agricultural enterprise.
- Analysis of methodologies for improving the efficiency of the enterprise.
- Systematization of the necessary indicators of the effectiveness of the agricultural enterprise

The object of this article is the Ukrainian agricultural market. The subject of the research is modern indicators of the efficiency of the agricultural enterprise.Objectives of the article:Study theoretical approaches to performance indicators of an agricultural enterprise.Identify the main problems to determine the effectiveness of the agricultural enterprise.

Overview

Analyzing theoretical approaches to the concept of the efficiency of an enterprise, one can come to the conclusion that there are no ideal methods and approaches to assessing the effectiveness of agricultural activities[1]. The development of methods for evaluating efficiency occurs in parallel with the evolution of forms of organization of production, changes in views on the content and value of its results[2].In the context of the need to ensure sustainable economic development of enterprises, taking into account the influence of external and internal effects, fundamentally new requirements are needed for methods for studying the effectiveness of activities[3].

Despite the availability of proven methods for researching an agricultural enterprise, in particular, in the scientific developments of Lebedev K.A., Pogrischuk B.V. and other scientists., have not yet found the final recognition of the systemic, integrated, dynamic and functional approaches, since, in the studies, a number of qualitative characteristics are left out of consideration, such as: overall efficiency and effectiveness at different stages and components, compliance of the means used with the set goals and etc[4].

The methodology for researching the organizational and economic mechanism of managing an agrarian enterprise in modern conditions should cover research methods based on a dialectical-hierarchical approach to a complex economic system that is characterized by movement, development and contradiction.

This approach will allow to take into account the impact of changes and development of the external and internal environment on the effectiveness of management, the totality of elements of the management system, the specifics and relationships, which will allow them to be synthesized and explore the activities of the agricultural enterprise as a whole[3].

In addition, when studying the management efficiency of an agricultural enterprise, one should take into account the hierarchical structure of the management mechanism, which implies the need to take into account differences in goals, objectives, interests, and, accordingly, the effectiveness of manage ment objects at different levels[2].

Decision

Without denying the objectivity, usefulness and information content of all the proposed methods for assessing the effectiveness of the management activities of an agricultural enterprise, we note the lack of an approach that allows us to assess the effectiveness of management as a whole, comprehensively and systematically. At the same time, it is extremely important to present an accurate and adequate definition of the management goal. Only such an approach will allow you to choose the right method / tool that will determine the degree of achievement of your goals [4].

The system of indicators proposed for assessing the effectiveness of the management of an agricultural enterprise at the meso- and macro levels is presented in Table 1.

Table 1. Indicators of the effectiveness of the management of an agricultural enterprise

Indicators	Content
Technological efficiency indicator	Characterizes the degree of compliance of the material and technical base of the enterprise with the current stage of scientific and technological progress
Functional efficiency indicator	It is characterized by the degree of satisfaction of the needs of the population and all elements of the structure of the enterprise to fulfill their functional purpose.

Economic efficiency indicator	It is determined by the effectiveness of costs at all stages of the movement of products; calculated as the ratio of the profit of individual business entities to the amount of own capital
Social performance indicator	It is characterized by the degree of satisfaction of the needs of hired personnel at the enterprise, consumers of products, the level of socio-economic development of rural areas.
Environmental performance indicator	Characterizes compliance with environmental standards, the state of the environment as a result of the implementation of environmental measures and environmental programs
Logistics performance indicator	Characterizes the capacity, cost and quality of the national transport network to meet the needs of the industry and export products.
Indicator of foreign economic efficiency	It is determined by the proximity of export and global suppliers, the balanced development of the industry, which determines import dependence on foreign manufacturers.

Conclusion

Given the diversified structure of an agricultural enterprise, the presence of both agricultural and processing, industrial and transport subcomplexes in its composition, it is advisable to use a differentiated approach to assessing the effectiveness of management activities of all structures, because each industry has its own characteristics associated with the specifics of the activity.

References

[1] Lebedev K.A. Organizational and economic mechanism for the development of the grain product subcomplex: theory, methodology, practice. Monograph. – M.: NIA, 2009 – 271s.

[2] Boyko V.I. Grain economy: problems and directions of development / V.I. Boyko. - M.: IAE, 1998. - 66s.

[3] . Andriychuk V.K. Economics of agricultural enterprises / V.K. Andreichuk - K .: KNEU, 2002. - 624 p.
;

[4] Kolesnik V.M. Methodological aspects of evaluating the effectiveness of marketing at industrial enterprises of the grain product subcomplex of the agro-industrial complex / V.M. Kolesnik//Economy: difficulties in theory and practice. - Dnepropetrovsk. 2006. pp.122-128 Issue 212 (volume 1).

Impact of the pandemic on the development of digital technologies in the charitable sector

Vadim Shiryayev*

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail:* vadbaltic@gmail.com

Abstract

The COVID-19 pandemic has fundamentally changed how people perceive the world. The current socio-epidemiological crisis has actualized the role of digital technologies in these changes. In conditions of isolation, the status of digital spaces has switched from convenient to necessary, because they have become not only the main way to access information and services, but also one of the few vectors of economic, educational and leisure activities, as well as social interaction. More clearly than any event before, the COVID-19 pandemic has shown the importance of civil communities. The flexibility and network structure of civil society engaged in the charitable sector, and the absence of bureaucratic barriers have brought non-profit organizations to a new level of development. Charitable foundations have banded together and self-organized to provide vulnerable populations with the health care they need. Going online has become a must for many of them, and it has been difficult to understand what activities can and cannot be done online, and how to bridge the gap between active users and those with less technological skills.

Keywords: charity, digital charity, non-profit organization

1 Introduction

There are still few scientific works aimed at studying the digitalization of activities and the impact of IT technologies on the activities of NPOs during the COVID-19 pandemic in the world scientific discourse. In general, one can note the understanding of the impact of technology on social structures, including volunteerism, as a two-way process. The ambivalent nature of digitalization during the pandemic is associated both with supporting functions in the activities of non-profit structures, and with an even greater increase in digital divides, especially among vulnerable segments of the population.

This category includes families in which children with special needs are brought up. Most of the work is aimed at analyzing the causes of digital divides among vulnerable segments of the population (Van Lancker, Parolin, 2020; Wang, Tang, 2020). For example, the pandemic has greatly reduced visits to families with children with disabilities by volunteers and social workers in order to minimize social contacts and the risk of infection, which has led to an increase in social isolationism and deprivation of these populations, who use digital technologies to a small extent.

At the same time, the difficulties of digital philanthropy associated with recruiting new members, the lengthy process of their involvement and retention are noted. Technological innovations and digitalization have accelerated and expanded the scope and scale of the response during the pandemic, redistributed responsibility between aid agents, which has allowed researchers to rethink the institutional mechanisms of the influence of volunteers on the charitable process.

They also noted the "touchless" nature of assistance for vulnerable groups and families with children with disabilities, and the possibility of scaling it from the local to the national level. First of all, we will single out activities related to the organization of online volunteer campaigns through social media and crowdsourcing platforms for the purchase of food products for different categories of the population, in particular those who are at risk for morbidity.

The practice of introducing digital technologies is fair for the philanthropy sector in the global space. Based on the Charity Digital Skills Report, 83% of charities have adapted their services, pivoting to remote service delivery, responding in an agile way and developing digital skills and capabilities as a result. But the flip side of this is that digitally excluded service users are now even more isolated and excluded, and this is a key concern for charities: over half (52%) are worried about excluding some people or groups, and 27% say they need more support around digital inclusion.

COVID-19 innovation is 83% of the charities had started offering online services. The key findings shown in Figure 1.

Figure 1 Key findings of pandemic restrictions

In addition, assistance and mutual assistance during the

COVID-19 pandemic is more often presented in various hybrid forms of associations — organized and spontaneous volunteer groups, self-organizing communities, business communities, government agencies that use crowdsourcing methods and mobile applications to provide assistance, track the spread of the virus and etc. It is in such forms of "collective hybridity" at the intersections of volunteering, new technologies, social innovations that scientists see new theoretical frameworks and analytical opportunities for studying civil society using the example of charitable activities.

Overview

Due to the lack of a comprehensive analytical model for analyzing the collective digital practices of charity in the context of pandemic restrictions, it seems necessary to develop it according to the method of grounded theory and taking into account important conditions, namely:

- it should explain the “online-offline” link that is characteristic of critical situations, which involves the emergence of practices in the digital environment and further implementation on the ground;
- it is required to critically consider possible communication/digital gaps when (re)broadcasting practices from online to offline space and vice versa;
- it is necessary to avoid technological determinism, since digital technologies act more like tools for volunteer practices that have certain meanings.

Decision

Although volunteer and charity organizations, like the rest of society, have plunged even deeper into a virtual environment, all digital formats of work used during the quarantine were used in one way or another by charity and earlier: for a decade they have been establishing coordination processes through social networks, recruit newcomers, notify and inform supporters, produce crowdsourcing, collect donations, make films and draw cartoons, lead educational work on websites, etc. The biggest changes affected educational programs that were previously conducted offline. To translate them into a remote format, volunteers actively used popular applications and technologies (for example, Skype, Zoom, various instant messengers and chats), quickly building up new knowledge and skills, as well as applying creative potential and links with the IT community.

Conclusion

In addition to the obvious benefits, the virtualization process has also opened up such problems as fatigue from remote formats, the inability to develop the practical skills necessary for working in the field, as well as the existence of a digital divide that closes the opportunities for the participation of volunteers who do not have digital literacy or equipment (laptop or desktop computer and etc.). The pandemic has "tested" the community of the charitable sector for the ability to provide assistance in the new conditions. Flexibility, quick adaptation and learning, network structure, availability of local knowledge again played into the hands of non-profit associations. It is obvious that the introduction of digital practices significantly expands the possibilities of remote consultations and rehabilitation activities in a pandemic.

References

[1] The Digital Dkill Report https://report.skillsplatform.org/charity-digital-report-2021/
[2] Doyle R., Conboy K. (2020) The Role of IS in the COVID-19 Pandemic: A Liquid-Modern
[3] Lachance E.L. (2020) COVID-19 and Its Impact on Volunteering: Moving Towards Virtual Volunteering. Leisure Sciences.
[4] Wang Zh., Tang K. (2020) Combating COVID-19: Health Equity Matters. Nature Medicine.
[5] Van Lancker, W., Parolin, Z. (2020) COVID-19, School Closures, and Child Poverty: A Social Crisis in the Making. The Lancet Public Health. Vol. 5.

Social Media Marketing: Advantages and Disadvantages of Online Store Promotion Strategies

Antipina N.*, Djakona V., Kuznetsova N.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: nantipina1319@gmail.com*

Abstract

Today, active business development can be carried out by promoting a brand, product or service through social networks. Social networks are powerful marketing platforms that allow you to convey the company's advertising messages to the target audience without intermediaries and in the shortest possible time. One of the key elements of an enterprise's marketing plan is to draw up a strategy for the Internet promotion of goods and services, which should display the goals of an advertising campaign, basic marketing communications approaches, as well as tools for promoting a product on the market. Due to the relevance of the chosen topic, the author highlights effective strategies for promoting online stores on Internet sites, their advantages and disadvantages.

Keywords: promotion, online-store, strategy, contextual advertising, SEO, SMM, influencer marketing.

1 Introduction

In today's world, e-commerce is the main part of all trade, which corresponds to all the requirements of a rapidly growing market. A new format of developing of your business is presented by the creation of an online store. According to present statistics, four out of ten purchases are made online - and this number grows every year. According to experts, the annual increase in 2021 was 23%. It has been proven that online trading opens up new channels for selling their goods not only to small businesses, but also to large companies which are already being long time lasting top leaders in the market for goods and services.

Recently, there are more and more online stores appears and offer a variety of goods and services. Accordingly, along with the popularity of online shopping, the requirements for the quality of service, page usability, visual content, methods of product promotion, etc. are growing. This type of activity forces the use of innovative promotion strategies in order to attract more customers, turning them into active consumers. Marketing strategies for promoting online stores are dynamic. They are actively evolving over time as new trends and opportunities emerge. That is why it is important to constantly optimize it accordingly to resent trends. A correctly chosen strategy largely determines the success and speed of promoting an online store. It is also worth considering that often, in order to achieve your goals, you have to use several types of tools.

Based on the relevance, we will consider effective marketing strategies for promoting of an online store to achieve such goals as: increase of sales; increasing of market share; launching of new products; increasing the amount of the average order check; increasing the number of visitors to the online store; increasing the percentage of conversion [1].

The most effective tool that allows you to start selling on the site immediately after it's release is the launch of contextual advertising. *Contextual advertising* (PPC - pay per click) is a type of paid advertising on the Internet, in which text advertisements or banners are displayed in search engines, on advertising sites tied to certain words [2]. This type of advertising is very popular among other promotion strategies, since it appeals only to those users who have really shown interest in a particular product or service.

The main advantages of using contextual advertising:

- quick setup and launch of advertising;
- the possibility of adjusting and changing the advertising campaign;
- work with a heated audience that knows what it wants;
- availability of detailed statistics of results.

Among the disadvantages of using PPC, there are fixed promotion costs and low efficiency in highly specialized niches where the cost per click is too high. To maximize the effectiveness of this tool, you need to control the budget, be sure to predict and analyze the results, and apply conversion tools.

The next powerful tool for organic website promotion on the Internet is search engine optimization. *SEO (Search Engine Optimization)* is a set of methods that allow you to increase the importance of the site in the eyes of search engines to increase search traffic.

The main benefits of SEO include:

- efficiency - half of Internet users prefer to go to sites than to contextual advertising;
- budgetary – in the long run, the cost of attracting clients is lower than the price of a client in the PPC;
- prospective – SEO allows you to overtake competitors in terms of issuing a search query, using contextual ads as the main tool for promoting and attracting traffic.

Among the shortcomings of search engine optimization, there are long promotion periods, as well as the possibility of changing search algorithms. It will take several months of hard work and financial injections to achieve positions in the TOP. However, using an SEO strategy in the long run is much more effective than PPC.

One of the fastest growing areas and strategies of e-commerce is social media marketing. *Social media marketing (SMM)* is a special Internet marketing tool that involves promoting of a product or service through the use of social networks, the content of which is created and updated through the efforts of visitors [3]. The sphere of SMM promotion is in demand and fast-paced. This is due to

the constant technical development of social media platforms. Any trends are short-term, and therefore one of the important competencies of a specialist in this field is the ability to follow current trends as quickly as it possible and qualitatively implement the most appropriate of them into the company's marketing strategy [4].

The following advantages of SMM:

- the possibility of promoting of an advertising campaign to a large audience of existing or potential customers who spend a lot of time on social networks;
- quick results – thanks to the total volume of traffic in social networks, you can get the first orders almost immediately after the launch of the advertising campaign;
- variety and possibility of segmentation, depending on the characteristics of the provided goods;
- ease of management - the interface of social network advertising cabinets allows you to set up the tools you use or change your strategy as quickly as you want.

Among the disadvantages - marketing in social networks requires constant replenishment of the advertising campaign budget and a decrease in audience activity after it stops. There are also difficulties in accurately analyzing the actions of subscribers and high competition for attention. Separately, it must be said that SMM is not suitable for advertising certain categories of goods: pharmaceuticals, gambling, politics, etc.

Promotion of an online store in social networks will increase the presence of the company on the network and increase the reach of the target audience. You can use the SMM strategy immediately after the release of the project to get quick sales, as well as together with SEO with a well-developed site structure. To get a good result from the application of a promotion strategy in social networks, it is necessary to plan work qualitatively based on a systematic approach, create interesting and unique content, constantly devote time to the project, and control budget expenses in order to timely adjust the online store promotion strategy if necessary.

Influencer marketing is a way for brands to promote their products through the endorsement or recommendation of influencers and content creators online. In many cases, the use of influencers is part of a brand awareness campaign and can also lead to high conversions and sales. Influencer marketing is now an incredibly popular marketing tool that will develop in the coming years [5]. According to the Digital Marketing Institute, 49% of shoppers rely on recommendations from influencers [1]. Moreover, advertising from influencers looks like friendly advice to their subscribers. And as we know, individual users like to imitate their idol: wear the same things, use the same cosmetics, use the same services.

The benefits of influencer marketing:

- attracting a new audience for less money - someone has a fixed price for advertising, someone agrees to work on barter, someone can be paid with advertised products;
- creating unique content - influencers know exactly how to win the favor of their audience, because they are professionals in creating effective content;
- the ability to independently choose an influencer focused on a specific target audience;
- nativeness of advertising - with a creative approach, advertising does not cause rejection and negative reactions, like regular advertising in the feed.

There are many advantages, but there are also some disadvantages, among which are: the difficulty in finding the right blogger, whose audience is interested in buying a product, as well as the unpredictability of the result. Influence marketing works effectively because it relies on both social and content marketing tools, where trust and authentic authority are already established in the minds of the audience.

2 Conclusion

In today's world, which can no longer be imagined without the Internet, it is not smart not to use online promotion of your business. Indeed, with the help of social networks, companies can solve a number of communication tasks, for example: informing the target audience as quickly as possible, creating a positive image, increasing of customer involvement, promoting goods/services, receiving feedback, and most importantly, increasing the company's income. Having considered the main strategies for promoting a business on the Internet, we can say that when choosing the optimal strategy for promoting a company, preference should be given to the symbiosis of available marketing tools at each stage of the development of an online store. Only by using traditional and innovative promotion strategies in combination, you can achieve the most effective advertising campaign.

References

[1] Andrew Chornyy. (2021). Online Store Promotion. URL: https://www.plerdy.com/ru/blog/ecommerce-marketing-strategy/

[2] Dubtsova, A. E., Petrova, O. A. (2010). Contextual advertising. Actual Problems of Aviation and Cosmonautics. URL: https://cyberleninka.ru/article/n/kontekstnaya-reklama/viewer

[3] Gurtskaya, B. T., & Merenkova, P. A. (2020). Promoting products using SMM. E-Scio. URL: https://cyberleninka.ru/article/n/prodvizhenie-produktov-s-pomoschyu-smm/viewer

[4] Nikitina, O. O. (2020). SMM Promotion Trends and Their Impact on Business Decisions. URL: https://cyberleninka.ru/article/n/trendy-smm-prodvizheniya-i-ih-vliyanie-na-resheniya-biznesa/viewer

[5] Werner Geyser. What is Influencer Marketing? – The Ultimate Guide for 2022. URL: https://influencermarketinghub.com/influencer-marketing/

A approach to measuring university branch efficiency

Djakons Romans

*ISMA University of Applied Sciences**, Latvia***

Corresponding author's e-mail: romāns.djakons@isma.lv

Abstract:

The relevance of this research is that knowledge of weaknesses in the branch of organization allows you to find ways to increase its potential. Such knowledge, accumulated during continuous monitoring of the organization's potential, increases its effectiveness. As a result, the implementation of corrective actions contributes to the establishment of new performance standards.

***Keywords**:* over-estimate, tranquillity, performance wane, negative occurrence, variables, effectiveness

1 Introduction

Considering that the totality of the established needs of educational programs contradicts their consumable needs, the problem of the study was expressed in the following wording: "It is impossible to effectively measure the change in the potential of an educational organization with a loss of trust on the part of all its participants".

2 Change of paradigm

The management of the branch of the university should have mechanisms for responding to negative reviews of both students and graduates of the university. The object of the research is substantiating the compatibility of the needs of the region to the educational services offered by the branch of the university.

3 Evolution of the system

Aim of the research is developing a procedure that allows timely recognition of the loss of the reputation of a branch at any level of its functioning. In accordance with the aim, the following tasks were formulated:

1. Conducting an ongoing analysis of the limitations that cause the branch management tranquility
2. The choice of the option to strengthen the position of the university in the conditions of weakening the disposition of it.
3. Implementation of a medium-term scenario for the timely detection of large-scale circumstances
4. Development of a report on neutralizing negative trends in long term perspective.

As practical results, it should be noted that the implementation of measures aimed at timely generalization of the identified circumstances improves the value based system.

4 Conclusion and future work

The novelty of the research is in measuring the ongoing transformations of the organization as part of the value pentagram, carried out on the basis of reasonably specified norms, ensures the development branch of the university in new conditions

Development of ethnic tourism in Greece

Veronika Ivanova*, Julija Mironova

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: ivanika@inbox.lv*

Abstract

Ethnic tourism entails full immersion into culture of a certain country or nation. Personal contact with locals, participation in their traditional activities, tasting of national cuisine and studying the centuries-old traditions – these are the main steps to experience cultural diversity and feel like a member of another ethnic group. For Greece, one of the most popular summer holiday destinations, tourism is a key industry in terms of economic growth. Ethnic tourism, however, is not considered to be very popular due to the fact the dominant trend of all Mediterranean countries has always been the seaside tourism. This work is an attempt to explain why it is crucial for Greece to develop and promote ethnic tourism.

Keywords: ethnic tourism, Greece, COVID-19

1 Introduction

Nowadays, when the tourism market is extremely saturated, it is crucial for every destination's development to design a specific action plan and development directions. Development of ethnic tourism is one of the ways how to promote destination. In 1977, Smith was the first one who came with the term ethnic tourism as 'marketed to the public in terms of the 'quaint' customs of indigenous and often exotic peoples'' (Yang, 2011) [9]. Ethno-tourism is a specialized type of the tourism, what can be defined as "any excursion which focuses on the works of humans rather than nature, and attempts to give the tourist an understanding of the lifestyles of local people" (Bolnick, 2003) [2]. It is a combination of different touristic activities in terms of understanding ethnic and cultural spheres. Different sub-types of the ethno-tourism can be distinguished - ethno-educational tourism, religious tourism, anthropological tourism, etc. (Aleksandrowa, Aigina, 2014) [1].

When we speak about worldwide tourism and hospitality industry of the 21st century we cannot ignore the COVID-19 pandemic. Businesses in many industries were negatively affected by it: severe profit losses, forced retrenchments and functional termination, – tourism and hospitality industry, unfortunately, has suffered the most.

Figure 1 [4] clearly illustrates a sharp decrease in the total number of tourists coming to Greece in 2020.

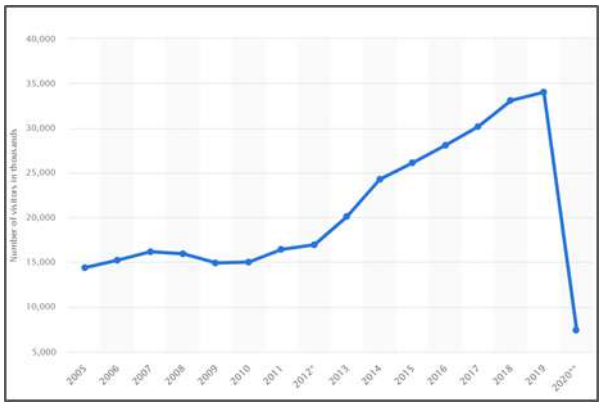


Figure 1 Number of international visitors in Greece from 2005 to 2020

Comparing to the previous year, when there were approximately 34 million foreign tourists, number of inbound trips in 2020 has decreased by 5 times (≈ 80%). Surely, tourism and hospitality industry of Greece suffered great losses. Although the current situation is gradually stabilizing, Greek market still needs recovery.

Despite the fact that the COVID-19 pandemic has had a significant negative impact on the global tourism industry, authors of the OECD paper called "Managing Tourism Development for Sustainable and Inclusive Recovery" nevertheless state that this time can be used to rethink the tourism and achieve more sustainable goals. Still, it is clear that pandemic hit the global tourism with restrictions, and quick recovery is unlikely (OECD, 2021) [5].

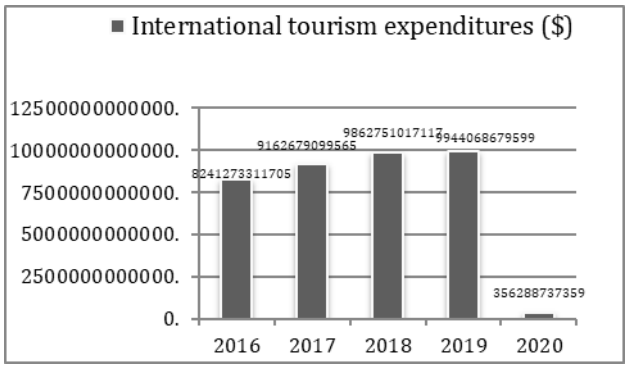


Figure 2 International tourism expenditure ($)

Statistical data of the World Bank, reflected in Figure 2 [7], shows that total international tourism expenditure in year 2020 decreased by 96,4% in compare with 2019 as pre-pandemic period. The World Tourism Organization, in its World Tourism Barometer report in December 2020, stated that loss of about billion arrivals in 2020 resulted in a loss of about 1.1$ trillion in international tourism receipts (UNWTO, 2020) [8].

Overview

This work discusses the following issues:

- Impact of COVID-19 on tourism and hospitality industry in Greece;
- Statistics on inbound tourism;
- Development of Greek ethnic tourism

Decision

In order to recover tourism and hospitality industry in Greece, new opportunities for tourists should be offered. Development of ethnic tourism can be a good investment of the Government of Greece for many reasons.

Firstly, such type of tourism will attract people interested in history, culture and life of Greeks.

Secondly, ethnic tourism is safe enough in terms of accommodation during post-pandemic time: tourists will be staying not at the crowded cities but in secluded rural area.

Thirdly, the Government of Greece will support local farmers, suppliers and other service providers that can receive visitors, provide them with accommodation, catering and entertainment related to local culture and ethnicity, and thus contribute to economic prosperity.

In addition, ethnic tourism is directly connected to sustainable tourism – concept that covers social-cultural, environmental and economic issues of the country.

Conclusion

Ethnic tourism is a type of tourism, the main purpose of which is to experience culture of the visited country. It includes various activities: from personal contact with local people to participation in century-old customs. Ethnic tourism is an advantageous solution for Greece. By creating a new, non-standard product in the market of the Mediterranean country, the Government will be able to attract tourists interested not only in beach vacation. In this way, historical heritage and cultural practices will be preserved.

Moreover, as it is unlikely to expect a quick recovery after the COVID-19 pandemic, country should develop new directions in order to support tourism and speed up the recovery process.

So, ethnic tourism is a great opportunity for Greece to develop tourism and hospitality industry.

References

[1] Aleksandrowa, A., Aigina, E. (2014) Ethno-Tourism Research in Lovozero, Murmansk Region, Russia.SHS Web Conferences, 12, 01036.

[2] Bolnick, S. (2003). Promoting the Culture Sector through Job Creation and Small Enterprise Development in SADC Countries: The Ethno-tourism Industry. Geneva, International Labour Office, ISBN 92-2-115284-7

[3] Cooperative research centre for tropical rainforest ecology and management. (1999). Understanding Ethnic Tourists - the Tjapukai experience

[4] Number of international visitors in Greece from 2005 to 2020. [10] Statista. https://www.statista.com/statistics/444847/total-number-of-inbound-visitors-in-greece/ (available 27.03.2022)

[5] OECD (2021). Managing tourism development for sustainable and inclusive recovery.

[6] OECD Tourism Papers, 01.

[7] The World Bank, International tourism expenditures. retrieved from: https://data.worldbank.org/indicator/ST.INT.XPND.CD?view=map

[8] UNWTO (2020). World Tourism Barometer, 18(7).

[9] Yang, L. (2011). ETHNIC TOURISM AND CULTURAL REPRESENTATION. Annals of Tourism Research, Vol. 38, No. 2, pp. 561–585.

A kubernetes ci/cd pipeline with integration of clair for the security purpose

Rajaguru Selvaraj[1]*, Viktors Gopejenko[1,2]

[1]ISMA University of Applied Sciences, Latvia, [2]Ventspils University of Applied Sciences, Latvia

**Corresponding author's e-mail: rajaguru@outlook.com*

Abstract

Everyone in the IT community is talking about the fully utilise microservices and Kubernetes, CI/CD must be used. Every day, multiple production deployments are planned. To deploy swiftly while trusting the results. CI/CD has the flaw of not being universally applicable. Applications big deep dive in CI/CD pipeline constructed entirely from open-source software will be tested locally. The process of developing software requires a lot of tasks, especially when it comes to large-scale applications. You need to have a vision for the project, write the code, build it for production, test it out, and deploy it, and a lot more. It doesn't matter how good your application is, if it's not secure attackers can easily use the vulnerable code to steal the data on it. This can kill your entire business and reputation. This is where Static Application Security Testing (SAST) tools come into play. They ensure the security of the application's source code before it is deployed to users. SAST is not only used to detect and catch security issues, it also has other benefits such as the ability to improve source code and identify problematic areas. In this thesis, SAST tools are paired with CI/CD pipelines, which give full secure automation abilities for developers and speed up the development process. Also Dynamic Application Security Testing (DAST) is used to examine applications for vulnerabilities in deployed environments. Its generates report, discovered vulnerabilities and displayed.

Keywords: Docker, Kubernetes, DAST, SAST, CI/CD

Introduction

The objective is to deploy to production numerous times each day. To deploy quickly while also having faith in the results. The issue with CI/CD is that no single approach works for everyone. There isn't a "right" way to do anything. Only suitable for us" is offered [1]. At the end of the day, CI/CD is all about determining and implementing the release culture that works best for your team. Each section of the text has an own heading. Both theoretical and real-world applications. It explains how to deploy to Kubernetes using the relevant components of technology. It will introduce the reader to the fundamentals of microservice architecture, containerization, and Kubernetes to help them get a better understanding of these topics. It examines Continuous integration and deployment in further detail. After a broad introduction, will look at Kubernetes and microservice architecture in more detail. Many CI/CD open-source projects are available (programmes, tools). For starters, we want to find and compare open-source CI/CD technologies for Kubernetes deployment. The goal is to see how effectively a CI/CD pipeline built purely from open-source software can perform on local servers.

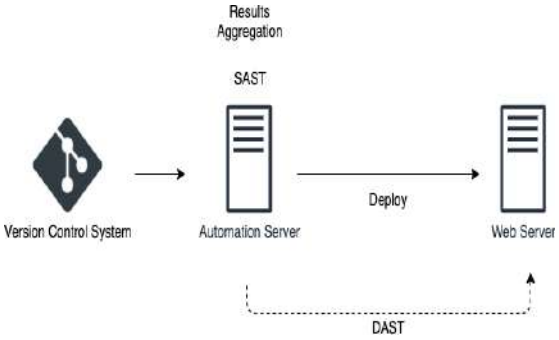


Figure 1 Automation testing

Taking into account the architectural requirements discussed in the previous section, we madethe following choices for the CI/CD environment setup:

Software Versioning Control System - we make use of Gitlab to hook on to our automa- tion system, such that a build is triggered each time a commit is pushed onto a Gitlab repository.

Automation Server - in this server, we host Gitlab CI/CD Runner for the automated build process, along with all the complementary tools for SAST and DAST checks.

Web Application Server - in this server, we host a web-application server that dependson the application at stake: two instances were configured, one running Apache Tomcat for Java web applications, and another running NodeJS for Javascript web applications.

Overview

This work discusses the implementation of a wide range of

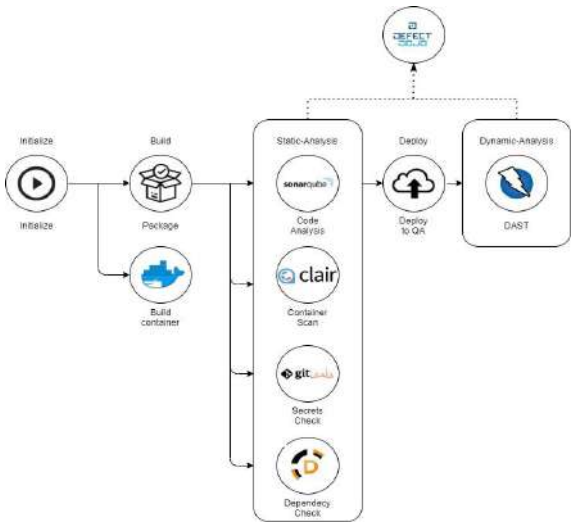
different security checks in a standard CI/CD pipeline.

1. In depth analysis of existing Kubernetes CI/CD pipeline will be carried out.
2. Its development and related security concerns will be discussed using previous research works.
3. Several security improvement techniques that exists and detailed benefits of using a third-party CVE Clair scanner system will be discussed.
4. A Kubernetes CI/CD pipeline with integrated third-party CVE scanner Clair is designed for the security purpose.
5. Integrating SAST and DAST tools with CI/CD pipelines for better security purpose.

Implementation

The overall goal of our work is to integrate a wide range of different security checks on aCI/CD. For this, we make use of the techniques and tools presentedin the state-of-the-art of this dissertation.

In total, we integrate a total of five security checks on top of a simple baseline pipeline. The implementation follows a



It have modular approach, with none of the security checks being reliant on each other, by dividing the pipeline definition in several separate job definitions. These modules are then imported at will to the baseline definition. Additionally, all the results from the different security checks are all aggregated in uniform manner.

The security checks comprise of 4 SAST checks (that do not require a live deployment of theapplication), and one DAST check (that requires live deployment).
The SAST checks are as follows:

- **Code Analysis** - to examine the code against a set of rules that check the data and controlflow of the source-code for security vulnerabilities.
- **Secrets Scan** - to perform regex scanning of the repository for hard-wired secrets such as passwords, API keys, etc.
- **Dependency Scan** - to compare the libraries imported in the project against a database of known vulnerabilities.
- **Container Scan** - to analyse the produced container image against a database of known vulnerable packages.

Conclusion

After concluding the dissertation project, several conclusions can be drawn from the accom- plished work. It can be concluded that it is possible to integrate a wide range of security checks of different types and with different goals in a single CI/CD pipeline.

Additionally, it's also possible to aggregate all the results from the different implemented checks in a uniform way, with the same scale of severity.

The same pipeline framework is modular and reusable in different projects, as well as compatible with different programming languages - as the leveraged tools support at least the most mainstream ones.

Finally, another drawn conclusion is that the DAST type of security checks are the ones that cause the most overhead to the performance of the pipeline. If in a given context the performance is a deciding factor, this stage should be ran in parallel as to not halt the conclusion of the delivery.

References

[1] arminc/clair-scanner - Kubernetes containers vulnerability scan. https://github.com/ arminc/clair-scanner. Accessed on 14-01-2020.
[2] kubernetesd Kubernetes Documentation. https://docs.kubernetes.com/engine/ reference/commandline/kubernetesd/. Accessed on 14-01-2020.
[3] E. Viitasuo. Adding security testing in DevOps software development with continuous integration and continuous delivery practices. 2020.

Beyond contribution value algorithms

Djakons Romans, Kopitov Rostislav

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: romāns.djakons@isma.lv, rostislavs.kopitovs@isma.lv

Abstract

The present study is devoted to a construction of a model of a purposeful system which associates two important parameters – competitive and investment appeal. Such system is developed on the basis of new management products aimed at assessing a current state of an enterprise and ensuring a continuous measurement of its performance. The measure of efficiency was defined as the current value of an association comprised of three potential members: the higher education institution, investors, and business representatives.

Keywords: diagnostics, sustainability, position, norms, performance, value, parameters, participants, growth

1 Introduction

The used methods of value-based diagnostics allow to estimate the innovation directions, which are suggested to be conducted at the institution. Assessment of the current value was carried out through the expansion of Reichheld's three-loyalty effect. Such effect suggests inclusion of three loyal participants. Its expansion required the identification of three values. Identification was carried out using the respective instruments. The value estimation was conducted in the long-term perspective. The denomination of the value was determined on the base of discounting cash flow in the frame of the functioning enterprise model. The rate of the discount was found as the rate revenue taking into consideration the existing ratio of the property assets to the lending assets. Some factors influenced its cost, for example: risk premium, systematic risk coefficient and county risk influenced the value denomination.

2 An Approach

The content of the study is set out in three parts.

In the first part, a study of flexible methodologies and maintenance of management products is conducted. During their systematization, reasons for an unavailability of a management system to timely influence challenges of an external environment were identified. In order to assess the current value of contribution of the higher education institution to the social capital of the region, a business plan was prepared in advance in a long-term perspective.

The second part develops procedures for measuring an effectiveness of an enterprise. It is based on new algorithms for developing a complex coefficient of short-term stability. Then, the following course of action consisted of the working enterprise model, CAPM model, WACC model SGR direct capitalisation model and the Gordon growth model, value pentagram. As a result, adduction of future values as of the beginning of 2019 was carried out.

In the third part, approbation of the developed procedure was carried out based on the example of a development of the higher education institutions to three directions: hotel business, tourism, other business. In the course of the study, a system of effectiveness norms was developed, on the basis of which some zones for functioning of the enterprises were formed in the context of sustainability. Dynamics of investments into education was determined over a ten-year period as well. Funds of withholdings from investments were assessed. The final stage was the assessment of the contribution of loyal participants to the image of the region. This involved the development of a number of business plan options for hotel business, drawn up in a ten-year perspective in accordance with the UNIDO standard. These were used as a basis for determination of the value potential of hotel business and assessment of the value of intangible assets of hotel business.

3 Conclusions

The practical value and novelty of this study consists in the fundamental approach to identification of the reasons leading to the loss of performance of an operating enterprise, taking into account the application of new projects to its activities. Such reasons are revealed on the basis of the conversion of the values of dimensionless coordinates into a cost equivalent. Thus, using the prospective control technology, it was determined that by 2027, alumni of the higher education institution employed in business would contribute more than 27 thousands Euros to the social capital of the region.

A procedure for accuracy increasing of a solar power plant short-term generation forecast

Natalya Lisitskaya[1], Semen Frid[1], Sofya Kiseleva[1,2*]

[1]*Joint Institute for High Temperatures of the Russian Academy of Sciences, Russia*

[2]*Lomonosov Moscow State University, Russia*

**Corresponding author's e-mail: k_sophia_v@mail.ru*

Abstract

A method has been developed for refining a short-term forecast of solar power plant performance using machine learning, which allows reducing financial losses of inaccurate forecast in most cases to 2-7% of the generated electricity cost and is approximately an order of magnitude more accurate than the dynamic simulation of solar power plant operation based on numerical weather prediction data.

Keywords: solar power plants, short-term forecast, financial losses, forecast errors

Introduction

The growing fraction of renewable generation in power network makes it difficult to maintain a balance of power and energy in them. Due to the non-guaranteed electric power output at exactly the specified time by solar power plants (SPP), it becomes relevant to develop methods for short-term forecasting of the performance of these plants [1]. Particular attention is paid to the forecast for the generation of solar power plants for the day ahead with an hourly resolution, which is due to the current procedure for electricity trading in the wholesale market in many countries of the world, including Russia. The rules of the Russian wholesale electricity and capacity market establish permissible deviations of actual production from hourly volumes in the price application for the day ahead market (DAM) for SPPs in the amount of 10% of the installed capacity of generating equipment. The financial losses of the generating organization consist of lost profits (results from the fact that excess energy is paid at the rate of 1 rouble/MWh) and losses from negative imbalance (they can be interpreted as the need to purchase on the balancing market the missing energy for wholesale market supply).

A significant reduction in financial losses was achieved by solar power plants modeling using numerical weather prediction (forecasting the level of insolation and temperature in the surface air layer) with a combination of machine learning methods.

Materials, methods and results

Of the many existing forecasting error metrics [1], the root mean square error (RMSE) normalized to the installed capacity of generating equipment was used. In addition to it, financial losses from forecast errors were also used directly. Preliminary estimates showed that a halving of the RMSE forecast leads to a 5-9-fold decrease in losses.

The calculation was carried out throughout Russia (3241 grid points 1°×1° in latitude and longitude) excluding the territories served by the Far East power network and technologically isolated power networks for the period from January 2020 to July 2021.

The calculated output of the photovoltaic panel (PVP) operating at the maximum power point was used as the actual SPP output. PVPs of the most widespread types in Russia (STP380S-B60/Wnh [2] and HVL-320/HJT [3]), oriented to the south and installed at an angle of inclination to the horizon less than the latitude by 12°, were considered. The generation calculation was carried out by dynamic simulation with the TRNSYS system [4] using a single-diode five-parameter PVP model. The calculations use actinometric data of NASA Clouds and the Earth's Radiant Energy System (CERES) [5] (according to [6] CERES satellite observations are the most accurate available for the territory of Russia) and averaged over the CERES spatial grid (1°×1° in latitude and longitude) ERA5 data [7] for ambient air temperature and wind speed.

An analysis of generation forecasting methods showed that for a forecast horizon of more than 6 hours, the forecast is almost always based on a numerical weather prediction (NWP). The generation forecast was calculated using the data of the NWP ICON model [8] averaged over the CERES grid, from which, according to daily forecasts for the next day, continuous time series of hourly data were built. To form the SPP forecast order for the DAM, submitted before 13:30 Moscow time, taking into account the delay in uploading the ICON data to the server, the results of this NWP, performed at 06:00 UTC, were used.

Before TRNSYS simulations the hourly sums of solar radiation from CERES and ICON were upper bounded by the values for a clear day.

The RMSE of the predicted output from the calculated one was 72-85 Wh (19-22%) for the STP380S-B60/Wnh PVP, and 60-75 Wh (19-23%) for the HVL-320/HJT PVP. A pronounced influence of the solar power plant location on the accuracy of the generation forecast was not found.

The purpose of updating the short-term forecast was to reduce the financial losses of the generating company. Since the Russian wholesale electricity and capacity market operates only in price zones, only the territories included in the first (747 1°×1° points) and second (550 points) price zones were considered. The indicators of the balancing market, averaged for the price zones, together with the day-ahead market prices, were taken from the website of system operator. A direct forecast method was implemented in which the predictive power calculated from the NWP data was used along with other characteristics for machine learning. In order to save time and resources, 4 classic machine learning models [9] were used separately for each point: linear and polynomial regressions, random forest and boosting [10].

An annual period was chosen for training the models, which avoids data imbalance. The remaining data from the sample (from January 18 to July 31, 2021) were used for cross-validation of models according to the following scheme: forecasting for 72 hours, calculation of metrics for the second half of the forecasting horizon, shift by 24 hours, which were added to the training set. The procedure was repeated 193 times. The model was evaluated for the entire period of cross-validation. Financial losses were summed up, the RMSE was calculated. The python libraries sklearn and xgboost were used.

More accurate regression results are observed for random forest (Random Forest Regressor of the sklearn library) and boosting on 35 features, although both methods require more time to calculate than linear or polynomial regression.

Analysis of the results of refinement of the production forecast by modeling using machine learning methods showed that the smallest financial losses in most cases are obtained by random forest method (64%), linear (26%) and polynomial (9%) regression, boosting – in 1%. For fast modeling and preliminary evaluation of the result, linear regression shows good results both in terms of speed and quality. For practical use, preference can be given to a random forest with saving the trained model and calling it to get a forecast, because these models have the ability to parallelize processes and do not require such costs as neural networks.

The developed short-term forecasting method allows to reduce financial losses in most cases to 5-15 rubles for the control 193 days per one PVP, which is about 2-7% of the cost of generated electricity and is approximately an order of magnitude lower than the loss estimate based on the results of dynamic simulation of the SPP operation according to ICON NWP forecast data.

An analysis of the influence of the location of solar power plants on the accuracy of the performance forecast showed that a large amount of financial losses from forecasting inaccuracy is typical for the polar part of the first price zone, which is unsuitable for the construction of SPPs, the smallest losses are observed in the southern part of the Krasnoyarsk Territory (Altai, Khakassia, Tyva) and in the northern part of the Irkutsk region.

Conclusion

The developed method for refining the short-term forecast makes it possible to reduce financial losses from inaccurate forecasting for most geographic points in the territory of the price zones of the Russian Federation to 2-7% of the cost of generated electricity, which is approximately an order of magnitude lower than the loss estimate based on the results of dynamic simulation of the SPP operation using ICON forecast data.

Acknowledgments

The study was supported by RFBR (project № 19-08-00877).

References

[1] Antonanzas J. et al. 2016 *Solar Energy* **136** 78-111
[2] Characteristics of STPXXXS-B60/Wnh. https://www.suntech-power.com/wp-content/uploads/download/product-specification/EN_Ultra_S_mini_STP385S_B60_Wnh.pdf (27.03.2022)
[3] HVL-320-335/HJT https://www.enfsolar.com/pv/panel-datasheet/crystalline/47300 (27.03.2022)
[4] Duffie, J. and Beckman, W. 2013 *Solar Engineering of Thermal Processes*, New York: Wiley
[5] Clouds and the Earth's Radiant Energy System https://ceres.larc.nasa.gov (27.03.2022)
[6] Yang D., Bright J.M. 2020 *Solar Energy* **210** 3-19
[7] Copernicus. ERA5 hourly data on single levels from 1979 to present https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview (27.03.2022)
[8] Dwd. Our Services. NWP forecast data. https://www.dwd.de/EN/ourservices/nwp_forecast_data/nwp_forecast_data.html (27.03.2022)
[9] Hyndman R J and Athanasopoulos G 2018 *Forecasting: Principles and Practice* Melbourne: OTexts
[10] Brownlee J 2018 *XGBoost With Python* Machine Learning Mastery

Intellectual Capital Management at the Scientific Institutions

Inese Spica, Baiba Berzina, Ernests Spics, Rozite Katrina Spica

ISMA University of Applied Sciences & Scientific Institution Business Competence Centre, Latvia

**Corresponding author's e-mail:inese.spica@gmail.com*

Abstract

At the present time the creation of intellectual capital and its managing is actively developing field of science managemet. The creation of inntellectual capital and its management is relatively young field, there are no best practices and standards formulated main directions for intellectual capital development in Latvia. Currently there are many approaches and tools on the technological business environment used by different scientific institution for creation of intellectual capital management. This work is an attempt to find the best way of doing intellectual capital management on the technological business environment in Latvia.

Keywords: intellectual capital, management, scientific institution,, technological business environment, Latvia.

1 Introduction

Taking into consideration the present techological business environment situation in Latvia it is important to make use of these conditions for further improvement and development of the intellectual capital and its management.

The object of the present research paper is intellectual capital. The subject of the research paper is the management of intellectual capital. The objective of the paper is to study the integration process of technological business environment and intellectual capital management problems, to elucidate the factors influencing the intellectual capital management effectiveness, to develop proposals for solving problems and for intellectual capital management mechanism by maiking use of relationship between these factors in investigation of intellectual capital management in Latvia.

Overview

The tasks advanced in order to reach the objective:

- Identify the concept of intellectual capital management;
- To carry out analysis of the factors influencing intellectual capital management in the process of the technological business environment integration;
- To carry out analysis of indicators characterising intellectual capital management effectiveness on the technological business environment.

Theoretical study methods are reported analysis of intellectual capital management, technological business environment management, study of correlation between intellectual capital management factors and the technological business environment. Empirical pilot methods are observation for the purpose of studying mutual influence between intellectual capital management factors and the technological business environment, study of documents regulating intellectual capital management at the different scientific institutions in Latvia, analysis of the technological business environment management in Latvia, economic and statistical analysis of the intellectual capital management results on the technological business environment, economic experiment, study of international evaluation of scientific institutions, public and non-government institutions data in Latvia.

Research basis are intellectual capital management, scientific institutions and its technological business environment in Latvia. The research period is from the year 2012 till the year 2022, separate themes have been studied for a shorter period of time or by way of comparison.

Conclusion

In Latvia the most significant problems of intellectual capital management are shortage of R&D personnel and expenditure, shortage of business competence of intellectual capital management at the different scientific institutions.

The solution of intellectual capital management problems is based on the study of technological business environment, intellectual capital creation and management, and ensuring effective solution of intellectual capital management problems in Latvia.

Goals and development of tourism in Saudi Arabia

Sarvinoz Tursunova, * Julija Mironova

ISMA Fergana Branch Latvia University of Applied Science, Fergana

**Corresponding author`s e-mail: sarvinoztursunova4@gmail.com*

Abstract

Saudi Arabia is an Arab country famous for its pilgrimage tourism and one of the richest countries in oil reserves. For several years, businessmen and pilgrims who came only as diplomats. Saudi Arabia has been a closed country for many years but now it is opening its doors to the development of many areas and equally important to tourism. Investment in tourism surprises many foreign countries and thus attracts them to the hotel business, restaurant and tour spheres because there are a lot of branches for the development and prospects of the world economy.

Keywords: Saudi Arabia, tourism, development, goals

1 Introduction

Saudi Arabia may become one of the leading tourist destinations in the future. Interest in this country is constantly growing, especially in the countries where Muslims live. Saudi Arabia is a valuable country in terms of its location for its rapid access to the African mainland, its growing young population and its high level of personal gain. It is expected that GDP per capita or purchasing power parity (PPP) of the state will reach 26,000 US dollars in the year 2014.

As is well known, tourism in the Kingdom is pilgrimage to Mecca and Medina, which is visited by Muslims from different parts of the world. Every year, 12 million Muslims perform Hajj and Umrah. And their number is growing by about 2030, pilgrims will increase by 17 million. [2] Undoubtedly, this will lead to a shortage of places to stay, but this issue is already being resolved now, a new hotel is being built near Mecca that will be larger than the Makkah Clock Royal Tower, A Fairmont Hotel. Transportation for Hajj and Umrah is currently available by high-speed trains, which connects the three destinations of Mecca, Medina and Jeddah. [4] For a complete understanding of what Saudi Arabia was like, you need to consider the statistics for the last time of its existence.

ITEM	2004	2005	2006	2007	2008	2009	2010	2011	2012	change % 12-11
Inbound Tourism										
Tourists – ('000)	8,579	8,037	8,620	11,531	14,757	16,896	16,850	17,498	14,276	-18.4
Nights - ('000)	111,810	91,359	112,383	152,372	209,309	157,010	180,805	388,805	279,132	-17.6
Receipts -(SRmn)	24,321	20,324	18,580	19,992	36,460	29,122	29,643	49,615	57,231	16.8
Domestic Tourism										
Tourists– ('000)	35,282	30,236	27,080	28,549	28,775	32,014	22,780	22,474	19,039	-15.3
Nights -('000)	216,870	196,737	183,527	186,403	199,037	198,477	116,962	109,751	95,590	-12.9
Expenditure -(SRmn)	36,320	31,968	32,262	31,770	37,590	33,398	31,324	35,548	32,644	-8.2
Internal Tourism (Inbound + Domestic)										
Tourists) – ('000)	43,861	38,273	35,701	40,080	43,532	42,910	33,630	39,972	33,315	-16.7
Nights- ('000)	328,680	288,096	295,910	340,775	408,346	355,487	297,867	448,556	374,722	-16.5
Receipts-(SRmn)	60,641	52,292	50,842	51,362	74,040	62,520	56,967	84,563	89,875	6.3
Outbound Tourism										
Tourists – ('000)	3,811	4,403	2,000	4,126	4,687	6,032	17,827	15,291	18,671	22.2
Nights - ('000)	52,644	56,143	25,544	45,576	42,155	54,657	218,473	200,093	121,347	-39.4
Expenditure (SRmn)	15,960	14,146	6,765	18,299	19,653	28,387	55,500	60,599	62,877	3.8
Tourism Balance										
Tourism Balance (SR mn)	8,361	6,178	11,815	1,293	16,797	725	-29,886	-11,584	-5,646	-

This is undoubtedly leading to economic expansion as the Kingdom of Saudi Arabia (KSA) has launched a plan to Saudi Vision 2030 with three main themes – «Vibrant Society», «Prosperous Economy» and «Ambitious Nation». Prospects for small business enthusiasm within the population, jobs and other opportunities. One of the goals is to attract 100 million tourists by 2030. And the main goal is to partially abolish the dependence of the economy on oil and the prosperity of tourism income, thereby attracting investment to the country.

The first sources for the development of the segment of the economy became realizable, which began in the 90s during the process of transition of the liberalization of certain spheres of society, the basis of which were: the social demand for democratic reforms, the partial change of the religious and political elite, the formation of a single economic space between the countries of the Arabian Peninsula on the basis of « Islamic Solidarity.[1]

The Kingdom of Saudi Arabia sees its advantages in a new chapter in the history of the tourism industry, Mohammad bin Sa Iman sees the kingdom as a holiday destination for foreign visitors by 2030. The tourism industry is becoming like WHITE OIL for the kingdom. He wants the kingdom to be a huge and growing demand for locals, domestic and foreign visitors. It is undergoing one of the biggest transformations in the tourism industry in the history of Saudi Arabia. The kingdom has had a huge investment of 172 billion Saudi Riyals in the tourism industry, which is the average global tourism capital investment. Investment has agreed to increase by 9.8% in 2017 and by 5% over the next ten years to 200 billion Saudi Riyals (US$54 billion). [3] Relaxing immigration rules and developing tourism infrastructure are just some of the many initiatives the kingdom is pushing to boost tourism. The Kingdom has promoted privatization in the country by substantially developing its current and future

attractiveness and greatly expanding its transport infrastructure.

Also promoting investment in the tourism sector with the help of the program, Kafala will provide land for privatization in the country and land lease extensions. The Kafala program guarantees that tourism projects will receive loans of up to 1.5 billion Saudi Riyals ($400 million), while the land lease extension initiative will provide businesses with an expected investment of more than 20 million Saudi Riyals ($5.33 million). United States) extension of the lease term of land to 50 years instead of the original 15 or 20. In the province of Medina, 50 Red Islands are being updated and expanded, there is another Okaz City. Qiddiya will have over 334 square kilometers outside of Riyadh to serve this newly founded area. John Pagano, chief executive of the Red Sea Development Company, said in an interview that the tourism industry has invested about 10 billion rials ($2.7 billion) in a mega project in the Red Sea, where there were many islands that are untouched and have an identity. Arabian desert and mountain landscapes. [5]

The government organization SCTA is expected to carry out tasks such as monitoring the development of the tourism sector and efforts to develop long-term investments. Of course, the tasks will not be limited only to the organization and structuring of the tourism sector, but also to more actively take over the national tourism administrations, that is, the development and marketing of tourism products. The comprehensive organizational structure of the tourism sector in each strategy included SCTA, provincial tourism development councils (PTC), provincial tourism organizations (PTO), tourism development committees in the respective provinces. [6]

Provincial Tourism Promotion Strategy the SCTA has developed a comprehensive plan for each province in Saudi Arabia over the next 20 years.

Overview

This work discusses the following issues:

- Development tourism of Saudi Arabia
- Goals in domestic tourism

Decision

In general, the picture of development and the goals of tourism in Saudi Arabia are very good in further development strategies, but it is important to consider that Saudi Arabia is a great owner of historical sights and, of course, a centuries-old place of pilgrimage and illumination. It is necessary to keep this fact, which is also a big goal for Saudi Arabia despite industrialization and tourism entry. It is also important to preserve the culture within the country because it is a kind of ethnically unique. Currently, one of the problems of the tourism industry in Saudi Arabia is the lack of qualified personnel with the necessary qualifications. In Saudi Arabia, the concept of tourism education has recently taken hold and the number of colleges and universities offering diplomas and degrees in Saudi Arabia is less than a handful. Thus, there is a lot of potential that educational units can realize to train future human resources in this growing industry.

Conclusions

For the first time, the Kingdom opens its doors to foreigners with complete relaxation and luxurious amenities. The growth of the tourism industry with its sub-sectors (aviation, transport, food and beverage, hospitality, tourism management, travel accompaniment, events and meetings industry, etc.) is inevitable throughout Saudi Arabia in the coming years. The Saudi Arabian tourism industry will welcome an increasingly diverse and mobile visitor who will not be limited to holy sites such as Mecca and Medina.

According to a study done on the topic, Saudi Arabia's vision for 2030 is one that aims to use their aid instead of oil, for example, in the tourism industry. Here, the kingdom uses its soft power to build its tourism industry, knowing the popularity of its neighbor in the tourism sector, but this does not affect the vision and support of Saudi Arabia.

References

[1] Madawi al-Rasheed (2002) A History of Saudi Arabia research in Saudi Arabia, Cambridge University Press.

[2] Joan C. Henderson (2017) International tourism development and the Gulf Cooperation Council Statas, Chapter Pilgrimage and tourism development in Saudi Arabia: Understanding the challenges and opportunities ISBN 9781315776576

[3] Muhammad Khurram Khan (Editor), Muhammad Babar Khan (Editor) (2020) Research, Innovation and Entrepreneurship in Saudi Arabia: Vision 2030 (Routledge Studies in Innovation, Organizations and Technology) 1st Edition ISBN-13: 978-1138488533

[4] Dr. Fadye Saud Al Fayad (Author) (2018) Logistics and The Saudi Vision 2030: The Top 10 Logistics Innovations to Facilitate the Vision ISBN-13: 978-6030269532

[5] Linda Low (Author) Abu Dhabi's Vision 2030: World Scientific; Illustrated edition (2012) An Ongoing Journey of Economic Development

[6] Mark C. Thompson (2019) Being Young, Male and Saudi, Chapter 7 - Saudi Vision 2030 and National Development, Publisher: Cambridge University Press.

A demand in changing approach to the educational process in Latvia

Dehtjare J.*, Mironova J.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: jevgenija.dehtjare@isma.lv*

Abstract

As practice shows, many people experience difficulties in choosing a career path for a variety of reasons. Rapid changes in all aspects of our lives are happening simultaneously in different countries. The planning horizon is impossible to determine, it is difficult to predict what other environmental factors may be decisive in the near future. Economic, political indicators, sudden blockages of social networks, sanctions and shifts in priorities at the personal level, at the level of the country or political alliances - all this has a huge impact when planning further career actions. A change in the approach to the educational process is the most important condition for people in need of career changes to be able to receive high-quality new knowledge, be competitive and be able to meet the changing requirements of employers in the near future.

Keywords: career, education, career guidance

Introduction

The object of this article is area of higher education in Latvia

The subject of the research is the determination of existing trends and issues on the market of higher education in Latvia in regards with current economic and political situation.

Objectives of the article: to determine existing requirements of labor market stakeholders and to offer an approach able to change the educational process in an order to satisfy better existing market needs.

The study used both theoretical and empirical methods of analysis.

Overview

At a certain stage of life, every person has to make one of the most important decisions in his life: to decide on the field of education and choose a profession. As practice shows, many people experience difficulties in choosing a career path for a variety of reasons. These reasons differ markedly depending on the age and position of a person, but there are also inherent in almost everyone without exception.

It is all the more difficult to make decisions about planning or changing your career now. Rapid changes in all aspects of our lives are happening simultaneously in different countries. The planning horizon is impossible to determine, it is difficult to predict what other environmental factors may be decisive in the near future. Economic, political indicators, sudden blockages of social networks, sanctions and shifts in priorities at the personal level, at the level of the country or political alliances - all this has a huge impact when planning further career actions.

The future is uncertain and changing much more rapidly than one might have imagined even five years ago. The impact of the pandemic, government intervention, a sharp change in policy and an unpredictable economic downturn are all having an impact on the labor market.

Unfortunately, at the moment, no large-scale and systematic work is being carried out nationwide to help in professional self-determination, from schoolchildren to adults. And if for adults such career guidance work is partially carried out by employment services, although it is considered more as an additional service, then in schools the career guidance of schoolchildren is at the mercy of the administration and teachers. Fortunately, many understand the importance of choosing a profession and arrange various events aimed at identifying students' inclinations and abilities for a particular profession. Among such events are psychological testing, excursions to enterprises, lessons with presentations of professions, and much more.

Decision

A change in the approach to the educational process is the most important condition for people in need of career changes to be able to receive high-quality new knowledge, be competitive and be able to meet the changing requirements of employers in the near future. In the mentioned circumstances, "immersive learning, experiential learning, is the pedagogy of choice, because it's not just a fixed body of knowledge that you want to transfer. It's a whole contextual set of lessons that you have to learn almost at the muscle memory level, to make them real" [1]

As education leaders consider their options in the age of the existing crisis, they must rethink the conventional wisdom.

The core mission of the university—instruction, research, and service—has not changed. Nor has the need for advanced education to prepare individuals for a fulfilling

life and to drive the knowledge economy. For individuals, the economic benefit of earning a college degree remains clear. College graduates are on average wealthier, healthier, and happier over a lifetime. [2]

In order to be able to provide competitive knowledge, universities need to take into account the following trends:

- Teaching technologies are outdated
- The pandemic has accelerated change.
- New approaches to the forms of knowledge transfer - remotely, combo approach, self-sufficiency
- McKinsey: 2026 is the peak of higher education, then we need to be prepared for a decrease in demand [3]
- Knowledge becomes obsolete faster than we can get it.
- Specializations are shrinking
- The range of applications is expanding
- The turnover of the labor force is growing.

Conclusion

It is difficult to teach a person what is needed in the modern world. It is important to grow interest - this is more like education than the classical paradigm of education, test papers kill competence.

Thus, modern education should provide the following:

- Arouse interest, make it possible to choose education and, thus, your career development consciously
- Individualize the offer, make it custom
- To make the possibility of obtaining the necessary knowledge and skills more independent, the choice - more autonomous
- The main emphasis in the transfer of knowledge to place on competence
- In addition to the transfer of hard skills - specific knowledge, to develop mastering and soft skills - additional skills (communication, languages)
- Keep in mind that modern knowledge must be "hybrid", because the requirements for the profession and skills become blurred, combine requirements from several areas (for example, the profession of a marketer includes knowledge of business, digital technologies, communications)
- The role of a teacher should move from a demanding mentor to the role of an accompanying guide, a coach.

A good university is not only knowledge, it is also networking, and managers should understand this.

In addition, the range of study programs at the university needs to be expanded, offering, among other things, life long learning.

References

[1] Johansen B 2012 Why business acumen is more important than ever in a VUCA world. https://celemi.com/blog/2019/business-acumen-vuca-world/ 24 Mar 2022

[2] Emmons R, Kent A, Ricketts L. 2019 Is college still worth it? The new calculus of falling returns. Federal Reserve Bank of St. Louis Review, 2019, Volume 101, Number 4, pp. 297–329

[3] Dua A., Law J, Rousanville T Viswanath N. 2020 Remaining higher education in the United States https://www.mckinsey.com/industries/education/our-insights/reimagining-higher-education-in-the-united-states 18 Mar 2022

The importance of company recognition in Latvian insurance companies

Leitendorfs R.*, Dehtjare J.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: r.leitendorfs@gmail.com*

Abstract

The insurance industry plays a vital role in today's modern economy. This sector covers a variety of unforeseen economic, technological, political and demographic risks, reducing insecurity and helping citizens to organize their daily lives, ensure the safety and well-being of themselves and their loved ones, as well as for companies to reduce unexpected and unwanted risks for businesses and the impact of possible events and to ensure their successful operation and development. Insurance companies are subject to regulatory enactments issued by the Financial and Capital Market Commission (FCMC). The activities of insurance companies and insurance intermediaries, as well as other financial institutions are regulated and supervised by the FCMC, which also maintains and regulates the registers of companies involved in insurance and reinsurance mediation.

Keywords: travel insurance, customer interaction, customer retention

Introduction

If in the recent past the quality and price of a product or service were the determining elements in attracting and retaining customers, now international research shows that the experience of customer interaction with the company (or the perception of the company's attitude towards customers) has become the most important customer acquisition and retention. loyalty factor as well as an important element of brand differentiation. Especially the customer experience that has created emotionally lasting impressions has a significant impact on the customer's relationship with the company in the long run. [1]

The object of the research is insurance market in Latvia, travel insurance in particular.

The subject of the research is customer retention in insurance companies in Latvia, such as Baltic Insurance House.

The study used both theoretical and empirical methods of analysis.

Overview

Continuous improvement of work processes means constantly reviewing and improving various processes and operations in the company as a whole. Continuous improvement work is not something that is done, but it is a way for the company to adopt a method of continuous improvement, it can mean two important aspects for the company:

First, focus on growth - the company must pay constant attention to the gradual improvement of products and services. This means streamlining and improving the sectors that are plaguing the quality of a company's operations as soon as a problem is identified, rather than taking one-off change initiatives when a significant amount of time has passed since the problem was discovered. Secondly, to promote the internal work cultures of the company's staff, because most often, customer problems and their solution are encountered by lower-level employees, not by the company's managers. Continuous improvement is the responsibility of every employee in the company and cannot be left to management alone.

Continuous improvement processes allow companies to identify problems and find ways to fix them. Small positive improvements over time can have a significant impact on the overall quality of a company's work. Gradually improving the quality of work, the company will begin to feel a much larger influx of customers. Paying more attention to what the customer wants from the service offered can improve the company's revenue if the customer's wishes and needs are met. If the customer has received the service that meets their needs, the company has reasonable expectations for good feedback and a future influx of customers, without making much effort to attract new customers.

In 2021, the SKDS Research Center conducted a survey of the reputation of insurance companies, which provided a description of the overall situation in the insurance market as a whole, comparing changes in the situation over several years. The study was conducted to assess the reputation of insurance companies operating in Latvia. The study involved residents of all over Latvia in the age group from 18 to 75 years of age. In total, more than 1,000 respondents, both women and men, were interviewed, taking into account their conversational and family status, level of education and occupation, as well as other relevant parameters. The study compared the opinion of the respondents, which was obtained starting from 2017, taking into account how it changed in 2019 and 2021. Respondents who actively use the services of insurance companies and those who have

never purchased any insurance services were surveyed. [2]

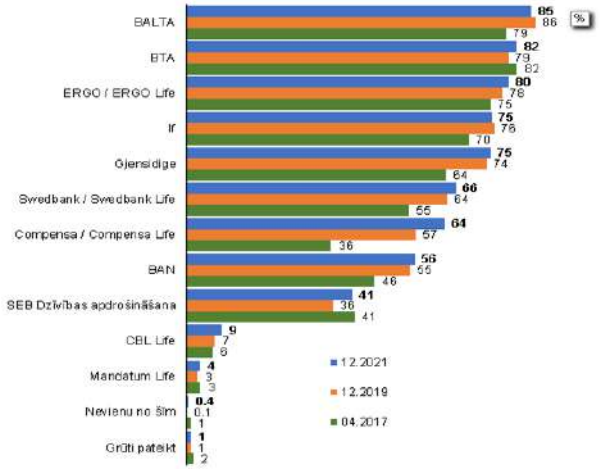


Figure 1. Recognition of insurance companies [2]

Decision

Implementation of a marketing strategy based on well-informed market research on what customers expect and what is the best way to make a product or service available to customers is important. When customers decide to start using a product or service provided by a particular company, they want to understand it as much as possible. For these reasons, the company must provide customers with as much information as possible. Customers are usually interested in the company's vision, mission and support when they start using the company's products. From this information, customers can get general information about the company. The company must allow users to access detailed information about each product or service. The company must demonstrate the characteristics of each product that can attract customers to use the product or service. This will effectively promote the company's marketing strategy.

Conclusion

In conclusion, despite the fact that, according to financial data, compared to other players in the Latvian insurance market, the Baltic Insurance House plays a small role due to the fact that the insurance company has an effective management system appropriate to its size and business, The Baltic Insurance House has managed to maintain a certain stability, regardless of the state of emergency in the world and in the country.

References

[1] Ieskats uzņēmumu rekomendēšanas indeksa (NPS) 2019.g. rezultātos. https://www.kantar.lv/newsletters/tnsab58/ieskats-uznemumu-rekomendesanas-indeksa-nps-2019-rezultatos/ 24 Mar 2022.

[2] Research of Reputation of Insurance Companies conducted by SKDS Research Center, 2021.

Business monitoring tools

Elena Santhirasegaram

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: jelena.santirasegarama@gmail.com

Abstract

The relevance of this study lies in the knowledge of bottlenecks in the organisation that can lead to its death. The knowledge is accumulated through measures that provide increased manageability in the implementation of extremely large-scale circumstances. As a result, it is possible to debug highly effective means of overcoming a crisis situation.

Keywords: destruction, reconstruction, plan, program, efficiency, position

1 Introduction

Considering that high profit is contrary to collateral asset, the research problem was expressed in the following definition: "It is impossible to ensure the implementation of a high-margin offer in the absence of a well-functioning programme to attract a special group of users."

2 Formulation of the Problem

The object of research is characterised as a set of forces that make it possible to invest capital, demonstrating the ability to manage its change during the implementation of a medium-term scenario of a highly profitable business [1]. The purpose of the study is aimed at developing a procedure that provides a system of measures to get out of difficult situations [2]. In accordance with the goal, the following tasks were formulated [3]:

1. Conducting an ongoing analysis of proposals that hinder the achievement of the ultimate strategic goal.
2. Choosing an option of requirements systematisation.
3. Implementation of the medium-term scenario in the circumstances of deviation from the loyalty program.
4. Development of strategic guidance for the interaction of participants in the organisation in special conditions.

3 Conclusions

As a result, this determines the degree of loss and assesses the willingness of the organisation management team not only to implement their existing and future plans, but also take corrective measures to restore the lost operational potential. As practical results, it should be noted that the timely detection of deviations from the strategy makes it possible to substantiate the scale of the prevented losses throughout the entire life cycle of the organisation. The novelty of the research lies in the implementation of the multi-user loyalty program in crisis circumstances.

References

[1] Santirasegarama E. (2019). Category wisdom: expert thinking development./*The 17th International Scientific Conference Information Technologies and Management,* 2019, April 25-26, ISMA, Riga, Latvia

[2] Santirasegarama E. (2020). Maintenance of Sustainable Entrepreneurship: Disclosing the Meaning of the Concept of "Entrepreneurship". / *The 18th International Scientific Conference Information Technologies and Management, 2020, April 23-24, ISMA, Riga, Latvia*

[3] Santirasegarama E. (2021). Maintenance of Sustainable Entrepreneurship: Disclosing the Meaning of the Concept of "Entrepreneurship". / *The 19th International Scientific Conference Information Technologies and Management, 2021, April 22-23, ISMA, Riga, Latvia*

How to predict the interest of the scientific community in subsections of artificial intelligence?

M Yelis[1]*, K Yakunin[1,2], R Mukhamediev[1,2], A Symagulov[1,2], Y Kuchin[2], E Mukhamedieva[2], N Yunicheva[2], F Abdoldina[3]

[1] *Satbayev University, Kazakhstan, Almaty, Satpayev str., 22A*

[2] *Institute of Information and Computational Technologies. Kazakhstan, Almaty, Pushkin str.*

[3] *Almaty Management University, Kazakhstan, Almaty*

**Corresponding author's e-mail: k.marina92@gmail.com*

Abstract

There are promising prospects for the widespread use of artificial intelligence (AI), but there are also challenges to overcome in order to adapt AI technologies in industries. Publication activity reflects the interest of researchers in scientific sections, so that new and promising in the eyes of the scientific community thematic sections are characterized by increased publication activity. To identify such sections and their comparative assessment in the field of AI and Machine Learning, we used dynamic indicators D1, D2. Some results of such evaluation are presented in the paper.

Keywords: artificial intelligence; machine learning; deep learning; scientometrics; bibliometric indicators

1 Introduction

Artificial Intelligence (AI) is the ability of a system to perform tasks normally performed by intelligent beings [1]. We can also say that AI is a software and hardware system that imitates human behavior and thinking. A schematic representation of AI components is shown in Figure 1 [2,3].

There are promising prospects for the widespread use of AI, but at the same time, there are problems, overcoming which means new opportunities for the adaptation of AI technologies in the economy and a new round of technological development of AI. In particular, it is possible to allocate technological problems, such as problems with data (quality of data and large volume of data), slow learning process, difficulties in explaining the results of ML models, and significant computational costs in the learning process.

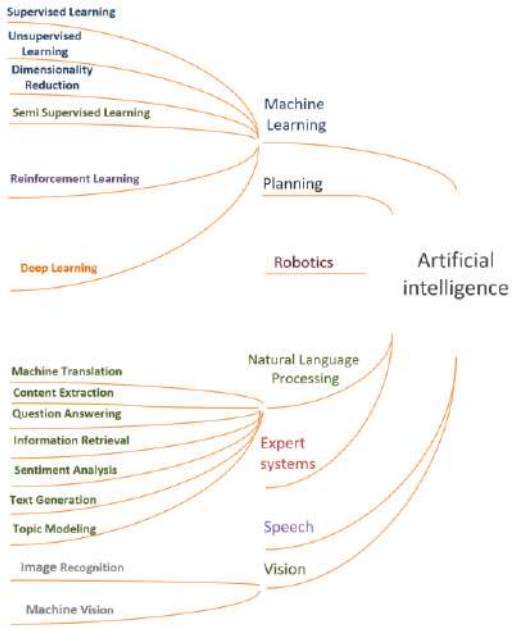


Figure 1 Subdomains of artificial intelligence

Method

The dynamic indicators growth rate (D1) and acceleration (D2) of the number of scientific publications are used to assess the field of scientific publications in the field of AI.

The dynamic indicators (D1-speed and D2-acceleration) of the j-th bibliometric indicator $s_j^{(db,k)}$ at time t_n can be calculated as follows [3,4]:

$$D1_{s_j}^{(db,k)}(t_n) = w1_j \times \frac{ds_j^{(db,k)}(t_n)}{dt} \quad (1)$$

$$D2_{s_j}^{(db,k)}(t_n) = w2_j \times \frac{d(ds_j^{(db,k)}(t_n)/dt)}{dt}, \quad (2)$$

where k is the search term in database db, and w1j and w2j are empirical coefficients that regulate the "weight" of the $s_j^{(db,k)}$. In our case, $s_j^{(db,k)}(t_n)$ is the number of articles in t_n - the year selected using the search query k in the Google Scholar database. Weights w1j and w2j are taken as 1.

The method has been used in the works of [5,6].

Results

The publication activity analysis showed a high interest in modern transformer models, the development of datasets for specific applications of deep learning models, and a sharp increase in interest in methods of explicable machine learning. Relatively small research areas are attracting more and more attention, as evidenced by the negative correlation between the number of articles and D1 and D2 scores. The results show that, despite the limitations of the method, it is possible to (1) identify fast-growing research areas regardless of the number of articles and (2) predict publication activity in the short term with satisfactory accuracy for practice (the average prediction error for the year ahead is 6% with a standard deviation of 7%).

Conclusion

The proposed method makes it possible to estimate the dynamics of growth and decrease of publication activity in scientific sections of AI, including those related to applications in economic sectors. The method does not require access to large bibliometric archives and allows to obtain relatively fast quantitative estimates of dynamic indicators of the growth rate (D1) and acceleration rate (D2) of the number of scientific publications. The software and examples of calculations are available at https://www.dropbox.com/sh/fkfw3a1hkf0suvc/AACRZ7v9qympen_ht00jeiF6a?dl=0.

Acknowledgments

This research was funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, Grant No. AP09259587, "Developing of methods and algorithms of intelligent GIS for multi-criteria analysis of healthcare data", and by the Slovak Research and Development Agency, no. APVV PP-COVID-20–0013, "Development of methods of healthcare system risk and reliability evaluation under coronavirus outbreak", ERASMUS+ ACeSYRI: Advanced Centre for PhD Students and Young Researchers in Informatics reg.no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP

References

[1] Artificial Intelligence- https://www.britannica.com/technology/artificial-intelligence
[2] Michael M. - Artificial Intelligence in Law: The State of Play 2016 https://www.neotalogic.com/wp-content/uploads/2016/04/Artificial-Intelligence-in-Law-The-State-of-Play-2016.pdf
[3] Mukhamediev R, Symagulov A, Kuchin Y, Yakunin K, Yelis M. 2021 From Classical Machine Learning to Deep Neural Networks: A Simplified Scientometric Review Applied Sciences – T. 11. – №. 12. – P. 5541
[4] Muhamedyev R., Aliguliyev R.M., Shokishalov Z.M., Mustakayev, R.R. 2018 New bibliometric indicators for prospec-tivity estimation of research fields
[5] Mukhamedyev R., Kuchin Y, Denis K., Murzakhmetov S. Symagulov A., and Yakunin K 2019 Assessment of the Dynamics of Publication Activity in the Field of Natural Language Processing and Deep Learning. Communications in Computer and Information
[6] Barakhnin V, Duisenbayeva A, Kozhemyakina O., Yergaliyev Y, Muhamedyev R 2018 The automatic processing of the texts in natural language. Some bibliometric indicators of the current state of this research area Journal of Physics

A complete guide to overcoming obstacles

Akimov Gleb

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: glezz@inbox.lv

Abstract

An approach explores new means of fundamental diagnostics that are aimed at identifying management problems and eliminating organisational pathologies.

Keywords: examples' theory's absence, false teaching jumping to conclusions, position

1 Introduction

The basis for a diagnostic assessment is a systematisation of both early and late symptoms. Its results form the basis for a development of symptomatic measures. Such measures are considered as means to eliminate appearance of external pathologies. To do this, it is necessary to undertake radical measures aimed at key changes in an organisation.

2 Main Part

In the first part a study of resultative means of business assessment is conducted. Such means are regarded both in short-term and long-term perspectives: for example: acceleration and improvement of the processes by means of automation implementation without staff training; process acceleration in consequence of automation; implementation of automation and staff reduction. So a special procedure is required to facilitate the objective change, the development of which was the goal of this study. The implementation of the procedure allows for identification of causes that result in the organization to remain in an unstable state for extended periods of time [1].

In the second part an approach in developing procedure for diagnostics of management system is expanded. Its basis is formed by mechanisms of an organisation in conditions of radical innovations related to high level of uncertainty and unpredictability of a project's life cycle. Such conditions is chronic, hence, unnatural for the organisation, as the external destructive forces occur along with the such problems: the market needs satisfaction and supply of resources in consequence of changes in environment requirements; lack of understanding of the company management system in consequence of the outdated knowledge submission; knowledge is delivered with an emphasis on "becoming a manager", and the environment requires you to be a professional manager; the norms are adjusted to the current production, and not to the requirements for improvement; problem solving in a short time [2-4].

In the third part, diagnostics management system is performed under conditions of a strategic course change. The results of the performed diagnostics made it possible to identify symptoms of abnormalities, which are following: ccompliance with established standards: the appearance of the management department in the form of an inability to solve quality problems due to absence of necessary funds; divergence of understanding between reality and the desire of the company's management [5,6].

3 Results

As a result, all experience gained is recorded in a specially developed methodology, which serves as a guide for crisis management and mitigation

References

[1] Akimov G. Diagnostics of management technologies in the context business organizations. /The 15th INTERNATIONAL INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2017, April 27-28, ISMA University, Riga, Latvia, Information Systems Management Institute, Riga, Latvia, p.177-178

[2] Akimov G., Amangeldiyev A., Kamforina O.,Kazina I., Kopitov R., Zaharov R.. Algorithms for calculation of discounting rates during various life cycles of an organization/ . /The 16th INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2018, April 27-28, ISMA University, Riga, Latvia, Information Systems Management Institute, Riga, Latvia, pp.231-232.

[3] Akimov G. The evaluation of strategic position of enterprise in diagnostic tasks algorithm . /The 17th INTERNATIONAL CONFERENCE OPEN LEARNING AND DISTANCE EDUCATION 2019, January 24-25, 2019, ISMA, Riga, Latvia

[4] Akimov G.,. Research of organization metadiagnostics algorithms. /The 17th International Scientific Conference Information Technologies and Management, 2020, April 23-24, ISMA, Riga, Latvia

[5] Akimov G., Amangeldyiev A., Djakons R., Kopitov R., Mikryukova Zn. Methodology Technique of Destructive Experience. /The 18th International Scientific Conference Information Technologies and Management, 2020, April 23-24, ISMA, Riga, Latvia

[6] Akimov G., Amangeldiyev A., Mikryukova Zh. Capitalisation of Large-scale Responsibilities. //The 19th International Scientific Conference Information Technologies and Management, 2021, April 22-23, ISMA, Riga, Latvia

Improving of the branch management structure of a commercial bank

Elena Koptseva*, Ivars Linde

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: elena.koptseva@gmail.com*

Abstract

In recent years, many banks have closed their branches. The main reasons are unprofitability and the transition of customers to online banking. But recent research has shown that customers still need branches for different reasons such as complex transactions or specific personal requests. In this work the new approach to improve the branch structure of a commercial bank was defined.

Keywords: commercial bank, branch, management structure, development and improvement of the management structure, information technology

Introduction

Banks are closing their branches in response to declining visits from customers and a shift to internet and mobile banking. Customers visits are estimated to decline by approximately 35% by 2020 [1]. Retail banking branch networks are contracting across North America, the UK, and Europe (Figure 1), although the pace of change varies considerably between regions. The great reduction of 71% is detected in the Netherlands. Banks in North America and Southern Europe are reducing branches and growing digital sales at a more gradual rate. In many Asian, African, and Latin American countries, branch reduction is not so apparent - only because retail banks in these markets leapfrogged branch distribution to go directly to digital sales.

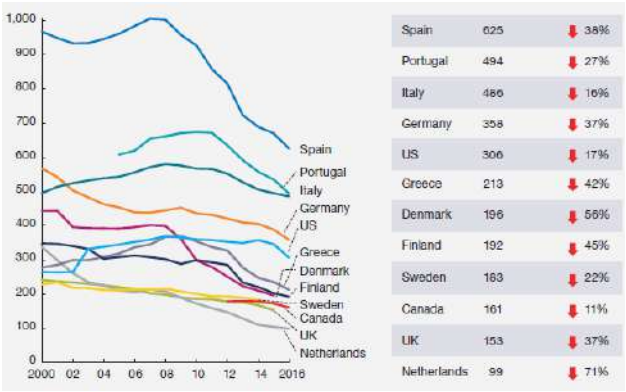


Figure 1: The number of branches per million people [2]

But reality is more complex. The customers still demand interactions at key moments. They love digital for routine transactions, but want human contact when they need it. Branches give them the reassurance about the bank's brand as well. So the branches still have a vital role as visible, tangible locations that customers associate with trust and reliability [3].

Decision and methods

In previous article [4], the approach for improving the branch network of banks was defined. The main idea of this approach is incomplete, but partial opening of a branch, which involves several stages. In the first stage, only one third of all function shall be performed. At the second stage, a real assessment of the branch's capacity should be made, which verifies the theoretical calculations. In the next step, the mini-branch does two-thirds of the work of a standard branch. At this stage, the general-purpose specialists are replaced by the core team of workers.

In this article, the defined approach will be improved. First of all, a bank branch should be considered as an experience center where individual customer requests will be considered by specialists. Thus, a special individual approach to each client is developed. The function of such specialist is to build up a personal relationship with the client. At the same time, the client receives advice on complex operations and may even receive training or education. With this service, the client will be able to make a decision himself, but at the same time relying on a specialist. An important role of the bank is to confirm the correct decision.

Other tasks of the experience center are operating as an integrated component of the overall channel strategy, leading with experience and emphasizing the human touch with the front-line complementing technology with empathy.

This improved method implements three stages of improving the banking branch system. At the last stage, the experience center can be upgraded to a full unit. At this stage, the main part of the portfolio investment takes place from the parent bank, which gives more flexibility to the branch.

Conclusion

This partial opening of a branch in several stages minimizes risks and allows the branch to instantly adapt to the specifics of the given region. The modification of the standard branch into an experience center allows banks to increase the profit, achieve a new level of the digitalization and find a special relationship to customers.

References

[1] BBA Annual Abstract of Banking Statistics, 2021
[2] Gujral V., Taraporevala Z.:McKinsey Company Report: Rewriting the rules: Succeding in the new retail banking landscape, 2019
[3] Whittaker N. The Banking Branch Dillemma, http:/www.bearingpoint.com, 2021
[4] Koptseva E., Linde I. Improving of the Branch Management Structure, Article, 2021

Improving system of staff motivation at KTDC, Idukki, Kerala

Soy S.*, Dehtjare J.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: Sharonsoy1998@gmail.com*

Abstract

In recent years, having a motivated workforce provides a variety of benefits, such as decreased absenteeism, employee retention and low staff turnover, better interactions between management and employees, increased worker performance, improved quality and enhanced customer service etc. The department's and even the company's success is directly correlated to the level of motivation of its employees. In order to keep personnel motivated, it is necessary to do so on a regular basis. In this thesis, the authors make a research on the employee motivation in tourism industry Kerala. For the research authors used KTDC, Idukki as the environment for the research.

Keywords: employee, motivation, tourism, hospitality

Introduction

In tourism sector, it is vital to have motivated staff in an organisation. The success of a business is closely related to the motivation of its employees. Motivation is tough to analyse, control, and sustain, but if done effectively, it is relatively easy. In a world where most people work from home, it's all about having the proper attitude, energy, and perseverance. If one person is seen to be cheerful and excited about their motivation, the morale of the motivation will develop. The ability of a corporation to generate new ideas relies heavily on the motivation of its employees. A company's capacity to innovate is vital to its long-term viability, therefore you must guarantee that your employees are both innovative and driven. Employees that are invested in the company's success are more likely to come up with innovative solutions and improve overall performance.

The object of the research is entrepreneurial activity within tourism industry in the Kerala region, India.

The subject of the research is staff motivation system in the tourism and hospitality organisation.

Qualitative and quantitative research methods have been used to conduct the research. Primary data and secondary data will be collected.

Overview

Many people from all over the globe have come to visit the state since it is a lovely site with a diverse range of flora and unique features. Because of the tourism industry, more people are visiting Kerala. Kerala tourism is recognised for being high-end, which is why so many people visit the state. Kerala tourism has never looked back, thanks to its natural beauty, scenic attractiveness, and other attractions.

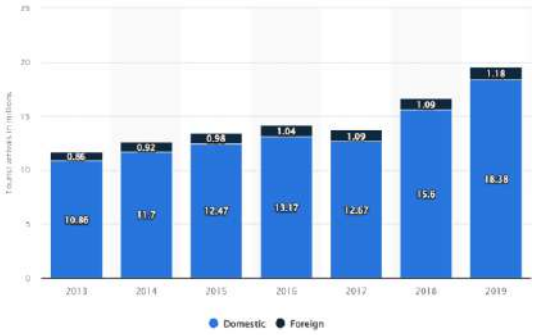


Figure 1.1 Foreign and domestic tourist arrivals across Kerala from 2013 to 2019 (Statista, 2022)

Government-owned, the Kerala Tourism Development Corporation, or KTDC, is in charge of and runs tourism in the state of Kerala. A group called the Kerala Tourism Development Corporation (KTDC) is based in Thiruvananthapuram and has offices all over the state of Kerala. It also runs hotels, resorts, and other places for tourists to stay in different parts of the state. When the Kerala Tourism Development Corporation was set up, it was in 1966[3]

Decision

The authors here make a research based on the employee motivation at KTDC, Idukki. With the help of primary data, (Survey's and interviews) the authors acquire required information's regarding the current employee motivation strategy of the organization and this could help the authors to provide a new action plan for the improvement.

Conclusion

A pleasant work environment is the foundation for a company's success. Motivating employees may be time-consuming and tough. However, in order to boost employee productivity, managers must promote a favourable work atmosphere. Ascertain that workers believe their work and efforts contribute significantly to the company's success. Always remember to have a 'open-door' policy and a friendly management staff. Becoming a true and open communicator with your group. Maintaining constant communication helps build professional relationships. Staying optimistic and maintain calm specially under unforeseen events. Providing frequent, positive feedback to workers and team members can and will help the employees to get them motivated.

References

[1] Ellliot, A. J. & Covington, M. 2001. Approach and Avoidance Motivation. Educational Psychology Review, 13, 2

[2] Anderson, R. J. & Adams, W. A. 2015. Mastering Leadership: An Integrated Framework for Breakthrough Performance and Extraordinary Business Results. Wiley.

[3] Kerala Region statistical overview. 2022 www.statista.com/keralatourism 18 Mar 2022

[4] Kerala Tourism Development Corporation. 2022 www.ktdc.in 6 Mar 2022

How to estimate mass media?

M Yelis[1*], K Yakunin[1,2], R Mukhamediev[1,2], A Symagulov[1,2], Y Kuchin[2], E Muhamedijeva[2], N Yunicheva[2], F Abdoldina[3]

[1]*Satbayev University, Kazakhstan, Almaty, Satpayev str., 22A*

[2]*Institute of Information and Computational Technologies. Kazakhstan, Almaty, Pushkin str*

[3]*Almaty Management University, Kazakhstan, Almaty*

**Corresponding author's e-mail: k.marina92@gmail.com*

Abstract

A method for evaluating media in several modalities is described: by thematic focus, by classes and properties defined by experts. The method allows the evaluation by semantically complex queries, for example, concerning socially significant topics. The algorithm is based on the thematic model of the corpus of publications and includes decision support methods to take into account expert opinions. In contrast to deep learning models, the proposed approach does not require markup of large corpora of texts and a long learning process.

Keywords: mass media, topic modeling, natural language processing, social significant information

1 Introduction

The media are sometimes referred to as the "fourth estate" because they not only reflect the activities of the state, but also form the informational context, sentiment, depth and level of significance attributed to certain state initiatives and public events. A multilateral and quantitative (as far as practicable) assessment of media activity is important for understanding their objectivity, role, thematic and tonal orientation and, ultimately, the quality of society's "fourth estate. Therefore, it is useful to assess not only individual documents, but also the media as a whole in terms of the validity of specific hypotheses, such as "Are the media a source of socially relevant information?", "Do the media publish popular articles?" and "Do the media display objectivity?", etc. The papers [1-4] discuss a method that provides answers to the questions posed, based on the objective characteristics of the corpus of media articles and subjective high-level expert evaluations.

Method

The proposed method [5] allows the evaluation of media in several modalities (topics, properties, classes). The method combines thematic modeling of corpora of texts and multicriteria decision making [6-8]. Thematic modeling as one of the natural language processing methods [9,10] provides the division of a corpus of documents into intersecting groups based on the statistical characteristics of the vocabulary of words composing this corpus.

Each media article can be described by a set of properties, which are often heterogeneous. For example, these properties can include both objective indicators (the number of reposts and comments) and subjective indicators (emotional tone or tone). It is necessary to assign a published text to a certain class, which allows us to evaluate, for example, the degree of its impact on the audience or the need for a more detailed analysis.

The method is based on the analysis of document corpora and works as follows: a conditional probabilistic distribution of media by topics, properties and classes is calculated after forming a thematic model of the corpus of texts. The classes can be popularity, social significance, objectivity, etc. [11] Several methods are used to obtain weights that describe how each topic is related to the properties and classes in the analyzed document. These methods include manual high-level labeling using an analytic hierarchical process (AHP) [12], the use of multiple document corpora, and comparative corpus partitioning. The latter involves evaluating the thematic asymmetry of the corpora to obtain weights describing the relation of each topic to a particular criterion/property. These weights, combined with the thematic model, can be used to evaluate each document in a corpus for its relevance to properties and classes.

Results

The proposed method was applied to the corpus described in [13] to classify negative media information into socially relevant topics. A thematic model was developed using BigARTM (200 topics) [14]. Experiments confirmed the general feasibility of media evaluation using the thematic corpus model, as a ROC AUC score of 0.81 was obtained in the classification task, which is comparable to the results obtained for the same task using the BERT (Bidirectional Encoder Representations from Transformers) model [15] with a limited size of the marked corpus of documents (1000

documents).

It has been revealed that in the situation of limited number of marked-up texts, the quality of classification is almost the same for both the proposed method and the BERT model, which allows us to recommend the proposed method for fast, low-cost processing of large bodies of documents and media assessment in general. The architecture of the software system implementing the proposed approach is based on the components described in [16]. The code of the system is available at [17].

Acknowledgments

This research was funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, Grant No. AP09259587, "Developing of methods and algorithms of intelligent GIS for multi-criteria analysis of healthcare data", and by the Slovak Research and Development Agency, no. APVV PP-COVID-20–0013, "Development of methods of healthcare system risk and reliability evaluation under coronavirus outbreak".

References

[1] Mukhamediev R, Yakunin K, Mussabayev R, Buldybayev T, Kuchin Y, Murzakhmetov S, Yelis M. Classification of Negative Information on Socially Significant Topics in Mass Media Symmetry. – 2020. – T. 12. – №. 12. – C. 1945

[2] Yakunin K, Ionescu M, Murzakhmetov S, Mussabayev R, Filatova O, Mukhamediev R. Propaganda Identification Using Topic Modelling Procedia Computer Science 178 (2020) 205–212

[3] Yakunin K, Muhamedyev R, Kuchin Y, Mussabayev R, Buldybayev T, Murzakhmetov S. Classification of negative publication in mass media using topic modeling Journal of Physics: Conference Series. 1727. 012019. 10.1088/1742-6596/1727/1/012019

[4] Barakhnin V, Muhamedyev R, Mussabayev R, Kozhemyakina O, Issayeva A, Kuchin Y, Murzakhmetov S, Yakunin, K. Methods to identify the destructive information Methods to identify the destructive information Journal of Physics Conference Series 1405. 12004. 10.1088/1742-6596/1405/1/012004

[5] Yakunin K, Mukhamediev R, Mussabayev R, Buldybayev T, Kuchin Y, Murzakhmetov S, Rassul Y , Ospanova U. Mass Media Evaluation Using Topic Modelling International Conference on Digital Transformation and Global Society. – Springer, Cham, 2020. – C. 130-135

[6] Kumar A, Sah B, Singh A, Deng Y, He X, Kumar P, Bansal R. A review of multi criteria decision making (MCDM) towards sustainable renewable energy development. Renewable and Sustainable Energy Reviews

[7] Hoceini Y, Mohamed C, Abbas M. Towards a New Approach for Disambiguation in NLP by Multiple Criterian Decision-Aid The Prague Bulletin of Mathematical Linguistics. 95. 10.2478/v10108-011-0002-5.

[8] Mukhamediev, R, Mustakayev R, Yakunin K, Kiseleva S, Gopejenko V. Multi-Criteria Spatial Decision Making Support System for Renewable Energy Development in Kazakhstan IEEE Access. 2019, 7, 122275–122288

[9] Mukhamediev R, Symagulov A, Kuchin Y, Yakunin K, Yelis M. 2021 From Classical Machine Learning to Deep Neural Networks: A Simplified Scientometric Review Applied Sciences – T. 11. – №. 12. – P. 5541

[10] Садовская Л, Гуськов А, Косяков Д, Мухамедиев Р. Обработка текстов на естественном языке: обзор публикаций Искусственный интеллект и принятие решений.- 3/2021 с. 95-115, DOI 10.14357/20718594210306

[11] Barakhnin V, Muhamedyev R, Mussabaev R, Kozhemyakina O, Issayeva A, Kuchin Y, Murzakhmetov S, Yakunin K. Methods to identify the destructive information Journal of Physics: Conf. Series. - 2019. - V. 1117. 10 p. - http://dx.doi.org/10.1088/1742-6596/1117/1/012001

[12] Saati T, Andreychikova O. About measuring the intangible An approach to relative measurements based on the principal eigenvector of a pairwise comparison matrix Cloud Sci. 2015, 2, 5–39

[13] Yakunin K, Kalimoldayev M, Muhamedyev R, Mussabayev R, Barakhnin V, Kuchin Y, Murzakhmetov S, Buldybayev T, Ospanova U, Yelis M, Zhumabayev A, Gopejenko V, Meirambekkyzy Z, Abdurazakov A. KazNewsDataset: Single Country Overall Digital Mass Media Publication Corpus. Data. 6. 31. 10.3390/data6030031

[14] Vorontsov K, Frei O, Apishev M, Romov P, Dudarenko M. BigARTM: Open Source Library for Regularized Multimodal Topic Modeling of Large Collections. In International Conference on Analysis of Images, Soc. Networks and Texts Springer: Cham, Switzerland, 2015 pp. 370–381

[15] Devlin J, Chang M.-W, Lee K, Toutanova K. Bert: Pre-training of deep bidirectional transformers for language understanding arXiv 2018, arXiv:1810.04805

[16] Barakhnin V, Kozhemyakina O, Mukhamediev R, Borzilova Y, Yakunin K. The design of the structure of the software system for processing text document corpus BusinessInformatics, vol. 13, no 4, pp. 60–72. DOI: 10.17323/1998-0663.2019.4.60.72

[17] Yakunin K. Airflow DAGs for NLPMonitor Available online: https://github.com/KindYAK/NLPMonitorDAG

Creating competitive advantage through online marketing for DMC company in Latvia

Dragunova A.*, Dehtjare J.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail:kasvndragunova@gmail.com*

Abstract

The purpose of this paper is to find new possibilities how companies can improve its online marketing and increase the awareness of products and services to achieve a competitive advantage in the business market. The object of the study is online marketing application in entrepreneurial activity. The subject of the study is application of online marketing strategies for small and medium-sized companies in an order to create a competitive advantage.

Keywords: business-to-business marketing, competitive advantage, online marketing, destination management company

Introduction

Creating a competitive advantage over one's competitors is important for every company across the globe and online marketing has proven to be one of the most effective competitive strategies in a business-to-business field.

The object of the study is online marketing application in entrepreneurial activity.

The subject of the study is application of online marketing strategies for small and medium-sized destination management companies (DMS) such as Baltic Blues Travel LTD in order to create a competitive advantage.

The paper utilizes secondary quantitative and qualitative data for the research findings.

Figure 1. Competitive advantages of online marketing (the table created by author based on [4])

Overview

Online marketing means marketing services and products and building customer relationships over the internet. It is the fastest growing form of direct marketing. In general, using the internet makes goods and services more competitive internationally because it creates efficiencies in distribution and transport, and reduces costs. The internet has created a standardized way for companies to communicate across country borders by reducing the language barrier in international marketing. It is also an effective way to gather and distribute information regarding international markets. Other considerable benefits include improved cash flows and more efficient payment processing.

Here are a few statistics that show results to help steer your advertising business to business strategy decisions:

1. 92% of young buyers prefer direct mail for making purchasing decisions, implying that the current and emerging generation has a higher level of trust in traditional advertising.

2. For every $167 spent on direct mail, marketers in the United States sell $2,095 worth of goods or services.

3. According to marketing experts, the average American is exposed to roughly 5,000 commercials every day, with most of them being digital ads and only about two being direct mail pieces.

This implies that direct mail can help you break through the digital clutter and make your company stand out.

4. Direct mail is opened 80-90 percent of the time, whereas emails are only opened 20-30 percent of the time.

5. Direct mail has a response rate of 5.1 percent, compared to 0.6 percent for email, 0.6 percent for paid searches, 0.4 percent for social media, and 0.2 percent for online display ads.

6.When used as part of an integrated campaign, direct mail increased advertisers' ROI by 20% [1].

Decision

There are many ways to build a sustainable competitive advantage of DMC companies in Latvia, such as Baltic Blues Travel company in digital marketing. Some of the suggestions include:

1. Become seen as a leading authority
2. Create vastly superior content
3. Rule a social media platform
4. Build a vastly superior user experience
5. Build a passionately loyal audience

Conduct usability testing and implement refinements on an ongoing basis. Users will remember if your site is far easier to use, and it can keep them coming back.

Build a site that's unbelievably fast. This is a specific way to build a superior experience. One way to do this is to consider implementing Accelerated Mobile Pages.

Make a fantastic mobile experience. Site speed is one way to do this, but the other is to adopt a mobile-first mentality. Redesign your site and mock up your mobile experience first; work on your desktop version *only* after your design for the mobile site is complete

Conclusion

The main objective of this paper is to investigate different methods how small and medium-sized DMC companies in Latvia, such as Baltic Blues Travel can create a competitive advantage over its competitors through online marketing, using international experience. The offer of their services to business buyers may improve leading to competitiveness increase. The case study provides a strong theoretical basis for online marketing and all presented ideas are inexpensive and can be executed easily. However, it is too early to say whether the recommendations presented in this thesis will be effective or not due to the current global crisis (COVID pandemic and global economic downturn) which has affected the whole industry.

References

[1] Enge E. 2016 Sustainable competitive advantages in digital marketing. https://searchengineland.com/sustainable-competitive-advantages-digital-marketing-258100 24 MAR 2022
[2] Custom online marketplace solutions 2022 https://www.cobbleweb.co.uk/ 20 MAR 2022
[3] The difference between digital marketing and advertising. 2018 https://www.youtube.com/watch?v=G9FGwnr4-lQ 10 MAR 2022
[4] Kotler P., Amstrong G., Wong V., Saunders S. 2008 Principles of Marketing. Pearson Education, p 819

Guide to measuring full lifecycle business operability

Vadim Gailis, Olga Kamforina

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: oljga2005@inbox.lv

Abstract

The study is oriented to know the weaknesses in the organization. It allows to overcome obstacles in the implementation of the medium-term scenario within given norms. .Such knowledge is permitted to find the improvements in the system through locating and understanding the weak points of the system. The methodology for performing diagnostics is accumulated through constant monitoring the potential of value. There are effective means of increasing the rate of capital turnover, tested in the context of established regulations e system. As a result, implemented measures targeted at improving the system, positively affect the characteristics of the system.

Keywords: methodology, oobstacles, leverage, restore, live activity, chance

1 Problem

The requirements for continuous monitoring of introduced modifications to the system are in conflict with the reluctance of developers to locate the vulnerabilities in their patched version of the system. Considering that the focus on long-term value growth is in contradiction with short-term profit accumulation schemes, the research problem was expressed in the following formulation: "It is impossible to make effective changes to the system without being able to reveal the hidden causes for its quality deterioration" [1]. The object of the study is revealed in the identification of organizational growth factors, which provide an opportunity to identify the symptoms of inhibition of production by taking responsibility for the abandonment of productive entrepreneurship (going beyond) before and after justifying the loss of value due to the focus on short-term gain [2].

2 Methodology

Advance of rules for overcoming violations during the full life cycle of production. The aim of the study is to develop a procedure that allows you to identify the necessary measures and be able to initiate and implement them, eliminating issues as they emerge. As a result, the following four tasks were formulated:

1. Perform a continuous analysis of the barriers responsible for complacency in the management team.
2. Choice a new set of measures for the next version of the system and select the variant of exclusion of effectiveness.
3. Implement a middle-term scenario for the performance system transformation.
4. Development of a manual for the operation of the system in special conditions.

3 Results

As practical results, it should be noted that the implementation of measures targeted at identification of system vulnerabilities, helps to improve the system as a whole. Besides, it should be distinguished the reasoning for changes that allow to produce valuable through the mastery of unique technology before and after the agreement of the regulations of all work and how to pay for it.

The novelty of the research is in the full-scale implementation of an improved version of the system, which ensures the development of an organization under updated conditions. It allows to implement a program of the sustainable growth of the organization in a difficult environment

References

[1] Kamforina O. (2021). Methodology for Strengthening the Vulnerability of the System . / The 19TH INTERNATIONAL SCIENTIFIC CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT, 2021, April 22-23, ISMA, Riga, Latvia

[2] Gailis V. (2021). Analysis of the Business Making**.** / The 19TH INTERNATIONAL SCIENTIFIC CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT, 2021, April 22-23, ISMA, Riga, Latvia

The ecosystem of higher education in the global space

Iryna Kalenyuk, Deniss Djakons*

ISMA University of Applied Sciences, Latvia

**Corresponding authors' e-mails: kalenuk@ukr.net; deniss.djakons@isma.lv*

Abstract

Higher education is a complex ecosystem that is rapidly changing in the modern world. The globalization of the educational space is accompanied by increased competition between countries, uneven and non-linear expansion of higher education. Forms, methods, technologies of education are developing, primarily related to the use of ICT. The requirements for the result of education - its graduates - are changing.

Keywords: digitalization, international students, pandemic, ICT.

Introduction

Since the beginning of the 21st century, rapid transformation processes have begun in the system of education and higher education. Back in the 2000s, analysts noted a significant turbulence in its development, which is associated with the high growth dynamics of student numbers. The boom in higher education was accompanied by a significant increase in international flows, an increase in the number of foreign students. Under the influence of rapid digitalization, new forms and methods of teaching began to appear. The financial crisis and various financial restrictions have led to a decrease in the cost of education.

Results

Demographic trends have led to a clear distinction between the Global North and the Global South. The hallmark of Global North has been a decrease in the number of students despite efforts to attract international students. Conversely, Global South has seen a rapid growth in student numbers.

At the same time, the new events of the 2020s showed that all these circumstances turned out to be only prerequisites for real transformations. The following are the most important current trends:

1) The first severe and completely unexpected test was the global pandemic, when in April 2020 higher education institutions around the world were forced to close and international transport traffic was interrupted. At the beginning of 2022, there are still no exact data on the number of students in general and international students in the world in 2020 and 2021. But there is every reason to believe that it has decreased.

However, the educational community has risen to the challenge. More than 20 years ago, MOOCs (massive open on-line courses) appeared and have been developed since 2011, when leading American universities (Stanford and Massachusetts Institute of Technology) posted video courses of academic disciplines of their professors in open access. In the new situation, information technology has become a decisive factor in overcoming the difficulties of the pandemic and has itself received a new impetus for development. The wide dissemination of learning technologies using ZOOM platform made interactive communications possible and thereby ensure the continuity of the educational and scientific processes.

2) The next unexpected factor was the military aggression of 2022, which, despite its local nature, will have great consequences for the global educational space. Undoubtedly, this will mean a redistribution of student flows and, accordingly, financial flows between countries and continents, in general - a change in the structure of both the total number of students and the number of foreign students. The Russian Federation was the fifth country in the world in terms of the number of foreign students in 2019 - 282.9 thousand, which accounted for 4.7% of their total number (6063.7 thousand). Obviously, the majority of them will change their place of study and go to other countries.

3) There is a further intensification of competition at the global level for foreign students, evidence of which is the constant changes in its structure. Thus, the long-term leader in the world market - the United States, despite the increase in the number of foreign students, is gradually reducing its market share. In 2019, 16.1% of all foreign students studied in the USA, while in 2015 there were 19%, and in 2000 - 25.3%. Also constantly fighting for their market share are such leaders as Australia (8.4% in 2019 and 6.2% in 2015), the UK (8.1% and 9.0 respectively), Germany (5.5% and 4. 8%), Canada (4.6% and 3.6%). There are new leaders of the world market of higher education, which are very actively developing. So, the UAE for the same period (2015 - 2019) increased its market share from 1.5% to 3.7%, Japan - from 2.8% to 3.4%, China - from 2.6% to 3.3%, Turkey - from 1.5% to 2.6% .

4) It is also necessary to note the transformational changes in higher education itself: its temporal and spatial limits are changing; along with formal documents on education, the role of various certificates and diplomas (on participation in competitions, courses, trainings) is growing; paramount is not so much a diploma of education as the presence of certain skills, and first of all, creative skills, leadership qualities, abilities for continuous development and creativity.

Conclusion

The current stage is characterized by profound changes in the ecosystem of higher education. A new paradigm of higher education is being formed, in which its main subjects (teacher and student) will acquire new functions. The scale of higher education will also expand and take on new shapes, both due to geographical expansion and due to the diversity of its forms of manifestation.

Pretrained Deep Neural Network Models for Image Change Detection

Symagulov[1], Y.Kuchin[1], Jan Rabcan[2], Ye.Kulakova[1], I. Assanov[1], R. Mukhamediev[1]

[1]*Satbayev University (KazNRTU), Kazakhstan, Almaty*

[2]*University of Zilina, Slovakia, Zilina*

Abstract

This paper describes a method for estimating the difference between images acquired from a UAV while flying along the same routes. The method is based on the use of embeddable images acquired by pre-trained neural networks. The main advantage of the method is that there is no need to train a deep neural network.

Keywords: embedding, deep learning, cosine distance, computer vision, UAVs

1 Introduction

Image change detection [1,2] is one of the current tasks in the field of computer vision, which is based on a set of photos taken at different moments in time. Change detection methods are applied to many tasks, such as anomaly detection with video surveillance and satellite cameras, road quality verification, and automation in the field of precision agriculture [3]. However, existing change detection methods are often trained to recognize specific objects such as machinery, people or plants, or to recognize specific changes such as changes in plant conditions [4].

The purpose of this paper is to evaluate the feasibility of using pre-trained deep neural networks to solve the problem of detecting significant changes in frames without additional training of the neural network.

2 Data and method

Image processing involves tasks of identification (cv1), verification (cv2), recognition (cv3) and determination (cv4) of visible object characteristics (speed, size, distance, etc.). The cv2 problem is often solved using so-called Siamese networks [5], where two images are processed by two identical, pre-trained networks. The method based on the application of pre-trained deep neural networks is efficient in terms of the effort involved in image partitioning and model training. One type of cv2 class task is to identify frames of two video sequences containing significant changes. For example, such video sequences can be obtained by flying a UAV along the same route. A well-proven method of face recognition is based on obtaining vector representations (so-called embeddings) of frames after the images have passed through the network layers. The results obtained (image vectors) are compared using a triplet loss function, which can be implemented as triplet distance embeddings [6] or a triplet of probabilistic embeddings [7]. However, this approach still requires some pre-training of the network, which may be difficult to implement in some operational monitoring tasks. Therefore, in this paper we use a direct comparison of image embeddings, which can be done by calculating the cosine distance, or cosine similarity between the embedding vectors. Since the scalar product of the vectors and the cosine of the angle between them are related by the relation (1):

$$e^{(1)} \cdot e^{(2)} = \|e^{(1)}\| \cdot \|e^{(2)}\| \cdot \cos(\theta) \tag{1}$$

therefore the cosine similarity can be calculated as follows (2):

$$\cos(\theta) = \frac{\sum_{i=1}^{N} e_i^{(1)} * e_i^{(2)}}{\sum_{i=1}^{N} [e_i^{(1)}]^2 * \sum_{i=1}^{N} [e_i^{(2)}]^2}. \tag{2}$$

The cosine distance can be calculated with the computational libraries as follows:

```
import scipy.spatial.distance as ds
    dist2 = ds.cosine(embedding1,embedding2)
```

The value of dist2 can be between -1 and 1. A value of 0 means that the vectors are the same or, more precisely, point in the same direction in multidimensional space (the angle between them is 0). Significantly different vectors will have a distance estimate at a level close to 1.

The cosine distance value is used to match parallel frames from the two flybys based on the cosine distance between their vector representations. Then, based on experiments, a threshold of cosine distance has to be selected, above which the frames will be marked as having significant differences.

During the computational experiments, synthetic data obtained in the Unreal Engine 4 3D environment was used. The data represents videos of virtual UAV overflights over

fields, with varying illumination, wind speed (which slightly changes the UAV's route), and season (vegetation colour) for different overflights. Random objects were added to the field, the frames with which the model should identify. The figure 1 shows a fragment of the video file in which there are foreign objects on the 4th frame.

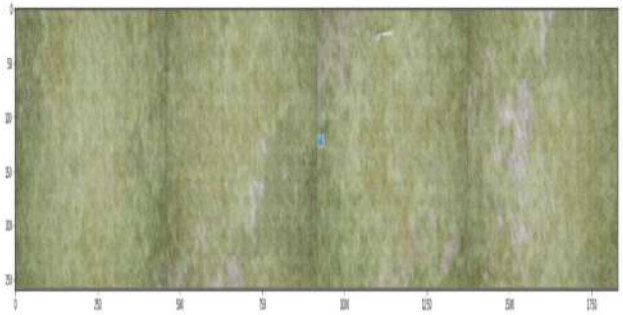


Figure 1 - Four frames of the video file

Alexnet [8] and ResNet 50 [9] were used as pre-trained models.

The AlexNet network architecture can be summarised as follows: Input (227 x 227 x 3) -> Conv (11 x 11 x 96, s = 4) - > Max pool (3 x 3, s = 2) -> Conv (5 x 5 x 256, same) -> Max pool (3 x 3, s = 2) -> Conv (3 x 3 x 384, same) -> Conv (3 x 3 x 384, same) -> Conv (3 x 3 x 256, same) -> Max pool (3 x 3, s = 2) -> -> FC (9216) > FC (4096) > FC (4096) > Softmax (1000) > Output. Conv - convolution layer, FC - full connected layer. The word same in convolution layer designation means that stride and padding are chosen so that the size of output tensor coincides with the size of input tensor. The original 227 x 227 three layer image is transformed into a 6 x 6 x 256 tensor which is fed to the full-link neural network to perform classification. The Resnet 50 architecture is even more extensive: Input (224x224x3) -> Conv (7x7x64, s=2) -> Max pool ((3x3x64, s=2) -> 3x Conv(3x3x64, s=1)->3xConv(1x1x256, s=1) ->4x Conv(1x1x128, s=1) ->4x Conv(3x3x128, s=1) ->4x Conv(1x1x512, s=1) ->6x Conv(1x1x256, s=1) ->6x Conv(3x3x256, s=1) ->6x Conv(1x1x1024, s=1) ->3x Conv(1x1x512, s=1) ->3x Conv(3x3x512, s=1) ->3x Conv(1x1x2048, s=1) -> Avg pool -> FC(1000) -> Softmax -> Output.

4 Results and discussion

The table 1 contains the results of computational experiments which show that, in general, pre-trained models can be used to determine the difference between frames under certain conditions. For each data set, 2,000 different thresholds were enumerated and the one with the maximum F1 Score was selected. This maximum F1 Score is also presented in the table, along with the area under the ROC curve.

TABLE 1 Model testing results

Model&Dataset	ROC AUC	Top F1 Score
resnet50_land1.csv	0,875059723	0,859813084
alexnet_land1.csv	0,819079471	0,859813084
alexnet_land2.csv	0,895814379	0,736378205
resnet50_land2.csv	0,905669552	0,793485342
alexnet_land4_orig.csv	0,710267544	0,570752714
resnet50_land4_orig.csv	0,740790885	0,606711409
resnet50_land4_sdvig.csv	0,583277779	0,443386955
alexnet_land4_sdvig.csv	0,622562454	0,453596288
alexnet_land5.csv	0,718294092	0,832342449
resnet50_land5.csv	0,749291395	0,832818074
resnet50_land6_spring.csv	0,67740601	0,473432056
alexnet_land6_spring.csv	0,682125913	0,476976209
alexnet_land7_fall.csv	0,73668296	0,55743326
resnet50_land7_fall.csv	0,753649462	0,621779859
alexnet_land7_spring.csv	0,777882066	0,58454387
resnet50_land7_spring.csv	0,797022712	0,635791881

It can be seen that resnet50 performs better (by 3-5%) than alexnet. Both networks performed poorly for the land6_spring image set, which reflects abrupt changes in weather conditions. The networks also failed to cope with the shift of land4_sdvig images, illustrating inaccurate UAV overflights along the route.

5 Conclusion

The use of pre-trained deep neural networks for frame difference detection has potential for practical applications. Experiments have shown that the quality of such classification increases significantly when monitoring within the same season under the same weather and lighting conditions. The method does not require extensive frame marking work and is suitable for classifying any changes. The resnet50 model showed the best results on the dataset used. However, a significant change of the UAV route or a change in weather conditions leads to a drastic decrease in the quality of frame classification. Further research should evaluate the possibility of partial marking to improve the quality of change identification.

6 Acknowledgements

This research was funded by the: Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, grant number AP08856412 « Development of Intelligent Data Processing and Flight Planning Models for Precision Farming Tasks Using UAVs»; grant number BR10965172 «Space monitoring and GIS for quantitative assessment of soil salinity and degradation of agricultural lands in South Kazakhstan». Publication was partially realized with support of Operational Program Integrated Infrastructure 2014 - 2020 of the project: Intelligent operating and processing systems for UAVs, code ITMS 313011V422, co-financed by the European Regional Development Fund and ERASMUS+ ACeSYRI: Advanced Centre for PhD Students and Young Researchers in Informatics reg.no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP.

EUROPEAN UNION
European Regional Development Fund
OP Integrated Infrastructure 2014 – 2020
MINISTRY OF TRANSPORT AND CONSTRUCTION OF THE SLOVAK REPUBLIC

References

[1] Minu S, Shetty A. 2015 A comparative study of image change detection algorithms in matlab. – Aquatic procedia. **Vol. 4. 1366-1373**.

[2] Radke R. J. et al. 2005 Image change detection algorithms: a systematic surve. – IEEE transactions on image processing **14 (3) 294-307**.

[3] Mukhamediev R I, Symagulov, Kuchin Y, Zaitseva E, Bekbotayeva A, Yakunin K, Tabynbaeva L. 2021 Review of Some Applications of Unmanned Aerial Vehicles Technology in the Resource-Rich Country. Applied Sciences, 11(21), 10171.

[4] Yang C. 2020 Remote sensing and precision agriculture technologies for crop disease detection and management with a practical application example //Engineering **6 (5) 528-532**

[5] Taigman Y et al. 2014 Deep Face: Closing the gap to human-level performance in face verification. - Proceedings of the IEEE conference on computer vision and pattern recognition **1701–1708**.

[6] Schroff F, Kalenichenko D, Philbin J 2015 FaceNet: A unified embedding for face recognition and clustering Proceedings of the IEEE conference on computer vision and pattern recognition **815–823**

[7] Sankaranarayanan S. et al. 2016 Triplet probabilistic embedding for face verification and clustering. - IEEE 8th international conference on biometrics theory, applications and systems (BTAS). – IEEE **1–8**.

Ensuring national security of the bsbm countries in the current geopolitical situation

Antonina Djakona*, Kaspars Ķikste

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: antoina.djakona@isma.lv*

Abstract

The current geopolitical situation requires a fundamental change in the system of national, collective and global security of the countries of the world. Under these conditions, such forms of cooperation and association of countries that form new directions and vectors of attraction are of particular importance. Cooperation between the countries of the Baltic and Black Seas has a long history and huge untapped potential.

Keywords: the national security, the collective security, alliance, Baltic Sea – Black Sea cooperation.

The current geopolitical situation is characterized by extreme turbulence: the situation and the balance of power in the world are changing rapidly. Despite the successes achieved since the Second World War in reaching stable peace and order, we can state a constant increase in the number of new threats to the security of countries and peoples. Singling out such a phenomenon as terrorism as a separate threat. Aggravation of painful imperial ambitions of the Russian Federation. Islamic fundamentalism and interethnic conflicts in Arab countries. All these and many other processes exacerbate the need to create military alliances and alliances for security purposes.

Russian aggression against Ukraine has become a new factor, and quite unexpected in its scale, despite the constant readiness to see this threat. The impact of this factor on the strength and further development of NATO remains to be assessed in further studies. There is no doubt that the threat from the East was not exaggerated, that it was indeed serious and underestimated. Despite the intelligence and analysts' data, the scale of today's aggression raises many questions regarding not only the need to strengthen the alliance, but also the solution of future issues of the fate of the Russian Federation and its status in the world.

Moreover, there is every reason to believe that not only the system of collective security in Europe needs a radical revision, but the entire system of global security in the world. The Russian war in Ukraine made obvious the need to build a radically new order of international security and its guarantees.

Under these conditions, cooperation between the countries of the Black and Baltic Seas has a great potential, which has not been fully used. In any case, the development and strengthening of cooperation in these regions seems extremely promising both in the economic aspect and in the aspect of collective security.

In the modern context, there is a need to build a radically new system of regional, collective, pan-European and even global security. The starting point for this new configuration of international security will be Ukraine and the agreements that will be adopted after the end of hostilities. In any case, regardless of this, it is necessary to clearly understand the potential of the Black Sea region in terms of both developing cooperation and building the North-South vertical, the Baltic-Black Sea axis. It is quite obvious that all previously created institutions will certainly be reviewed in a new context, since they will either have to disappear, or be transformed, or acquire a radically new purpose and mission.

Loss prevention guide

Grinberg Sevil

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: sevila.grinberga@inbox.lv

Abstract

During the sustainable operation of the enterprise, the attention of the management team is lost. The study explores ways to renovate the operability of the organization. At loss of stability consultants are involved, but management has no objective means to make a reasoned conclusion about the state of development of the organization. This study proposes a full-scale review advance to the organization's current activities. Such procedures are confined to the development of a special program on the basis of which the organization is improved. As a result, the skill of conducting effective changes throughout the life cycle of entrepreneurship is being practiced.

Keywords: environment, impact, inactivity, crises, diagnosis, symptoms, changes, advantage

1 Introduction

Existing business valuation methods are focused on standard procedures that do not allow to assess the stability of the organization as a whole. The relevance of this research study lies in the awareness about weaknesses of an organisation that are threatening to destroy it. Assessment of the state of the business is impossible in the absence of diagnostic tools. Such knowledge is generated by the measures ensuring sustainability under extensive circumstances, which results in the possibility to undertake activities on crisis response. Management should have a diagnostic method that will allow making a timely and accurate diagnosis as well as provide measures for restoring activity. Considering that measures on crisis response contradict the norms of sustainable functioning, the problem of the research study should be formulated as follows: "it is not possible for an organisation to avoid entering a crisis without the means for timely neutralisation of the destructive forces" [1].

2 An Approach

The purpose of the research study is the availability of means to prevent disorganised consequences through diagnosis before and after the generation of knowledge and prevention of organisation's entering the crisis. The following research tasks have been formulated according to the purpose of the research:

1. to systematize the factors that interfere with the functioning of the organizations and to analyse the current deficiencies causing management inactivity;
2. develop measures to restore lost functionality, taking into account the means of fully diagnosing the organization and to choose the effective version of the diagnostic system;
3. to evaluate the effectiveness of the developed mechanism and to implement the medium-term plan of organisational changes;
4. to organise an effective interaction between the members of the organisation under special circumstances and to advance a handbook of research on trends in product development and loss prevention .

It allows to elaboration the procedure to ensure the measurability of an organisation's integrity in the course of conducted changes.

3 Conclusions

Based on the developed the requirements have been elaborated that not only allow choosing the priority areas of the work, but are also ensuring the degree of understanding organizational traps calling for the deviation of the enterprise from the final aim. In terms of practical outcomes of the research, the activities to prevent potential losses throughout the life cycle of an organisation should be mentioned. The novelty of the research is in implementing an improved technology supporting organisational development under the new condition.

References

[3] Grinberg S.. Loss Prevention Technology . /The 19th International Scientific Conference Information Technologies and Management, 2021, April 22-23, ISMA, Riga, Latvia

COVID-19 pandemic impact on tourism industry in Uzbekistan

Musinjonova N.*, Dehtjare J.

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: niginamusinjona@gmail.com*

Abstract

This paper examines the impact of COVID-19 pandemic on the tourism industry of Uzbekistan. In recent years, coronavirus (COVID-19) along with strict isolation measures had shown its negative impact on various sectors of the economy around the world, so in Uzbekistan. The tourism industry has been one of those sectors which faced the adverse impact of COVID-19. As a result of the pandemic isolation the flow of tourists to many tourism destinations dropped sharply. Tourism related companies such as hotels, restaurants, travel agencies and many other leisure activity providers witnessed a significant decline in their businesses. The thesis explains the importance of tourism industry in the economy of Uzbekistan and analyzes the impact of coronavirus (COVID-19) on the Uzbek tourism sector.

Keywords: COVID-19, tourism industry, pandemic, Uzbekistan

Introduction

The COVID-19 outbreak has seriously affected travel demand both internationally and in Uzbekistan. The tourism sector experienced:

- the sudden cancellation of international flights;
- restrictions on both domestic and international travel;
- awareness of health and safety issues.

Indeed, the decline in the number of tourists, because of the pandemic restrictions, affected the economy of Uzbekistan's tourism industry. The objective of the study is to define the impacts of COVID-19 on the sector using statistical data.

Object is entrepreneurial activity of tourism industry in Uzbekistan.

Subject is the impact of COVID-19 to the entrepreneurial activity of tourism in Uzbekistan.

The paper utilizes secondary quantitative and qualitative data for the research findings.

Overview

Uzbekistan is one of the popular international tourist destinations with its UNESCO-recognized historical sites and cultural history. The Uzbek tourism industry had seen significant growth over the last couple of years (before COVID-19) in the number of tourists visiting the country. According to statistics the total number of the visitors who visited Uzbekistan in 2018 was 5.34 million, while it increased by 35% to 6.74 million in 2019 [1]. This growth was mirrored in tourism income, which raised from 1.04 billion US dollar in 2018 to 1.34 billion US dollar in 2019, indicating 26.2% increase [2].

However, due to the implemented worldwide lockdown, Uzbekistan closed its doors on March 16, 2020, to tourists from all over the world. As result of this, the developing tourism industry of the country experienced several rapid declines. For instance, according to the statistical data, in 2020 around 1.5 million and in 2021 around 1.3 million tourists visited Uzbekistan, representing less than 23% of the 6.7 million recorded in 2019 (Figure 1). Tourism service exports estimated 260 million US dollars in 2020, less than 20% of previous year's level of 1.313 billion US dollars [3].

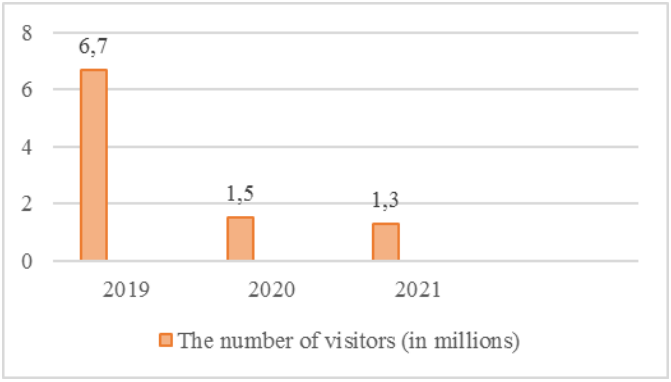


Figure 1. The decline phase, in the number of visitors in millions, 2019-2021 (the table created by author based on the statistics [3])

Furthermore, COVID-19 affected the employment in the travel & tourism sector of Uzbekistan with 27.3 % decrease in 2020 compared to 2019 [4].

Decision

As travel restrictions at country borders have been removed this year, tourism may see some increase from now. But tourism will not be the same as it was before COVID-19 crisis. Because tourists are more conscious to their health and safety now that even small things which may threaten their health at the country they want to visit, would change their perception about this destination. Therefore, it requires particular attention and serious action from both government and tourism companies to recover the tourism sector and attract tourists to the country again. Authors suppose that the tourism companies should transform their

traditional way of attracting tourists to innovative, with investment in technology and digital innovation programs. Also, the government should introduce supportive programs to help tourism businesses; especially small and medium-sized enterprises and as well it should invest for the sustainable growth of tourism sector of the country.

Conclusion

The COVID-19 crisis has had a detrimental impact on the tourism industry, and it may keep so for some years. This paper investigates the severe impacts of the COVID-19 on tourism and the economy of the country. Along with the economic downturn, the coronavirus has created a significant threat to the tourist industry. Because of this reason it seemed to have had an impact on the tourism sector.

References

[1] Statistics: the number of tourists increased in Uzbekistan - https://eurasian-research.org/wp-content/uploads/2020/10/Weekly-e-bulletin-06.07.2020-12.07.2020-No-267.pdf
[2] Statistics: increase in tourism revenue - https://strategy.uz/index.php?news=797&lang=en
[3] The number of visitors and tourism service exports in 2020 - https://traveltomorrow.com/tourism-in-uzbekistan-in-2021-and-beyond/
[4] Decrease on the travel and tourism employment - https://wttc.org/Research/Economic-Impact

Metric Data Visualization. Practical Benefits.

Alexandr Selin*

Satbayev University, Kazakhstan, Almaty

**Corresponding author's e-mail: shuranick60@gmail.com*

Abstract

At the present time monitoring and performance analysis of Information systems is necessary. An important part of this process is the visualization of the received data.

The first part of this work focuses on metric data visualization options. The data in its turn includes the one collected for monitoring and analysis of information system workload. Zabbix, PRTG and Grafana were chosen as visualization programs. The study comprises a brief comparative analysis of the selected programs.

The second part of this work is practical. It focuses on SQL Server deadlocks which can affect the overall system performance and on how to fix them.

Keywords: monitoring, Zabbix, PRTG, Grafana, system performance, deadlocks

Introduction

Working on my thesis ("Development of the Monitoring and Analysis System For Information Network's Server and Client Parts") I encountered a collected data visualization issue. There were various metrics for performance analysis. Operational system's performance counters, a database workload, application performance index, number and type of errors, etc. After data collection and preliminary analysis there is a need to somehow display the date on a user's screen. We need monitors, graphs, charts, tables. Otherwise, this information is just zeros and ones that lie in their database and do not affect decision making. Without visualization, the system doesn't make any sense - no matter how well it is set up, no matter what type of analysis it carries out. So I am going to launch a program which enables the system kernel to collect and log the necessary information, using automatic and manual settings.

A huge amount of work to visualize the collected data must be done either by yourself or using ready-made solutions.

Having conducted a more careful study, I focused on the following software products:

1. Zabbix
2. PRTG
3. Grafana

Zabbix [1] - the server can be installed on Linux only, while the agent can be installed on both Windows and on Linux. It is a free software product. There are several templates for monitoring networks, servers, routers and other IT infrastructure devices in the "box". It is possible to connect new sensors to different settings - this is what I need. Through such sensors it will be possible to show the information that the system kernel collects.

Figure 1 shows an example of a Zabbix dashboard (the screenshot is not from my system, but from the Internet).

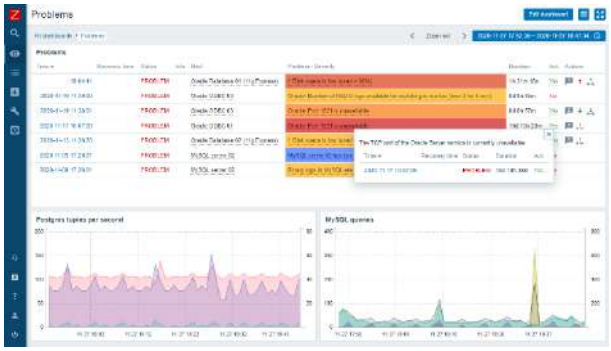


Figure 1. Zabbix

PRTG [2] – the server can be installed on Windows. It is a shareware product. The free version is more than enough for my research. Again, there are many sensors from the "box" for collecting data on IT infrastructure devices. And it is also possible to connect new sensors which in their turn can be connected to the necessary data.

Figure 2 shows an example of a PRTG dashboard (the screenshot is not from my system, but from the Internet).

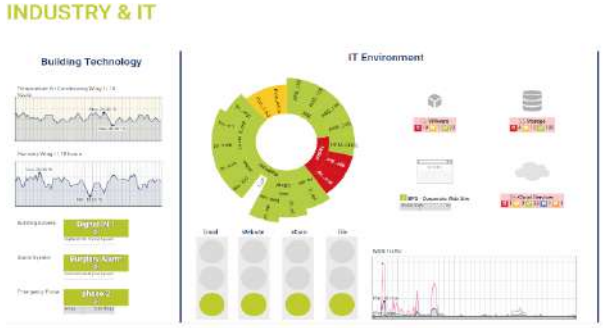


Figure 2. PRTG

Both Zabbix and PRTG are equally suitable solutions for the data visualization problem. The only difference is that PRTG is easier to set up while Zabbix is completely free software. However, both products duplicate the information that the kernel of my system has already collected and prepared for output. In other words, they are redundant. So we need to take a closer look at the third software product - Grafana

Grafana [3] is a free data visualization, monitoring and analysis platform. It can connect to various data sources. Meanwhile it is not a collector and analyzer. It is a good and pleasing visualize – the one that I need.

Figure 3 shows an example of a Grafana dashboard.

Figure 3. Grafana

Overview

This article shows how to detect and fix errors in a working information system, using a visualizer. The process consists of four stages:

- Finding an error
- Analysis
- Fixing an error
- Conclusion

Decision

My choice is Grafana. Though the system kernel for my thesis paper has not been written and the metrics, being a result of the non-existent kernel, has not been collected, I cannot wait to test the visualizer.

After consulting with colleagues I deployed a bunch of software to collect the log information of our productive system. Error and warning data from the logging migrated to the Elasticsearch search engine. Further the databases aggregated by error, time and server were transferred to the Grafana dashboard. There are several key nodes in our productive system - that is the central node, the warehouse node and the online store node. And there are several dozen knots of ordinary stores. Information on key nodes was displayed in separate histograms whereas data for all the stores - in a general histogram. I also added the error code below. The result is a dashboard, shown in Figure 4.

Figure 4. Dashboard

Here is the text of one of the common errors detected while working with the the visualizer:

Lock conflict while executing a transaction: Microsoft SQL Server Native Client 11.0: Transaction (Process ID 99) was deadlocked on lock resources with another process and has been chosen as the deadlock victim. Rerun the transaction. HRESULT=80004005, SQLSrvr: SQLSTATE=40001, state=33, Severity=D, native=1205, line=1

Using the MS SQL Extended Events mechanism [4], we were able to catch conflicting queries leading to these errors. These turned out to be deadlocks that occur when one session registers data for exchange and uploads this data to exchange files by another session. Figure 5 shows the deadlock graph of these sessions.

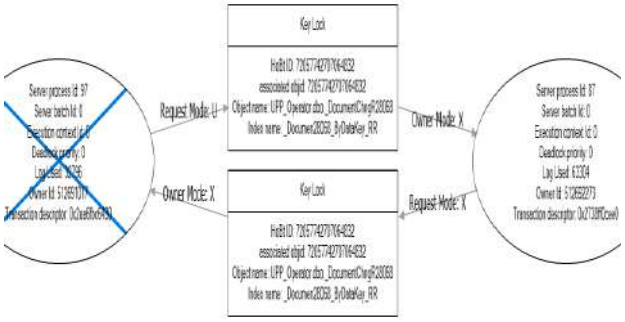


Figure 5. Deadlock graph

Having considered the graph information in detail, I managed to find lines of code from which conflicting requests were called. By changing the algorithm a little (managed locks were added to the data before the request), I managed to resolve the deadlock conflict and eliminate the errors associated with them.

Conclusion

Thus it can be concluded that the visualization of any information is very important. Specifically, in my case, it helped to detect errors hidden from both users and developers, those which consumed server resources and negatively affected overall performance of the system.

References

[1] Zabbix :: The Enterprise-Class Open Source Network - https://www.zabbix.com/ru
[2] Paessler - The Monitoring Experts - https://www.paessler.com/prtg
[3] Grafana: The open observability platform - https://grafana.com/
[4] Quickstart: Extended events in SQL Server - https://docs.microsoft.com/en-us/sql/relational-databases/extended-events/quick-start-extended-events-in-sql-server?view=sql-server-ver15

Beyond organizational reconstructing

Kalejevs Andrejs

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: andej-73@inbox.lv

Abstract

The present work is devoted to ensure the management of the whole process at the level of responsibility centers. An approach is proposed to the research of problems of business protection from a position of means for ensuring of protection at various levels of the organization The objective means that allow to identify the reasons for the destruction of the organization and to create a system of countermeasures act as such tools. The core principle behind the advance is to hold the individuals responsible for the task they have control over. This will decrease internal waste and downtime caused by structural changes within the organization.

Key words: diagnostics, duplication, depreciation, changes, improvement, performance

1 Introduction

Introduction of new control facilities and the organization cause changes in strategic development of the enterprise. However, gaps of responsibility within the structure of the organisation, results in a problem that is due to the organizational structure of an organisation being unable to ensure effective management. The main task of the research is expert activity within the framework of which it would be possible to recommend to managers of the enterprise to choose their concrete technology for protection of business. . As a result, to restore management functions of the organisation, changes in the organisation's structure in the form of power and responsibility redistribution have to be made, hence ensuring the "withdrawal" of the organisation from an unstable state [1].

2 Main Part

As a subject of study, performance mechanisms of organization protection are used. The aim of this study comes to development of the procedure that ensures a change in the organisational structure, taking into account the effective means of managing the whole process. It allow providing the protection of business at any stages of it's life cycle. In accordance with the goal the following objectives are solved:

1. To provide continuous analysis of violations in the distribution of powers;
2. To choice for adjusting the organizational structure in the short term.
3. To implement the scenario for assessing the full performance of the organisation in the medium-term;
4. To development the manual on what steps to take in the conditions of internal self-organization.

The tasks listed above were the basic for execution of the examination, allowing to develop a complex of recommendation for the use of effective mechanisms of business protection in each specific case.

3 Results

Examination of business protection mechanisms is focused on finding of leverages for an integrated assessment of all types of ensuring the sustainable business operation.

As a result, the proposed approach makes it possible to improve the implementation efficiency of the taken decisions until the final goal is achieved.

At the same time it is necessary to concentrate attention to the following circumstances: assessment of the situation both from within and outside the branch; definition of potential factors that may become a source of new opportunities; development of the strategic plan to achieve the ultimate potential benefit.

The novelty of the approach is in the mechanisms of internal self-organisation that is accompanied by the changes in the organisational structure.

References

[1] Kalejevs A.. (2021). Reconstruction of the Organization under Decreasing External Support. / The 19TH INTERNATIONAL SCIENTIFIC CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT, 2021, April 22-23, ISMA, Riga, Latvia

Work with bibliography in academic research during studies

Zaiga Oborenko*, Marga Zivitere

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: zaiga.oborenko@isma.lv*

Abstract

During their studies, students acquire skills and competencies to work with scientific literature and various sources of information. Students use a variety of data collection methods in their research and learn how to analyse the data obtained. The task of scientific supervisors is to guide, couch and support students in research work. Work with bibliography in academic research include such areas as 1) creating a literature review, 2) compilation of the list of sources and literature used in the research, 3) creating references in the text, 4) avoiding plagiarism in scientific writing.

Keywords: academic research, bibliography, references, plagiarism

Introduction

During the study process, students develop various academic works that have the characteristics of scientific research work. These are most often scientific essays, reports, case studies, term papers, bachelors or qualification theses, master's theses. Students have been studying for academic writing since the first semester. Education, theory and practice are the cornerstones of every profession. Acquisition of knowledge of the principles of scientific methodology and basic skills of scientific research is now included in every study program. The academic staff is responsible for providing a scientific approach to their subjects, the development of critical thinking in today's information-rich news field.

Results

Literature reviews are designed to provide an overview of sources explored while researching a particular topic and to demonstrate that research fits within a larger field of study. There are 4 stages in creating a literature review: 1. Problem formulation - which topic or field is being examined and what are its component issues?; 2. Literature search - finding materials relevant to the subject being explored; 3. Data evaluation - determining which literature makes a significant contribution to the understanding of the topic; 4. Analysis and interpretation - discussing the findings and conclusions of pertinent literature [2], [6], [7].

Thorough bibliography shows that researcher has used appropriate sources for the research. Bibliography can help researcher make sure that the best versions of all sources are used, to demonstrate that researcher is aware of all of the relevant and update literature with the latest trends in the field.

Referencing helps the researcher to avoid plagiarism so that it is clear which ideas belong to him/her and which are somebody else's. References show awareness of the topic, provide supporting evidence for new ideas, arguments and opinions, allow others to identify the sources used [2], [4], [7]. All university assignments that involve research by another author must be properly cited. By citing the work of a particular scholar, researcher acknowledges and respects the intellectual property rights of that researcher.

Academic integrity encompasses a number of values including honesty, trust, respect, fairness, and responsibility and ideals that should be upheld by all educational stakeholders [1]; [3], [5], [8]. Strategies to deter plagiarism include advice regarding assessment development, curriculum design, and academic skills education [1].

Conclusion

The academic staff of each study course is responsible for the observance of scientific principles in their study subjects. The teacher must set high quality requirements for each study work that is a studies outcome. Each teacher develops students' attitudes towards education, the fair study process and the results obtained. Thus, the inclusion of this topic “Work with bibliography in academic research during studies” in the study process contributes to one of the most difficult problems in the implementation of research-based studies

.

References

[1] Bretag T. (2013) Challenges in Addressing Plagiarism in Education. *PLoS Medicine*, 10(12). [online] [Accessed 20 March 2022.] Available: https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pm

ed.1001574

[2] Fink A. (2019) Conducting Research Literature Reviews: From the Internet to Paper. 5th ed. Sage publications, 304 p.

[3] Helgesson G., Eriksson S. (2015) Plagiarism in research. *Medicine, Health Care and Philosophy*, 18(1), p. 91–101. [Accessed 20 March 2022.] Available: https://pubmed.ncbi.nlm.nih.gov/24993050/

[4] Kristapsone S. (2014). *Zinātniskā pētniecība studiju procesā*. Rīga: Biznesa augstskola Turība, 350 lpp.

[5] Latvijas Zinātņu akadēmija (LZA), Latvijas Zinātnes padome (2017) Zinātnieka ētikas kodekss.

[6] Mārtinsone K., Pipere A., Kamerāde D. (zin. red) (2016) *Pētniecība: Teorija un prakse.* Rīga: RAKA, 546 lpp.

[7] Mārtinsone K., Pipere A. (zin. red.) (2019) *Zinātniskā rakstīšana un pētījumu rezultātu izplatīšna*, 2. pap. izd., Rīga: RSU, 301 lpp.

[8] Mihailovs I.J., Sīle V., Sīlis V. (2016) Tiesiskie un ētiskie aspekti pētījumā. **No** Mārtinsone K., Pipere A., Kamerāde D. (zin.red.) *Pētniecība: teorija un prakse*. Rīga: RaKa, 64.-83. Lpp.

Video pre-processing for computer vision tasks using UAVs.

Symagulov[1], I. Assanov[1], Y.Kuchin[1], Jan Rabcan[2], Ye.Kulakova[1], Bayangali Abdygalym1

[1]Satbayev University (KazNRTU), Kazakhstan, Almaty

[2]University of Zilina, Slovakia, Zilina

Abstract

The paper discusses the video and image preprocessing steps that are required for a wide range of clustering, segmentation and classification tasks. The peculiarities of the processing processes presented in this work are the large volume of video data and potentially high data acquisition speed when multiple UAVs are in operation. The described stages provide conversion of the raw data into a format suitable for input to a machine learning system with subsequent solution of the problem and for further research.

Keywords: computer vision, UAVs, machine learning

1 Introduction

Computer vision is a set of machine learning techniques, which in turn is part of the field of artificial intelligence [1]. Computer vision tools and techniques are widely used for UAV data collection and processing. The wide range of UAV applications and the features of this platform [2] require the development of a set of video data processing methods in monitoring tasks. In fact, it is necessary to develop a sequence of operations that could transform and process the "raw" data to solve a wide range of clustering, segmentation and classification tasks. The first and very important task is video and image preprocessing.

Data preprocessing is a set of methods that provide conversion of raw data into a format suitable for input to a machine learning system and subsequent solution of the problem.

2 Overview

Video data processing involves the same steps as image processing except for one additional step to extract frames from the video file. The steps for pre-processing video data include:

1) Retrieving frames from the video, and saving them.
2) Dividing the dataset into training and test parts.
3) Increasing the sample size by adding modified frames.
4) Normalization of data.
5) Data centering.
6) Data scaling.

Later in this paper, these steps will be discussed in more detail.

3 Decision

3.1 Retrieving frames from video, and saving them
This procedure is illustrated in figure 1 (figure 1)

Figure 1 - Frames of the synthesised video file

Above is an example of the same frame cut out of three video files. Since the length of the video is 53 seconds, we get 1590 frames, given that the frame rate of the video is 30. It is possible to reduce the number of images by taking only part of the frames rather than all of them, which is essentially equivalent to reducing the frequency.

3.2 Dividing the data set into training and test sets

It is necessary to divide the data set into two groups of unequal size in order to check the validity of the obtained results (to check the quality of the classification algorithm). The first (large) group is intended for training the system. The second (smaller) group is for testing the system.

3.3 Augmentation of the sample by modifying them

Data set augmentation or data augmentation is a technique that allows increasing the size of the training dataset by modifying the existing dataset. In image processing tasks, such modification is performed with the existing images, which eventually improves the generalization ability of the neural network. Such methods include the following:

- Image cropping.
- Vertical and horizontal shifts.
- Magnifying or reducing the image.
- Rotations and flips. We can rotate the image by a certain angle.

Each rotated image is unique for the model. Arbitrary rotation within 360 degrees is possible. The image can be

flipped horizontally or vertically, depending on the object. For example, a car image cannot be flipped vertically, as this would result in an upside down car. However, it is possible to flip it horizontally so that the car is viewed left and right.

3.4 Normalizing

Scaling is an operation that moves data from one numeric range to another by simply dividing it using a predefined constant. In deep neural networks it is necessary to limit the range of input variables to 0 to 1. This allows first of all to give all the input data the same weight initially, and secondly, to optimize the learning process (matching the ranges of input variables and neural network weights speeds up the process of finding the optimal weights). For example, individual pixel colour parameters vary from 0 to 255. During normalization, this range changes to a range of 0 to 1.

3.5 Centering

Centering is an operation that helps achieve more stable learning. Centering partially solves the problem of explosive gradient growth and vanishing gradient, when due to the great depth of the neural network, the gradient required for the error back propagation algorithm becomes vanishingly small. Centering allows to transform the data set so that the average value of each data sample is 0.

3.6 Scaling

To train a neural network, it needs to be given an image of a certain size. Since the data source may be different, most often we convert its images to a certain size. For example, in our experiments we have used image sizes of 128x128, 256x256, 512x512 pixels. The maximum size is usually limited by the GPU memory and its architecture. In particular, when using NVIDIA P100 GPU with 12 GB of memory it is possible to store 3 images of 512x512 size at a time in the video memory.

4 Conclusion

As a result of computational experiments, preprocessing methods for synthetic and real video data have been tested, which include

- Obtaining frames from video, and saving them.
- Dividing the dataset into training and test parts.
- Data augmentation.
- Normalization.
- Data centering.
- Data scaling.

The peculiarities of the processing processes are the large volume of video data and potentially high data acquisition speed when multiple UAVs are in operation. Features of real-time data processing of multiple UAVs will be the subject of further research.

5 Acknowledgements

This research was funded by the: Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan, grant number AP08856412 « Development of Intelligent Data Processing and Flight Planning Models for Precision Farming Tasks Using UAVs»;, grant number BR10965172 «Space monitoring and GIS for quantitative assessment of soil salinity and degradation of agricultural lands in South Kazakhstan».

Publication was partially realized with support of Operational Program Integrated Infrastructure 2014 - 2020 of the project: Intelligent operating and processing systems for UAVs, code ITMS 313011V422, co-financed by the European Regional Development Fund and ERASMUS+ ACeSYRI: Advanced Centre for PhD Students and Young Researchers in Informatics reg.no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP.

References

[1] Mukhamediev R I et al. 2021 Review of Some Applications of Unmanned Aerial Vehicles Technology in the Resource-Rich Country. – Applied Sciences **11 (21) 10171**

[2] Mukhamediev R. I. et al. 2021 From Classical Machine Learning to Deep Neural Networks: A Simplified Scientometric Review. – Applied Sciences **11 (12) 5541**.

Software product control

Dina Kelsina, Rostislav Kopitov, Irina Pyasetska

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: d.kelsina@gmail.lv, rostislavs.kopitovs@isma.lv, irina.pjasecka@gmail.com

Abstract

The result-oriented tools for evaluating software labor intensity focus on the sustainable management of the interaction between the participants who are involved in the development process. Preventing deadline disruptions in the course of work increases the accuracy of the developer's obligations to the customer.

Keywords: methodology, effort, need, change, effectiveness

1 Introduction

The approach focuses on identifying and correcting planning defects in the early stages of software development. These measures reduce financial losses and enhance the reputation of developers. However, inefficient production of software products is caused by a mismatch between the resources allocated and the amount of labor expended by developers.

2 The Computational Platform

The purpose of the study is focused on the development of a procedure that ensures the responsibility for the issuance of objective conclusions about the estimated labor intensity of software development. In this regard, it was necessary to carry out the classification of tools for estimating labor intensity. On its basis, a systematization of software production process control was carried out.

As a result, it became possible to develop a procedure for a full-scale assessment of software labor intensity. Approbation of the procedure was carried out in the course of packaging the activities of the BPO organization in a specific product.

3 Conclusions

On the basis of the procedure recommendations were developed on the use of performance tools that evaluate the labor intensity of the production of software products. The obtained results indicate the presence of the resultant tools to evaluate the effectiveness of the enterprise as a whole and identify weaknesses in the individual stages of its implementation.

Overview of the main subjects of the US and Europe market of university press

Jekaterina Korjuhina, Anastasiia Khmil

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: [1]jekaterina.korjuhina@gmail.com, [2]khmilasya@gmail.com

Abstract

The article deals with associations of university publishers in the US and Europe, as well as university publishers that are leaders in the field of academic literature in the US and Europe. In addition, provide analysis of university presses companies of management models, marketing strategies, profits during the pandemic crisis were analyzed.

Keywords: university presses, academic publishers

1. Introduction

The pandemic crisis has greatly affected the work of many publishing houses, especially the university press, which was often published in print format. The crisis affected the supply of paper, the limited physical access of users to libraries and shops, and the closure of bookstores.

These factors influenced changes in the management strategies of such companies (switching to flexible management - part of the days of work in the office, part of the days of work remotely from home), and literature promotion strategies (arrangements with online book promotion platforms (Amazon etc.), opening their own courses, developing their own platforms for book sales).

Publishers have been challenged to move quickly to digital.

2. Research results

The international university press market consists of both publishers and associations. There are two major associations in the USA and in Europe: The Association of University Presses (AUP) and the Association of European University Presses (AEUP).

Association of University Presses (https://aupresses.org/) based in New York and Washington, USA. This association assists in the marketing and promotion of books published by its members, and professional training of university publishers. Most American university presses are members of this association, but since 2017, the association has also attracted publishing houses from other countries.

AUP establishes and maintains links with state and government institutions, foundations and other organizations that may be interested in the development of academic publishing. In addition, the organization contacts sponsoring organizations to raise funds for the implementation of projects in the interests of all university publishers and the entire student and teaching community monitors legislative changes, provides legal consulting services, and, if necessary, can also organize lobbying for the interests of university publishing houses [4]. The association is engaged in researching the market of this literature, identifying the main problems, preparing various events to support the publishers that are part of the association.

One of the main types of AUP services that publishers use is corporate advertising. For example, if a university press can't afford to pay for its ads in the New York Times, then the AUP steps in and collects applications from several participants and then enters an advertising contract with the newspaper on its own behalf. The source of payment is the AUP, whose costs are covered by the university publishers participating in the advertising project. One of the activities of AUP is the formation of a database of scientific publications for all universities, these databases are available for use by students through the university server, which makes it easier for them to search for literature and get acquainted with thematic novelties, and promotes monographs. The budget of the Association of University Press is $2 million a year. One-third is membership fees and two-thirds are income from the provision of services (management consulting, marketing, advertising) [4].

Many European university presses have joined the Association of American University Press (AAUP) as foreign members. Despite this, there is still a significant difference between the structures, legal aspects of university publishing in the US and Europe. France, Germany, and Italy have a national association of university presses, while in other countries only one or two university presses can be found. Many university presses in Europe are not known to the general public. Even though each publishing house has different vectors of development, mission, structure, eight universities from the Netherlands, France, Germany, Belgium, the United Kingdom in 2010 decided to form an association of European University Presses. It is an organization of and for university presses across Europe to help them build stronger relationships between them, co-operate, and share knowledge in order to reach common goals and to jointly address important issues in a currently dynamic time in publishing [3].

Their primary goal is to help each other define the vision of university press publishing in the digital age, and we can share ideas on how to (re)invent ourselves. Participation in the association is paid. The team provides opportunities to participate in various conferences, international exhibitions.

Now, this association is working to improve its catalogue (aeup-catalog.eu). They already have a catalogue platform to which all members are connected, title metadata, printed and eBooks uploaded. But so far there is no proper marketplace and open searchable database.

It is important to note that this association also includes representatives of Latvia. Riga Technical University Press actively participates in many activities of the association.

We would also like to consider world leaders among university publishers as subjects of this market. According to the SENSE ranking of academic publishers [5] the main publishers in the world, who publish scholarly works and books for students are California University Press, Cambridge University Press, Clarendon Press, Columbia University Press, Harvard University Press, Oxford University Press, Pennsylvania University Press, Stanford University Press, etc. These publishing houses produce journal articles, dictionaries, monographs, scholarly editions, higher education textbooks, schoolbooks and working papers. Also, they have blogs and specialist networking sites.

Consider the general points of the marketing and management strategies during pandemic Covid-2019 of these three leading non-profit academic publishers: *Cambridge University Press & Assessment (UK), Oxford University Press (UK) and University of California Press (USA).* These publishing houses have sales representatives all over the world.

Management. The number of employees in these publishing houses is 7986 employees in Oxford University Press, 123 employees in University of California Press and 3035 employees worldwide in Cambridge University Press. All of the publishers represented have a board of directors and committees, which are appointed by the staff of their universities. They have a Finance committee, Marketing department, Publishing committee and others. After the pandemic, the Presses assumed that they would be implementing a hybrid model of working that mixes some days in the office and some working from home. During pandemics Cambridge University Press, for example, actively invests in skills development of staff; an apprenticeship scheme; a focus on equality, diversity, inclusion and belonging; coaching from external professionals around issues of change to encourage greater flexibility and resilience at work; the encouragement of community engagement and charitable activity by their own offices around the world.

Marketing. The publishing house has made a big breakthrough in digital technology during the pandemic despite the reduction in staff. The main achievements: online and digital projects focused on improving reach and flexibility. For example, Oxford University Press improved its online platforms MyMaths, Kerboodle and Oxford Owl. Also, the OUP provided its services as a developer of online platforms for representatives of the educational business. Cambridge University Press improved online projects such as Cambridge Core, Cambridge Dictionary and Cambridge Go. Both these publishing houses started actively blogging. For example, Cambridge University Press created a series of blogs “Cambridge Reflections”, written by our authors and editors in the humanities and social sciences on the wider impact of the pandemic

Profit. According to the Annual report of Cambridge University Press, sales of the previous fiscal year were £384 million in the period and operating profits in the 15-month period were £20.7 m. The Finance Annual report of Oxford University Press showed that the estimated annual revenue for the fiscal year ending 31 March 2021 was over £56 million. Growjo Statistics claims that the University of California Press's estimated annual revenue is currently $29.9M per year [1; 2; 6].

3. Conclusion

After analyzing the work system of the largest European and American publishing houses, we can conclude that the pandemic crisis contributed to a sharp transition to the digital format, the founding of their own written blogs, and the search for solutions to provide new types of services. As an example, cooperation with other companies to provide services for the creation of educational platforms or the creation of their own courses. Also, many publishing houses have approached the idea of making academic literature accessible to people from all over the world. All reviewed publishers provided free medical literature so that doctors could improve their fight against coronavirus. Some of these publishers, like Cambridge University Press, were able to get out of the crisis with the least financial losses.

References

[1] Amy Watson 2021 Profit for the year of the Oxford University Press worldwide from April 1, 2010 to March 31, 2021 https://www.statista.com/statistics/284493/oxford-university-press-net-profit-wordwide/ 26 Mar 2022

[2] Annual Report 2020-21 Finances of Oxford University Press 2021 https://assets.foleon.com/eu-west-2/uploads-7e3kk3/48289/oup_finances_a4_pages_v3.a6901802109d.pdf 26 Mar 2022

[3] Association of European University Presses https://www.aeup.eu/ 24 Mar 2022

[4] Eriashvili Nodari Darchoevich, Saudakhanov Dinara Naderovna University Press USA 2014 https://cyberleninka.ru/article/n/universitetskie-izdatelstva-ssha 24 Mar 2022

[5] SENSE ranking of academic publishers 2016 https://silo.tips/download/sense-ranking-of-academic-publishers 25 Mar 2022

[6] University of California Press Revenue and Competitors https://growjo.com/company/University_of_California_Press 25 Mar 2022

Calculation filtration coefficient using regression models

Yan Kuchin[1,2], Jan Rabcan[3], A Symagulov[1,2], Ravil I. Mukhamediev[1,2], Bayangali Abdygalym[1] , Nadiya Yunicheva[1] and Elena Mukhamedieva[1]

[1]*Institute of Information and Computational Technologies MES RK, Kazakhstan, Almaty*

[2]*Satbayev University (KazNRTU), Kazakhstan, Almaty*

[3]*University of Zilina, Slovakia, Zilina*

Abstract

Uranium nuclear disintegration is one of the cleanest ways to meet the growing demand for energy. The uranium needed for power plants is mainly produced by two methods in approximately equal volumes: in quarries (underground and open) and leaching on-site (ISL). Effective use of ISL requires, among other things, the correct determination of the filtration characteristics of the accommodating rocks. In Kazakhstan, this calculation is still based on methods developed more than 50 years ago, and in some cases there is inaccurate results. At the sa uranium mining, machine learning, regression model, filtration characteristics.me time, knowledge of filtration characteristics is necessary to count extracted reserves, predicting the dynamics of production, calculating the optimal number of wells, etc. This article describes the method for calculating the coefficient of filtering of rudinal rocks using machine learning. The proposed method is based on nonlinear regression models. It also allows you to estimate the filtration properties of breeds in the process of technological acidification, where the existing method is not applicable. The proposed method is applicable to about half the uranium produced in the world and allows us to significantly (by 22% -70%) to increase the accuracy of determining the filtering coefficient and, accordingly, increase the accuracy of the estimated reserves and economic indicators of production processes.

Keywords: uranium mining, machine learning, regression model, filtration characteristics.

1 Introduction

According to the World Nuclear Association, in 2018, the largest uranium mining companies produced 86% of the world's total uranium production [1,2], of which NAC Kazatomprom JSC accounted for 21%. Companies use two main mining methods: open pit (underground and open-pit), which accounted for 45.9% of the production, and in-situ leaching (ISL), which accounts for 48.3% of the world's uranium production. Approximately 5.8% of uranium is mined as a byproduct, such as in gold mining [3]. In Kazakhstan uranium production is carried out by the in-situ leaching (ISL) method. In this method, uranium is extracted through a network of pumping and injection wells through which a leaching solution circulates. An important characteristic for planning uranium mining is the filtration properties of the host rock. Filtration properties of rocks have a significant impact on the mineral composition of both the surface soil layer and rocks that lie at a depth of tens and hundreds of meters. Knowledge of filtration properties in the form of filtration coefficient allows to plan the volume of ore extraction. The currently used methodology for calculating the filtration properties of wells for uranium mining by in-situ leaching is based on a system of rules that take into account only one geophysical parameter (apparent resistivity- AR). However, this methodology is not applicable in the case of a failure to record CW or distortion of values under the influence of acid, which is widely used in uranium mining. At the same time, other geophysical parameters can be used to calculate the filtration coefficient, the use of which can improve the accuracy of the calculation. Multiple parameters in the presence of actual measurements can be accounted for by using machine learning models (MLM) [4, 5]. MLM is widely used to solve the tasks geological mapping [6], lithology classification [7,8], stratigraphy [9].

2 Methodological steps

The methodological scheme of the study consists of the following steps:

- Data collection and preprocessing. This step is necessary to form a set of input variables and to select the target variable.
- Application of machine learning methods in two experiments.

a) Experiment 1: ANN-based regression model based on data from exploratory wells of the Budennovskoye field.
b) Experiment 2. Regression models based on ANN and Extreme Gradient Boosting (XGBoost [10]) use data from the Inkai field.

Verification of results using root mean square error (RMSE), coefficient of determination (R^2), Pearson correlation coefficient R.

3 Results

According to the current methodology [11], the parameters of the rock filtration properties and the actual value of the

filtration coefficient (K_f) were identified at the exploration drilling stage. Subsequently, the obtained parameters were used to calculate the filtration properties of the technological wells. Correct calculation of K_f affects the estimation of recoverable reserves and parameters of the production process. Based on the results of the experiments, a two-stage scheme for determining filtration coefficients in the fields of Kazakhstan using machine-learning models was proposed [12].

In the first stage, machine learning models were tuned using data from exploratory wells. A hybrid model is formed from the tuned models, which use the MLM for acidified well sections, where the input data are spontaneous polarization potential (SP) (XGBoost (SP)). For non-acidified sections, the apparent resistance logging (AR) and lithological code set by the expert (LC) data were used (XGBoost (AR, LC)).

Because technogenic acidification intervals are found only in production wells, they are not present in the dataset generated from exploration wells. Therefore, it is impossible to directly teach the correct predictions K_f for acidified intervals. Because of the poor quality of SP curve recording, adding it as an input regression parameter usually slightly worsens the accuracy.

However, in acidified well sections, the AR curve is too distorted, and the lithological code only indicates the acidification interval (not the actual rock type). Moreover, this distortion is dependent on the lithological composition of the rocks and the amount of acid. Therefore, the only option in this case is to use the SP, even though it has low accuracy.

During the training on data from exploration wells, only intervals with a thickness of 0.5 m were used for comparison with data from hydrogeological studies, which led to a high RMSE value. In the technological well data, lithologic intervals were mainly more than 2 m thick, so the result of the approved methodology was relatively good (in wells without acidified intervals, almost comparable with regression models). Based on this, we can draw the following conclusions.

1. Regression models work well for all intervals, while the current methodology is only suitable for intervals greater than 1.5-2m.
2. The current methodology is not applicable to wells containing acidified intervals.
3. Hybrid can be applied to wells containing acidified intervals.

4 Conclusion.

The extraction of uranium by the method of underground borehole leaching requires a fairly accurate determination of the lithological composition and filtration properties of ore-bearing rocks. The mineral composition of the surface layer of soil, as well as rocks at a depth of tens and hundreds of meters depends on the filtration properties of the ore rocks. The methodology used in Kazakhstan for assessing the filtration properties is based on the fact that at the stage of exploratory drilling, parameters are determined, which are subsequently used to calculate the filtration properties of technological wells. However, the existing technique gives an inaccurate result, and in the zones of technological acidification, which make up to 40% of all considered data, it cannot be used. Inaccuracies in determining the filtration coefficient lead to errors in the production process and inaccurate calculation of recoverable reserves.

To overcome the shortcomings of the existing approach, the paper proposes a method for calculating the filtration coefficient based on the use of regression models. The proposed model receives electrical logging data as an input, and the calculated filter coefficient as an output. To improve the quality of the model, it is made hybrid, that is, it is formed from two models. For non-acidified areas, a model is used in which the input variables consist of AR and LC. For acidic areas, a model is used whose input variables consist of SP data.

The analysis shows that the proposed method gives a significantly lower mean square error in determining the filtration coefficient, better (by 70%) correlates with the flow rates of wells, with the actual values of the filtration coefficient (by 27%) is applicable for small intervals and, in addition, can be used to calculate filtration coefficient in acidification zones.

5 Acknowledgment.

This research was funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grants: No. BR10965172), Integrated Infrastructure Operational Program for the project: Systemic Public Research Infrastructure – Biobank for Cancer and Rare diseases, ITMS: 313011AFG5, co-financed by the European Regional Development Fund, ERASMUS+ ACeSYRI: Advanced Centre for PhD Students and Young Researchers in Informatics reg.no. 610166-EPP-1-2019-1-SK-EPPKA2-CBHE-JP.

References

[1] Uranium reserves, which countries have the largest reserves? (2018). [Online]. Available: https://eenergy.media/2018/11/06/zapasy-urana-u-kakih-stran-oni-samye-bolshie

[2] World Nuclear Association, "Recent uranium production", The Nuclear Fuel Report: Expanded Summary – Global Scenarios for Demand and Supply Availability 2019-2040, June 2020, p. 48. [Online]. Available: https://world-nuclear.org/getmedia/b488c502-baf9-4142-8d12-42bab97593c3/nuclear-fuel-report-2019-expanded-summary-final.pdf.aspx

[3] U.K. Amirova, N.A. Uruzbaeva, "Overview of the development of the world market of Uranium," Universum: Economics and Law: electronic scientific journal, vol. 6, no. 39, Jun. 2017. [Online]. Available: https://7universum.com/ru/economy/archive/item/4802

[4] Mukhamediev, R. I., E. L. Mukhamedieva, and Ya. I. Kuchin. " Taxonomy of Machine Learning Methods and Evaluation of Classification Quality and Learnability," Cloud of science 2.3 (2015): 359-378.

[5] R. I. Mukhamediev, A. Symagulov, Y. Kuchin, K. Yakunin, and M. Yelis, "From Classical Machine Learning to Deep Neural Networks: A Simplified Scientometric Review," Appl. Sci., vol.11, no.12, p. 5541, Jun. 2021.

[6] C. Kumar, S. Chatterjee, T. Oommen, A. Guha, "Automated lithological mapping by integrating spectral enhancement techniques and machine learning algorithms using AVIRIS-NG hyperspectral

data in Gold-bearing granite-greenstone rocks in Hutti, India," Int. J. Appl. Earth Obs. Geoinf., vol. 86, Apr. 2020, Art. no. 102006.

[7] R.I. Mukhamediev, Y.I. Kuchin, K.O. Yakunin, E.L. Mukhamedieva, S.V. Kostarev, "Preliminary results of the assessment of lithological classifiers for uranium deposits of the infiltration type," Cloud of Science, vol. 7, no. 2, pp. 258-272, 2020.

[8] Y.I. Kuchin, R.I. Mukhamediev, K.O. Yakunin. One method of generating synthetic data to assess the upper limit of machine learning algorithms performance, Cogent Engineering vol. 7, no. 1, Feb. 2020, DOI: 10.1080/23311916.2020.1718821

[9] T. Merembayev, R. Yunussov, A.Yedilkhan, "Machine learning algorithms for stratigraphy classification on uranium deposits," Procedia Computer Science, vol. 150, pp. 46-52, 2019.

[10] J. Friedman,"Greedy function approximation: A gradient boosting machine," Ann. Statist, vol. 29, no.5, pp. 1189 - 1232, Oct. 2001, https://doi.org/10.1214/aos/1013203451

[11] Guidelines for determining the coefficient of filtration of water-bearing rocks by experimental pumping, Energoizdat, Moscow, Russia,1981. [Online]. Available: https://www.geokniga.org/books/17383

[12] R. I. Mukhamediev, Y. Kuchin, Y. Amirgaliyev, N. Yunicheva and E. Mukhamediev, "Estimation of Filtration Properties of Host Rocks in Sandstone-type Uranium Deposits Using Machine Learning Methods," in IEEE Access, doi: 10.1109/ACCESS.2022.3149625

International agreements to ensure the decarbonisation of the economies of the world

Inna Gryshova[1], Viktoriia Riashchenko[2], Wladimir Gottman[3]

[1]Scientific National Center "Institute of Agricultural Economics" National Academy of Sciences of Ukraine

[2, 3] ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: [1]260614@ukr.net; [2]Viktoriia.riashchenko@isma.lv

Abstract

The article deals with one of the most important global problems of mankind – climate change due to the increase in emissions of greenhouse gases, primarily carbon dioxide. The aim of the study is to analyse the implementation of international agreements on decarbonisation of the economies of the world .

Keywords: environment, climate change, decarbonisation, greenhouse gas emissions, carbon dioxide, agreements, international commitments

Introduction

At present, the fact of anthropogenic impact on global warming in the 20th – 21st centuries is considered proven. Indeed, neither solar radiation nor volcanic activity has a decisive influence on the global average annual temperature. It is the human factor that dominates here: population growth, destruction of forests and burning of fossil fuels, which have led to a rapid increase in the concentration of CO2 in the atmosphere.

Overview

Based on the study, it is found that: the current climate policy is not active enough; the climate leader is the EU with its Member States, which pursue a balanced integrated energy and climate policy that does not jeopardize social and economic growth.

Decision

Analysis of modern research on decarbonisation of the economy

As noted in the work P. Ekins, P. Drummond and J. Watson (2018) [2], "Energy, and access to energy, are essential to human life, civilisation and development. One characteristic of industrial societies, that has both allowed them to evolve into their current form and continues to fuel their activities, is their greatly enhanced use of energy per person, enabled by the discovery of fossil fuels and the development of technologies that enable these fuels to be exploited". But this has caused a number of problems that are gaining an increasing importance on the global stage, including: greenhouse gas emissions, energy security issues, etc.

The most comprehensive research of the problem of reducing carbon dioxide emissions in the energy sector are carried out by International Energy Agency (IEA), US Energy Information Administration, World Energy Council (WEC). Also, this issue is the subject of study of many scientists and expert researchers. Moreover, it is considered with regard to a number of aspects, one of the most important of which is the determination of priorities and mechanisms for elaborating a national decarbonisation policy, fair distribution of countries' contributions related to greenhouse gas emissions, impact of decarbonisation measures on the competitiveness and socio-economic development of countries; identification of effective mechanisms for international cooperation, etc.

Antimiani A. et al. (2016) [1] consider the risks of implementing the EU strategy to mitigate climate change by reducing greenhouse gas emissions and the impact of climate policy on competitiveness. The authors prove that this influence can be quite serious and, therefore, it requires informed decisions on the elaboration of a decarbonisation policy. At the same time, it is determined that a long-term EU strategy aimed at investing in energy efficiency and renewable energy sources can protect vulnerable industries while increasing the competitiveness of high-tech industries and advanced economic sectors. The need for a balanced decarbonisation policy, which will take into account support for high-tech industries, is also noted by Gryshova I. et al. (2020) [3], Khaustova V. et al. (2018) [4].

Research by Kyzym M. and Leljuk O. (2019) [5] deals with the analysis of the state of the power sector in Ukraine. Based on the study, it is proved that the main reason for the decrease in the volume and efficiency of production in the country is a steady downward trend in the intensity of electricity production, due to the deterioration of the technical condition of the generation capacities, which requires the implementation of appropriate measures for their modernization. Kyzym M. et al. (2018) [6] justify the directions of structural and technological modernization of the Ukrainian power sector, taking into account the prospects for the technological development of the modern energy sector, reducing its load on the environment and the production sufficiency of domestic power engineering.

Veysey J. et al. (2016) [7] analyse the possibilities for Mexico to reduce greenhouse gas emissions. The authors found that the ambitious national goals of reducing greenhouse gas emissions in the country contradict the latest trends in the field of energy and emissions in general and substantiates the need for decarbonisation of the country's power sector along with changes in the transport sector.

Investigation carried out by Singh A. et al. (2019) [8] presents the construction of a numerical economy-wide model of India with energy sector detail to evaluate the impact of achieving India's commitments to the Paris Climate Agreement (PA). The simulation results are used to determine the future decarbonisation policies of the country.

Thus, at present, decarbonisation of the economy is considered as an important integral component of the modern development of almost all countries of the world. According to modern researches, the largest impact on the environmental as concerns CO2 emissions is made by the energy and transport sectors. Therefore, countries pay special attention to the problem of decarbonisation in forming their energy policies. At the same time, scientists note that addressing this problem requires developing of balanced approaches and strategies that will allow achieving the goals of decarbonisation without threatening sustainable socio-economic development of countries and their energy security. International cooperation based on justice, political will and sustainable public policy of all countries of the world is also recognised as an essential component for a successful solving of the problem of reducing CO2 emissions into the atmosphere.

Conclusion

Thus, as was mentioned earlier, today, one of the most important global problems of mankind is climate change under the influence of increased emissions of greenhouse gases, especially CO2, which has led to the conclusion of a number of international agreements aimed at reducing emissions. At the same time, the world practice shows the presence of certain difficulties and contradictions in countries' observing them (Veysey J. et al. (2016) [14], Max Åhman et al. (2017) [9], Lois Barber et al. (2017) [10]). This requires further analysis and research since the determination of priorities, mechanisms and directions for the implementation of these agreements should take into account, on the one hand, the common goals of reducing emissions, and, on the other hand, the ability of countries to fulfil the agreements while ensuring their sustainable development and an adequate quality of life for their people. Only this can help to achieve harmonious cooperation and fair distribution of public responsibility in addressing climate change.

- Thus, the goal of this study is analysing the implementation of international agreements to ensure decarbonisation of the economies of the world.
- To achieve this goal, the study solves the following tasks:

Analysing the content and requirements of international agreements to ensure decarbonisation of the economy.

Considering the features of the implementation of international agreements by countries of the world.

References

[1] Climate Change: Atmospheric Carbon Dioxide. Available online: https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide (accessed on 12 April 2020).

[2] Boikova T., Zeverte-Rivza S., Rivza P., Rivza B. (2021) The Determinants and Effects of Competitiveness: The Role of Digitalization in the European Economies. Sustainability, https://www.mdpi.com/2071-1050/13/21/11689/pdf Special Issue "Exploring Relationships between Digitalization and Sustainability".

[3] Gryshova, I; Kyzym, M.; Khaustova, V.; Korneev, V.; Kramarev, H. Assessment of the Industrial Structure and Its Influence on Sustainable Economic Development and Quality of Life of the Population of Different World Countries. Sustainability. 2020, 12, 2072; doi:10.3390/su12052072.

[4] Khaustova, V.Y.; Kotlyarov, Y.I.; Lelyuk, O.V. Analysis of the state policy of electricity development in Ukraine. Bus. Inform. 2018, 12, 182–193.

[5] Kyzym, M.O.; Lelyuk, O.V. Analysis of the state of the electricity sector of Ukraine. Bus. Inform. 2019, 2, 186-201, doi:10.32983/2222-4459-2019-2-186-201.

[6] Chen Q, Balian A, Kyzym M, Salashenko T, Gryshova I, Khaustova V Veysey, J.; Octaviano, C.; Calvin, K.; Martinez, Sh.; Kitous, A.; McFarland, J.; van der Zwaan, B. Pathways to Mexico's climate change mitigation targets: A multi-model analysis. Energy Econ. 2016, 56, 587–599, doi:10.1016/j.eneco.2015.04.011.

[7] Singh, A.; Winchester, N.; Karplus, V. Evaluating India's climate targets: the implications of economy-wide and sector-specific policies. Climate Change Econ. 2019, 10(3), 1950009, doi:10.1142/S201000781950009X.

[8] World Energy Trilemma Index, 2019. World Energy Council. Available online: https://www.worldenergy.org/publications/entry/world-energy-trilemma-index-2019 (accessed on 20 April 2020).

[9] Åhman, M.; Nilsson, L.J.; Johansson, B. Global climate policy and deep decarbonization of energy-intensive industries. Climate Policy. 2017, 17(5), 634–649, doi:10.1080/14693062.2016.1167009.

[10] A checkup on country efforts to implement the Paris agreement. Climate Scorecard Report #11, edited by Lois Barber and Ron Israel, 2017, 33 p. Available online: http://climatescorecard.org/wp-content/uploads/2018/02/Climate ScorecardReport11.pdf (accessed on 19 April 2020).

Complete guide to improving system operability

Kopitov Rostislav

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: rostislavs.kopitovs@isma.lv

Abstract

This study is devoted to the development of skills, which allow you to apply the means of reproduction to the entire process by preventing the spread of false information about the system. Thus, the organization is in its neutral state, where destructive forces under the influence of external risks, do not pose a threat to the organization.

Keywords: destructive forces, pressure, stability loss, analysis, correction, testing, synthesis, improvement

1 Introduction

Analyzing the pattern of deviations makes it possible not only to develop means of neutralizing the reasons for destruction of the system, but also to find the right tools for unlocking the hidden potential of the organization. During research, it was found that superficial diagnosis of defects which attempts to justify them, contradicts the development of skills for analyzing complex problems of the organization. The discovered contradiction allowed for identification of the research problem, which can be summarized in the following statement: "It is impossible to draw objective conclusions about the state of the organization, whilst having an incomplete set of characteristic signs of a problem as well as without fundamental mechanisms for detecting and establishing, viable performance standards". When such standards are present, continuous changes will not interfere with the current operations of the organization.

2 Nature and Purpose of the Methodology

In the selection process of the object of study, it was determined that strict adherence to the guidelines for maintaining the emergence qualities of the system throughout the organizations' entire life cycle ensures that the organization can achieve its specified goal. Additionally, the goal of the study is to develop a procedure to quantify the benefits of continuous improvements and corrections to the system, with a focus on confirming the efficacy and reliability of such changes. In accordance with the goal, the following tasks were put forward:

1. Conduct an analysis on the current disturbances, which result in the functioning instability of the system.
2. Selection of a method for bringing back the organization from its unstable state.
3. Implementation of the medium-term development scenario for the organization, in accordance with the consolidated changes.
4. Development of a prospective report, based upon the actions of individuals involved in the operation of the system, whilst generating effective proposals that go beyond the desired goal.

Practical results show that the developed maintenance program allows not only to preserve the emergence of the system during the introduction of innovations, but also to ensure its efficacy without a decrease in performance standards.

3 Conclusion

The novelty of the study lies within the implementation of changes in the organization, which improve the quality of service from version to version without a loss in the functionality of the system. Thus, this elevates the level of system maintenance, whilst maximizing its resistance to external factors due to the continuous search for hidden control levers within the organization.

Speech Signal Processing for Low Resource Languages

Krassovitsky*, R. Mussabayev*

Institute of Information and Computational Technologies, Pushkin str. 125, Almaty, Kazakhstan

**Corresponding author's e-mails: akrassovitskiy@gmail.com, rmusab@gmail.com*

Abstract

ASR in natural language and corresponding machine learning methods are essential for research nowadays. The purpose of this work is to review the main challenges and approaches in Automatic Speech Recognition (ASR) for low resource languages in the scope of speech segmentation, automatic feature extraction and feature generation.

Keywords*:* ASR, speech features, clustering, machine learning

Introduction

Over the past decades, there has been significant development of the machine learning paradigm. This paradigm is often used for automatic speech recognition, ranging from mobile devices to "smart home" and ending with space systems [1, 2]. The most effective and commonly used machine learning techniques are artificial neural networks, support vector machines [3], Gaussian mixture models [4], and hidden Markov models [5]. Recently, the deep learning approach [6] has also received a significant expansion, which has improved the efficiency of speech signal recognition.

Although commercial speech recognition systems based on the machine learning paradigm have been available for some well-defined applications such as dictation and transcription, there are still many unsolved problems in this area. These include recognition in a noisy environment, multimodal recognition, multilingual recognition, recognition in an unknown language [7].

Modern automatic speech recognition systems have achieved acceptable accuracy results and are operated widely in various fields. Further improvement in accuracy will further expand the scope of speech technologies in the daily life of ordinary users. However, standard supervised recognition methods [6] have essential obstacles for further improvement in recognition quality due to some inherent limitations.

The most proven standard methods are based on machine learning algorithms with well-prepared training data sets (labeled speech corpora) and using them (hidden Markov models, neural networks, etc.). In such systems, recognition accuracy is limited by the training data set's volume, balance, and labeling accuracy. Often such systems have difficulty recognizing new words and rarely use contextual combinations of known words. There are several commonly recognized problems in modern speech technologies, the solution of which will contribute to their transfer to a new qualitative level. One of these problems is the problem of detecting unknown words in a speech signal [8]. The ability of the system to independently detect an unknown expression in a speech signal and learn to recognize them is a valuable feature that improves the quality of recognition. Modern designs are still terrible at this, and the presence of this feature will change the approaches used for acoustic modeling. Instead of simply accepting only what we already know, we need the ability to determine the fact that we do not know something. Before recognition, it is necessary to automatically divide and classify the signal into known and unknown fragments (words, phrases). The basic speech pre-processing pipeline is shown in FIGURE 1. The essential research interest is concentrated on advanced feature extraction and segmentation approaches, as these parts may potentially decrease the workload on speech recognition models. The work intends is study the possibility of creation a speech recognition system that are adaptable and flexible by posing a very extreme situation when it is necessary to learn the entire language without having any knowledge about it [1]. Due to resource limitations, it is reasonable to consider as the highest level of the language structure for the unsupervised learning system only the lexical level. Speech and linguistic technologies accompanied with algorithms that can complement systems with preliminary training in a

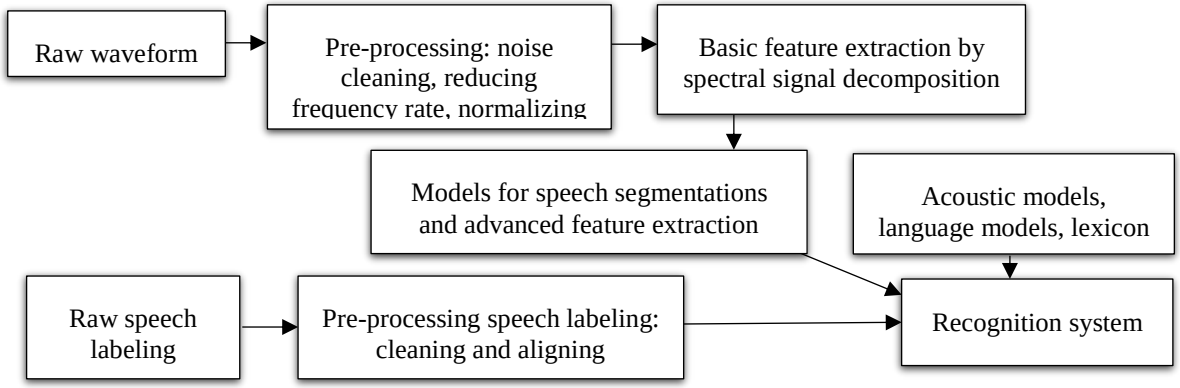


FIGURE 1 ASR pipeline

barely manually annotated corpus (low-resource languages or dialects) [8]. In addition, it allows identifying new and unknown words not included in the training data set in the speech stream. Fast unsupervised learning of recognition algorithms from a minimum data set is still a little-studied problem; some competitions are held annually [9].

Hence it remains challenging problem to extract effectively the information about the structural linguistic units of an unknown speech signal in an unknown language without prior training. Information about structural linguistic units is retrieved sequentially from low levels to higher ones. The lowest-level units are individual micro-local segments of the signal at the level of individual acoustic events, and the highest-level unit is subphonemic units of individual words. The process of analysis and transcription is performed by the sequential iterative clustering of low-level units to aggregate them into higher-level units up to individual words; density methods are used to cluster with a previously unknown number of clusters [10]. For these purposes, for each level, specialized clustering algorithms are developed that take into account the linear structure of the speech signal and the contextual features of the distribution of various types of segments at this level. One of the possible approaches for evaluating the solution's quality to this problem is modifying the method of dynamic adjustment of the time scale called Dynamic Time Warping (DTW) [11]. The main focus of this work is on robust algorithms for multilevel segmentation of the speech signal [12] and automatic classification of the received segments. The primary accented has been given to methods that allow extracting essential information about the structure of a raw speech signal in an unknown language using unsupervised learning. It allows to use unsupervised learning algorithms for an unknown language by identifying stable linguistic units in this language at various levels and their subsequent transcription. Transcription of speech signals means its encoding in the form of a compact textual description about the structure and various properties of the analyzed signal, taking into account its pronunciation. Transcription can be carried out hierarchically at all considered linguistic levels [2]. The machine learning system is immersed in an unknown language environment; hence, due to the generalization of the processed speech information and the analysis of the patterns, the system independently learns to identify various language structural units in the speech stream, up to individual words. This problem remains difficult to solve at the machine level, where the dominant paradigm is massive learning using large datasets manually labeled by humans.

Hence, it is essential to focus on highly efficient unsupervised speech signal recognition algorithms in an unknown language, which have high robustness to variability and changes in the dynamic characteristics of speech. One of the main advantages of approaches in [9, 11] is their focus on the process of unsupervised machine learning. These algorithms are used to overcome the shortcomings inherent in widely used methods of supervised speech recognition by combining best of their features. We hope that the provided survey will encourage the readers to participate in facing the challenges in the broad field of speech recognition.

Acknowledgments

This research is conducted within the framework of the grant num. AP088560349 "Self-learning robust unsupervised automatic speech signal recognition".

References

[1] Baker J, Li D, Glass J., Khudanpur S, Chin-hui L, Morgan N, O'Shaughnessy D Developments and directions in speech recognition and understanding 2009 *IEEE Signal Processing Magazine* 26(3) 75-80

[2] Lu L, Ghoshal A, Renals S Cross-Lingual Subspace Gaussian Mixture Models for Low-Resource Speech Recognition 2014 *IEEE-ACM Transactions on Audio Speech and Language Processing* **22**(1) 17-27

[3] Noda K, Yamaguchi Y, Nakadai K, Okuno H, Ogata T Audio-visual speech recognition using deep learning 2015 *Applied Intelligence* **42**(4) 722-737

[4] Karpov A An automatic multimodal speech recognition system with audio and video information 2014 *Automation and Remote Control* **75**(12) 2190-2200

[5] Solera-Urena R, Garcia-Moral A, Pelaez-Moreno C, Martinez-Ramon M, Diaz-de-Maria F Real-Time Robust Automatic Speech Recognition Using Compact Support Vector Machines 2012 *IEEE Transactions on Audio Speech and Language Processing* **20**(4) 1347-1361

[6] Cortes C, Vapnik V Support-vector networks 1995 *Machine learning* **20**(3) 273-297

[7] Baker J et al. Updated MINDS report on speech recognition and understanding 2009 *IEEE Signal Processing Magazine* **26**(4) 78-85

[8] Champion C, Houghton S Application of continuous state Hidden Markov Models to a classical problem in speech recognition 2016 *Computer Speech and Language* **36** 347-364

[9] LeCun Y, Bengio Y, Hinton G. Deep learning 2015 *Nature* **521**(7553) 436-444

[10] Nguyen G et al Machine Learning and Deep Learning frameworks and libraries for large-scale data mining: a survey 2019 *Artificial Intelligence Review* **52**(1) 77-124

[11] Gonzalez-Dominguez J, et al. A real-time End-to-End multilingual speech recognition architecture 2015 *IEEE Journal of Selected Topics in Signal Processing* **9**(4) 749-759

[12] Mitra V, Nam H, Espy-Wilson C, Saltzman E, Goldstein L Articulatory Information for Noise Robust Speech Recognition 2011 *IEEE Transactions on Audio Speech and Language Processing* **19**(7) 1913-1924

New Aggregative Algorithms for Robust Speech Signal Segmentation

Krassovitsky*, R. Mussabayev*

Institute of Information and Computational Technologies, Pushkin str. 125, Almaty, Kazakhstan

**Corresponding author's e-mails: akrassovitskiy@gmail.com, rmusab@gmail.com*

Abstract

Speech signals in natural language and machine learning methods used for analysis and recognition have attracted a lot of attention for many years as an object of research. The purpose of our work is to develop algorithms with cheap computation costs that allow extracting helpful information about the structure of a raw speech signal in an unknown language using unsupervised methods.

Keywords: ASR, speech features, FIR-analysis, clustering, machine learning

1 Introduction

We present new robust algorithms for multilevel speech signal segmentation as a part of the possible framework for automatic classification of received speech signal[1]. The obtained algorithms have a sufficient degree of robustness and allow for multilevel segmentation of the analyzed speech signal. The resulting multilevel segments of the speech signal are subjected to further classification in the context of different classes. The segmentation is performed at various scale levels that include the acoustic, and microwave levels.

2 Algorithmic approaches

Various methods and approaches for acoustic segmentation of a speech signal have been developed and implemented in software [2,3,4,5]. All developed methods were experimentally tested on the generated dataset. In the process of experimental verification, the effectiveness of the proposed algorithms for automatically determining the boundaries of acoustically homogeneous segments was evaluated. The measure of correspondence between the automatically obtained boundaries of segments and the manual labeling available in the dataset was numerically evaluated. If the studied algorithm had its parameters, their parametric identification was carried out to maximize the selected quality criterion to measure the correspondence between automatic and manual labeling. In the course of the experiments, it was important to evaluate the ratio of the speed and quality of the generated labeling, as well as the simplicity of the algorithm itself, both in terms of the simplicity of the algorithm structure itself and in terms of minimizing their customizable parameters.

The task of the developed algorithm is to identify local acoustically homogeneous sequences of basic frames of the analyzed speech signal. This algorithm is based on the analysis of a local homogeneity measure of the speech signal spectral characteristics. At the initial stage, the selected speech signal is subjected to pre-processing, including normalization, framing, and parameterization, i.e., calculation of basic informative features for selected frames and their subsequent higher-level analysis. During normalization and parameterization, the original speech signal is processed, and then it is automatically framed, i.e., it is divided into relatively short, evenly spaced, and overlapping frames (short sections containing the original speech signal). Before parameterization, each frame is weighted by a specialized window function in order to minimize the effect of a jagged or distorted spectrum. Thus, at the initial stage of acoustic segmentation, the basic units of analysis are parametrized frames presented as an ordered set of their compressed spectral characteristics. Each frame is already described not by a section of the original speech signal but by the corresponding vector of features that characterize its compressed spectral characteristic in the form of a finite set of spectral coefficients and their derivatives. Each frame is specified by 80 parameters, including the base spectral coefficients and the first and the second derivatives.

Thus, based on the results of framing and parameterization of the speech signal, we obtain a temporal sequence of vectors of features of the speech signal. And the very task of acoustic segmentation of a speech signal is reduced to finding local clusters of feature vectors in their resulting time sequence as they analyze the local commonality of their set of features. Local uniformity means the presence of similar spectral or acoustic characteristics in adjacent segments or in a group of adjacent segments.

2.1 ACOUSTIC SPEECH SIGNAL SEGMENTATION

Essential requirements for speed, accuracy, and robustness are imposed on the efficiency of the developed algorithm for acoustic segmentation of a speech signal [6,7]. These relatively high requirements are because this algorithm is one of the most fundamental algorithms and its efficiency directly affects the efficiency of other higher-level segmentation algorithms. The acoustic level segmentation

algorithm should be relatively fast, and it is desirable to have a linear dependence on the amount of processed speech data. This algorithm should analyze the local context of the speech signal exclusively, regardless of the global context; that is, segmentation should be carried out mainly at the local acoustic level without considering the global structure of this analyzed speech signal. The level of the local segmentation of the speech signal acts as the most basic level of segmentation. At the same time, its local essence lies in the analysis of only adjacent vectorized frames without taking into account their higher-level context, which will be taken into account at subsequent hierarchical levels of segmentation.

At the first segmentation stage, we must exclusively receive local segments without their global context-combinatorial analysis. Due to the exceptional local properties of this segmentation, the highest speed of this algorithm is achieved in comparison with other higher-level segmentation algorithms, including those based on cluster analysis. In fact, at this stage, we carry out only the local aggregation of parametrically defined frames into low-level segments, consisting of small groups of adjacent segments. It evaluates the maximum local similarity of spectral-acoustic characteristics and forms localized dense clusters of vectors in their time sequence, interspersed with discontinuities in their density distribution.

In the process of synthesis and experimental verification of various algorithms, the most optimal results of acoustic segmentation were obtained using the developed algorithm for detecting changes in the time that is the method of distortion accumulation (Algorithm 1).

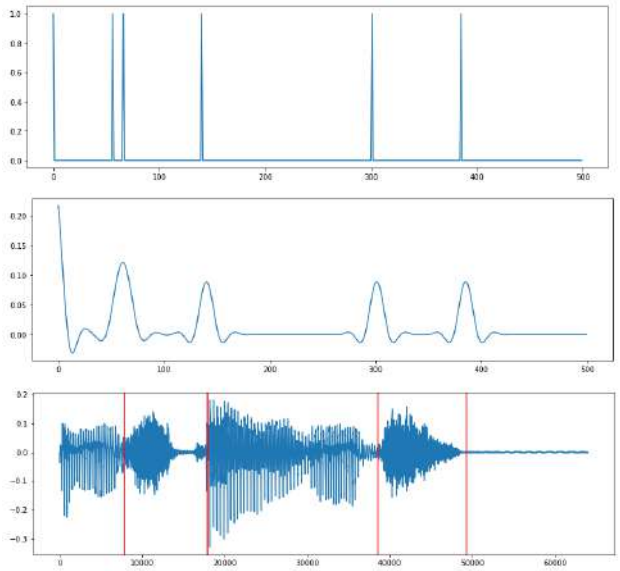


FIGURE 1 An example of the result of automatic segmentation of a speech signal using the algorithm for detecting changes in the time series of feature vectors using the error accumulation method

This algorithm takes X as input data - the time series being analyzed, consisting of spectre feature vectors, as well as two parameters: p - the maximum allowable deviation threshold in the formed segment, after exceeding which the local segment boundary is set and mode - sets the method for determining deviations in the segment. When *mode=Soft*, the algorithm operates in the soft mode: the next right object is added to the segment until the distance from the newly added object to the centroid of the cluster consisting of objects already added to the segment is less than the specified threshold value p. When *mode=Hard*, the algorithm operates in strict mode; adding the next right object to the segment is carried out as long as the distance from each already included object to the new centroid of the cluster consisting of objects already added to the segment (including the candidate object) is less than the threshold value p.

The proposed algorithm returns the following data as output parameters: k is the number of received segments; A is a sequence of k triplets (a, b, c) that specifies whether each element of the time sequence belongs to a certain segment; c is the centroids of the corresponding segment that are needed in subsequent calculations in case of a change in the composition of segments at subsequent levels of segmentation.

The result obtained in the form of identified boundaries is shown in FIGURE 1. An additional FIR filter was used to receive this result, allowing additional smoothing of the segment boundaries.

This filtering procedure allows one to select more general characteristics of transformations in the input sequence. For this, a software implementation of the *filtfilt* functions from the *scipy.signa* signal processing library has been utilized. FIR filtering, which performs smoothing of the obtained function of changes in the characteristics of the speech signal, uses a windowed filter. This filter function applies the linear digital filter twice: once forward and once backward. The combined filter has zero phases and twice the filtering order of the original signal. A characteristic feature of this method is the ability to regard the frequency features at the beginning and end of the processed signal. The filter parameters are adjusted for amplitude time sequences corresponding to the speech signal. The filtering procedure is initialized with the coefficients of the FIR filter (Finite Impulse Response). The *filtfilt* algorithm is used, which minimizes the initial and final transients. The coefficients for the band frequencies are selected manually. The lower and upper coefficients 0.0001, 0.2 were chosen, which correspond to the nature of the speech signal. The width of the filter window is set proportionally to the audio sampling frequency *Frequency_Rate*/10.

Algorithm 1:

function AggregationByAccumulation (X, p, *mode*)

Input : Raw spectral features of speech signals $X = \{x_1, \dots, x_n\}$
Sensitivity border parameter $p > 0$
Method of segmentation $mode \in \{S, R\}$

Output : Number of resulted segments k
List of left/right segmentation borders a_i, b_i and segmentation centers c_i;
$A = \{ (a_i, b_i, c_i) \mid i = 1, \dots, k\}$
$A \leftarrow \emptyset$; $a \leftarrow 1$; $c \leftarrow x_1$
foreach $x_i \in X$
  condition = $\frac{\|x_i - c\|}{\sqrt{n}} < p$
  if *mode* = $Soft$ **then**
    condition ← *condition* & $\min_{x_k \in \{x_a, \dots, x_i\}} \frac{\|x_k - c\|}{\sqrt{n}} < p$
  if not *condition* **then**
    $b \leftarrow i - 1$; add (a, b, c) into A; $a \leftarrow i$
  else
    $c \leftarrow$ **centroid** $\{ x_a, \dots, x_i \}$
if $x_a \neq x_n$
  $c \leftarrow$ **centroid** $\{ x_a, \dots, x_n \}$; add (a, n, c) into A

return : k, A

For the resulting smoothed function, it is analyzed for local maxima. By using the *find_peaks* function from *scipy.signal*, peaks are selected that correspond to the most significant changes in the characteristics of the speech signal. These peaks are markers for segmenting the speech signal into low-level speech analysis units.

2.2 MICROWAVE SEGMENTATION OF A SPEECH SIGNAL INTO SEGMENTS COMPARABLE TO THE PITCH PERIOD

New algorithm for segmenting a speech signal into segments comparable to the pitch period has been developed. The purpose of developing this algorithm is to obtain low-level atomic segments for the purpose of their subsequent hierarchical aggregation into high-level segments of a larger dimension comparable to the subphonemic or phonemic components of the speech signal.

Initially, the analyzed speech signal is uniformly segmented into mutually overlapping microwave sections comparable in dimension to the period of the fundamental tone frequency, i.e., reasonably short segments. A sufficiently small step is chosen when forming such sections, which should provide a sufficiently large degree of their mutual overlap. Then the parameterization of each of these microwave sections is carried out. Parameterization can be carried out in various ways [2, 5]. Based on the results of the parametrization, each microwave region is associated with a feature vector corresponding to it. An ordered set of such vectors form a time series.

In the next stage, the identification of local atomic clusters comparable with the fundamental tone period in the structure of the analyzed time series is carried out. The identification of such atomic local clusters is carried out by detecting discontinuities between the Euclidean distances of adjacent vectors (Algorithm 2).

Algorithm 2:

function AggregationByAttraction (X)

Input : Raw spectral features of speech signals $X = \{x_1, \dots, x_n\}$

Output : Number of resulted segments k
List of left/right segmentation borders a_i, b_i and segmentation centers c_i;
$A = \{ (a_i, b_i, c_i) \mid i = 1, \dots, k\}$

$A \leftarrow \emptyset$; $a \leftarrow 1$; $c \leftarrow x_1$

foreach $(x_i, x_{i+1}, x_{i+2}, x_{i+3})$, $i \in \{1, \dots, n-3\}$
  $d_1 = \|x_{i+1} - x_i\|$; $d_2 = \|x_{i+2} - x_{i+1}\|$;
  $d_3 = \|x_{i+3} - x_{i+2}\|$;
  condition = $d_1 < d_2$ & $d_3 < d_2$
  if *condition* **then**
    $b \leftarrow i - 1$; add (a, b, c) into A; $a \leftarrow i$
  else
    $c \leftarrow$ **centroid {** $x_a, \dots, x_i$**}**
    if $x_a \neq x_n$
  $c \leftarrow$ **centroid {** $x_a, \dots, x_n$**}**; add (a, n, c) into A

return : k, A

The meaning of these events is that noticeable changes in the time sequence of the norms of the difference of successive vector representations mean noticeable changes in the microwave audio sequence. Thus, the sequence of the speech signal is divided into intervals for which this event is not performed, and some homogeneity/similarity of speech characteristics within the interval can be assumed. Vector representations within the obtained intervals are local clusters, from which the most characteristic representatives can be distinguished. Getting this partition is a clustering process, and typical representatives are centroids. Thus, for the obtained local clusters, centroids are calculated, the sequence of which forms the time series of the next level, and the aggregation process is repeated recursively. In practice, it is advisable to use 2 or 3 recursive repetitions to obtain segmentation with a high level of detail in the phonetic features of speech. The calculated last level of partitioning is used for comparative evaluation of this segmentation algorithm with all other proposed algorithms.

An example of the result of a microwave segmentation of a speech signal into segments comparable to the period of the fundamental tone of the analyzed speech signal is shown in FIGURE 2. The lower part of FIGURE 2 shows the segmented speech signal, and the upper part shows the sequence of received segment boundaries. The third one represents speech segments of the lowest level. Their local aggregation will be carried out at subsequent stages to obtain larger subphonemic or phonemic segments.

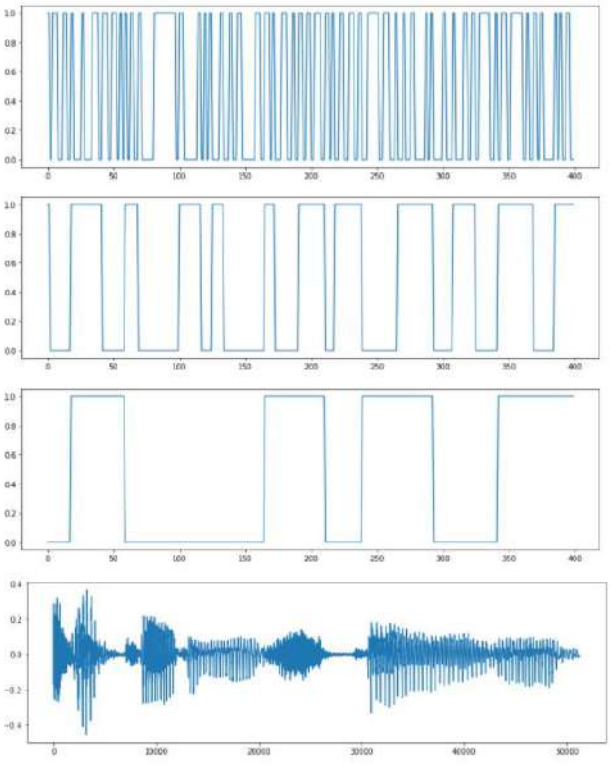


FIGURE 2 An example of obtaining a generalized segmentation result using the developed algorithm by analyzing the joint distribution of segment obtained by several different algorithms

2.3 LOCAL AGGREGATION OF WAVE SEGMENTS INTO LARGER SUBPHONEMIC SEGMENTS

An algorithm for multilevel sequential local aggregation of microwave segments into larger subphonemic segments has been developed. Sequential recursive local aggregation of objects in the time series is also carried out according to the principle of detecting gaps between their local clusters, but this procedure is repeated several times recursively, and

after each repetition, the centroids for all received segments are calculated, and these centroids already act as segmentation objects for the next level. For the local clusters obtained at the current level, centroids are calculated, the sequence of which forms the time series of the next level, and the aggregation process can be recursively repeated several times. Thus, the result is a multilevel segmentation of the speech signal. When moving from a lower segmentation level to a higher one, the boundaries of intermediate segments are removed. Accordingly, those boundaries that remain when moving to a higher level of segmentation are clearer, i.e., have a greater degree of unambiguity than the inter-segment boundaries that have undergone reduction. Accordingly, the lifetime of segment boundaries during multilevel aggregation and subsequent segmentation determines the degree of their importance in terms of making decisions about true phonemic boundaries.

When this procedure is used for the first time, the initial vector representations of short-term overlapping fragments of the speech signal are used as an input signal. After the distribution of these vectors over local segments is obtained at the output of this function, its centroid is calculated for each segment. An ordered set of such centroids form a new time series, which in turn is also segmented using the same procedure. Thus, segments of the next level of the hierarchy are obtained, for which centroids are also calculated, and the process can be repeated again. If this procedure is repeated many times; as a result, all segments will merge into one single segment. It should be noted that the segment boundaries of the next level are a subset of the segment boundaries of the previous level.

At this stage, the resulting total segment vector is smoothed using a FIR filter. The FIR filter parameters are adjusted so that the resulting smoothed signal peaks are located at the required distance from each other. At the final stage, the procedure for searching for peak vertices is performed and generalized segment boundaries are set in their place.

Conclusion

This work focuses on developing highly efficient unsupervised speech signal recognition algorithms in an unknown language, which have high robustness to variability and changes in the dynamic characteristics of speech.

The main feature of the developed algorithms is their focus on the process of unsupervised machine learning. These algorithms are used to overcome the shortcomings inherent in widely used methods of supervised speech recognition by combining them. The expected results are new algorithms for solving the tasks and their software implementation as part of an automatic continuous speech recognition system.

Acknowledgments

This research is conducted within the framework of the grant num. AP088560349 "Self-learning robust unsupervised automatic speech signal recognition".

References

[1] Baker J et al. Updated MINDS report on speech recognition and understanding 2009 *IEEE Signal Processing Magazine* **26**(4) 78-85

[2] Noda K, Yamaguchi Y, Nakadai K, Okuno H, Ogata T Audio-visual speech recognition using deep learning 2015 *Applied Intelligence* **42**(4) 722-737

[3] Karpov A An automatic multimodal speech recognition system with audio and video information 2014 *Automation and Remote Control* **75**(12) 2190-2200

[4] Solera-Urena R, Garcia-Moral A, Pelaez-Moreno C, Martinez-Ramon M, Diaz-de-Maria F Real-Time Robust Automatic Speech Recognition Using Compact Support Vector Machines 2012 *IEEE Transactions on Audio Speech and Language Processing* **20**(4) 1347-1361

[5] Baker J, Li D, Glass J., Khudanpur S, Chin-hui L, Morgan N, O'Shaughnessy D Developments and directions in speech recognition and understanding 2009 *IEEE Signal Processing Magazine* 26(3) 75-80

[6] Champion C, Houghton S Application of continuous state Hidden Markov Models to a classical problem in speech recognition 2016 *Computer Speech and Language* **36** 347-364

[7] LeCun Y, Bengio Y, Hinton G. Deep learning 2015 *Nature* **521**(7553) 436-444

System products maintenance

Odina Muhammadieva

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: odina.mukhammadieva@gmail.com

Abstract

The relevance of this study lies in the change in the negative attitude of users to the value characteristics of product development. Change of representations allows to accelerate a life cycle of a turn of the capital. This is achieved through the proposed product development tool. Its support is aimed at changing the market, which requires a serious reconstruction of the organization around a new scheme of activity, developed taking into account the introduction of new functions, adopted in the context of determining their priority, importance and complexityuation.

Keywords: norms, process, value, dissatisfaction, localization, replacement, efficiency

1 Introduction

Time the enterprise is in an unstable state, which has a positive effect on the safety of activities. New technical solutions implemented in the new version of the system contradict the requirements for product development. Requirements do not take into account user dissatisfaction with the product. As a result, the unreasonable race of developers to improve service functions worsens the quality of the product required by the user. The so-called "commoditization effect" extends to the organization, in which potential users cease to appreciate the development of the product. Technological uncertainty is due to the lack of instructions for the preparation of high-level specifications. The identified problem is expressed in the following wording: "It is impossible to ensure effective improvement of the product in conditions of only a technological focus on its improvement in the absence of means for a reasonable selection of innovative proposals, primarily taking into account customer dissatisfaction"

2 Problem

The sequence of identified problems considered as part of advanced design tools, goal setting reduces the. The object of research is the core of the product. This is a built-in control system unit used as part of the next version of the improved product [1]. Such a block transforms user tasks into an organization problem. The subject of the study is the application of high-level specifications that synchronize market requirements and industry proposals, and prevents the spread of the commoditization effect.

The purpose of the study is to develop a procedure that provides a search for ways to transform user problems. In accordance with the goal, the following tasks were set:

1. Use B. Olet's technology to create a well-established system (HOS) that performs current analysis of product promotion throughout the entire life cycle of its existence
2. Modify HOS into an open system, built according to the type of «Turquoise organizations» Lalu, and realizing the synchronization of requirements and innovative proposals in the course of choosing a short-term development option.
3. Evaluate the implementation of the medium-term scenario in terms of identifying key factors and symptoms that cause loss of value due to user dissatisfaction
4. Develop instructions for the long-term development of the enterprise based on a sustainable growth model.

3 Conclusions

As a result, this determines the degree of loss and assesses the willingness of the organisation management team not only to implement their existing and future plans, but also take corrective measures to restore the lost operational potential. As practical results, it should be noted that the timely detection of deviations from the strategy makes it possible to substantiate the scale of the prevented losses throughout the entire life cycle of the organisation. The novelty of the research lies in the implementation of the multi-user loyalty program in crisis circumstances.

References

[1] Mukhammadieva O. (2022). System product maintenance /The 20 th International conference open learning and distance education 2022 January 27-28 2022, ISMA, Riga, Latvia.

Expertise of the decision-making methodology

Galamovs Renats

*ISMA University of Applied Sciences**, Latvia***

Corresponding author's e-mail: r.galamovs@gmail.com

Abstract

This research is aimed at detecting subtle signals detected outside the organization. The omission of such signals causes a decrease in the importance of the organization's value resources. Therefore, their timely detection prevents potential losses in the future. The study of losses is based on the study of the components of intangible assets. Talk about the complexity of measures to restore a certain type of asset

***Keywords**:* event, execution, self-initiated activity, violations, lost revenues, preventing, effectiveness

1 Introduction

The presence of such information allows to uncover the forces leading to the adoption of hasty unreliable decisions. This determines the causes that cause the breakdown of the key competencies of the organization. Knowledge of the causes allows you to find the means to neutralize the elements of execution. Such elements are not consistent with the purpose of the organization, that is, with the effectiveness of the activity. The negative impact of execution on effectiveness is due to actions that not only violate its completeness of activity, but also cause the effect of self-initiated activity. Such actions belong to the so-called "private opinions", on the basis of which proposals for improving the organization are formed. During their implementation, carried out against the background of continuous changes, an incorrect assessment of the current state occurs, which makes it impossible to establish the correct meaning of what is happening.

2 Provided approach

To obtain a reliable assessment, a methodology is required that allows recognizing private opinions and proposals that contribute to improving effectiveness. At the same time, the formulation of the highlighted problem is expressed as follows: "It is impossible to make reliable decisions in the absence of fundamental diagnostic tools that allow us to identify the ratio of destructive influence of execution on the effectiveness of activities." The destructive nature of private opinions negatively affects the reputation of the enterprise. In this case, in order to preserve its image and improve its rating, it is necessary to carry out continuous effectiveness measurement. Such a measurement is carried out as part of a system configured for the examination of self-initiated activity. The subject of the study is the losses incurred by the organization due to the inability to recognize proposals such as "private opinions" [1]. The purpose of the research is aimed at developing a procedure that ensures the issuance of an objective conclusion about the current state of the analyzed enterprise and its development prospects [2,3] The implementation of the long-term scenario is carried out within the framework of the program for the recovery of lost benefits discovered during the study of the potential for sustainable growth as part of the system of intangible assets.

In accordance with the goal, the following tasks were set [4]:

1. Improvement of the methodology of the current analysis of the components of intangible assets in the context of the Andreessen-Thyssen approach.
2. Choosing the option of restoring damaged valuable resources included in the system of intangible assets in the context of assessing their labor intensity at the level of the Hull approach.
3. Implementation of the medium-term scenario of enterprise development as part of the sustainable growth model SGR.
4. Improvement of the decision-making methodology aimed at determining the preferred growth potential of the organization at the Copeland-Dolgoff pentagram level.

3 Results

The main result of the reaserch is the full-scale expertise, the peculiarity of which is the ability of the organization to justify the amount of damage prevented. The significance of the damage is determined on the basis of a program that allows you to identify cases that caused violations of the reliability of decisions made. The authenticity of solutions is associated with the use of means of control, formation, distribution and use of all the resources of the enterprise in the process of their circulation. The developed tools are part of a system that allows you to receive conclusions for time intervals of varying duration. The practical value of the reaserch consists in the development of recommendations that allow to restore the loss of value as the localization of the places of attributes that call for the destruction of efficiency

The novelty of the research consists in finding levers for the growth of the enterprise's potential. Their use allows for an increase in the cost of identifying key attributes. As a result, an increase in the efficiency of activities is carried out when measuring the significance of the elements of the system of intangible assets. During the measurement, organizational distortions caused by unreasonable decisions are revealed.

References

[1] Galamovs R. (2021). Intangible assets role in venture business / The 19th International Conference Open Learning and Distance Education 2021 January 28-29 2021, ISMA, Riga, Latvia.

[2] Galamovs R., Santirasegarama E. (2021). Venture Business Assets. / The 19th International Scientific Conference Information Technologies and Management, 2021, April 22-23, ISMA, Riga, Latvia

[3] Galamovs R. (2021). Measuring the effectiveness of the organization, specializing in business design /13th International scientific practical conference on business competences December 08-10 2021, ISMA, Riga, Latvia

[4] Galamovs R. (2022). Expertise of decision-making techniques /The 20 th International conference open learning and distance education 2022 January 27-28 2022, ISMA, Riga, Latvia.

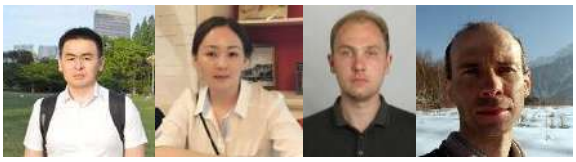
Comparison of Various Topic Modeling approaches

Alymzhan Toleu*, Gulmira Tolegen*, Rustam Mussabayev*,

Alexander Krassovitskiy

Institute of Information and Computational Technologies, Almaty, Kazakhstan

**Corresponding author's e-mail: alymzhan.toleu@gmail.com, gulmira.tolegen.cs@gmail.com, rmusab@gmail.com*



Abstract

This paper presents an empirical study comparing the existing topic modeling approaches in terms of their quality and effectiveness through designed experiments. Various topic modeling approaches were evaluated, including LSA, pLSA, LDA, and ARTM. Experimental results showed that pLSA, LDA, and ARTM are comparable in incoherence scores and running speed. But ARTM is slightly better than others thanks to the task-oriented regularizes. Results also showed that words for each topic will have a negligible effect after their position in the topic is larger than a certain top-M number on representing this topic.

Keywords: topic modeling, LDA, LSA, pLSA, ARTM

1 Introduction

Topic modeling is an important task of NLP, which automatically discovers the hidden structure and patterns from a large collection of documents. The discovered information has interpretability and modular structured features. A topic model provides topics, each of which is a ranking of all unique words in the documents by relevance to the topic. Take top-M most relevant words to describe the topic then get the relevant document by these topics. The main ideas of existing topic modeling approaches are to estimate topic-token and doc-topic latent parameters in two ways: matrix factorization and probabilistic estimation.

Early work on topic modelling with matrix factorization method is Latent semantic analysis (LSA) [1], which is an approach of using singular value decomposition (SVD) [2] that tries to find the best low rank approximation of an occurrence matrix. This approach has seen a resurgence in adding probabilistic features renamed probabilistic latent semantic analysis (pLSA) [3]. Instead of using SVD, the core idea of pLSA is to find a probabilistic model that estimates concurrence matrix observed from documents.

Latent Dirichlet allocation (LDA) [4,14] is a two-level Bayesian generative model: i) the first one is to model topics distribution over tokens and ii) another one is to model documents distribution over topics. One assumption of LDA is to apply a prior from Dirichlet distribution to generate the above mention distributions, which overcomplicates the model when applying the Bayesian inference [5, 6]. There are many other variations of LDA [7, 8, 9] have been proposed, most of them tried to solve the limitation of the original LDA under the LDA's framework, but these ingredients overcomplicate the algorithms.

BigARTM [10] is a non-Bayesian model that attempts to solve the problems that appeared in the LDA model. It considers the topic modelling as problem-oriented matrix factorization and the parameters are trained through expectation–maximization (EM) [11] algorithm adding several task-specific regularization terms and the model parameters start with random initialization. In the point of BigARTM, the parameters of LDA more likely to be initialized with Dirichlet distribution and trained with the single objective function.

This paper presents an empirical study comparing the existing topic modeling approaches in terms of their quality and effectiveness through a set of designed experiments. Considering the difference between the existing approaches and their similarities, controlled experimental comparisons are necessary for these approaches to analyze their effectiveness. Results showed that on a controlled dataset pLSA, LDA, ARTM are comparable in coherence scores and running speed. But ARTM is slightly better than others thanks to the task-oriented regularizes. Results also showed that words for each topic will have a negligible effect after their position in the topic is larger than a certain top-M ($\approx$ 50) number on representing this topic.

The rest of this paper is structured as follows. Section 2 describes task formalization of topic modeling. Section 3 describes the existing topic modeling approaches. Section 4 evaluates and compares the existing approaches. Section 5 concludes this work with possible future work.

4 Dataset and Experiments

Table 1 presents the data statistics of documents from 20newsgroup which is used in literatures as standard dataset. The documents pre-processed with several steps before the experiments, namely by cleaning (removing extra symbol, url, emails, stopwords, etc.), sentence segmentation, tokenization, stemming.

TABLE 1 20newsgroups dataset statistics.

20newsgroups	training set tokens:	11259
	test set tokens:	7488
	vocabulary size:	1995
	average document length:	88.06

In following experiments, we tested several existing approaches: latent semantic analysis (LSA), probabilistic latent semantic analysis (pLSA), latent Dirichlet allocation (LDA) and additive regularizers of the topic model (ARTM).

These approaches are compared with each other on 20newsgroup dataset. LSA is implemented gensim library with truncated singular value decomposition function, and pLSA, LDA and ARTM tested with BigARTM library. Cv coherence scores for obtained topics and the running time for 100 iterations are reported in Table 2. Cv coherence measures how often the topic words appear together in the corpus. The higher cv coherence scores indicate the model gives better results.

It can be seen from the Table 2 that LDA takes a longer running time for 100 iterations compared to others. Although LSA is the fastest among them, its performance cannot compete with others. ARTM performs good outcomes among them; it outperforms LSA and it is slightly better than pLSA as it added several regularizations to pLSA.

TABLE 2 cv coherence results for different approaches.

Models	M=10	M=20	M=30	M=40	M=50	Running time
LSA	0.482	0.385	0.356	0.351	0.341	22.6 s
pLSA	0.682	0.625	0.589	0.576	0.566	41.9 s
LDA	0.655	0.598	0.574	0.565	0.563	1 min 6s
ARTM	**0.689**	**0.644**	**0.605**	**0.588**	**0.571**	54.7 s

Topic modeling is unsupervised learning, and the optimal number of topics is unknown. We design the following experiments to determine if cv coherence can be an evaluation metric for identifying the optimal topic number. The corpus with 20 topics is chosen, and run different approaches on this corpus then calculated the coherence scores for various top-M relevant words. The expectation is that cv coherence values should be the highest at point top-M = 20 for all models.

It can be seen from Figure 1 that with grows of the M-most relevant words of each topic, the coherence scores drop gradually for all the models. It is clearly seen that pLSA, LDA and ARTM outperform LSA significantly, and all models reach a stable coherence value with growth of top-M. This result indicates that around top-M ≈ 50 words have a significant influence on representing the topics for topic modeling approaches. Experiments show that Top-M > 50 words for each topic will have a negligible effect on representing this topic.

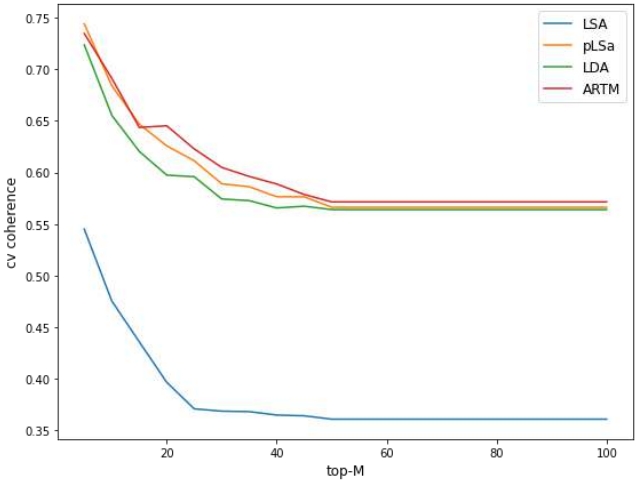


FIGURE 1 Comparison of different topic modeling approaches with M-most relevant words.

5 Conclusion

This paper presents an empirical study comparing various topic modeling approaches: LSA, pLSA, LDA and ARTM. Several experiments were carried out to evaluate their performance in terms of coherence and speed. Experiments show that LSA requires less time than other but with low coherence value, and pLSA, LDA, ARTM are comparable. ARTM is slightly better than others because it has task-oriented regularizes added. Results also showed that words for each topic will have a negligible effect after their position in the topic is larger than a certain top-M (≈ 50) number on representing this topic.

Acknowledgements

This work was supported by the Ministry of Education and Science of the Republic of Kazakhstan. IRN AP09259324 "Advanced Topic Modeling via Clustering by Variable Neighbourhood Search".

References

[1] Scott Deerwester, Susan Dumais, Thomas Landauer, George Furnas, and Richard Harshman. Indexing by latent semantic analysis. Journal of the American Society of Information Science, 41(6):391–407, 1990.

[2] V. Klema and A. Laub, "The singular value decomposition: Its computation and some applications," in IEEE Transactions on Automatic Control, vol. 25, no. 2, pp. 164-176, April 1980, doi: 10.1109/TAC.1980.1102314.

[3] T. Hofmann. Probabilistic latent semantic indexing. Proceedings of the Twenty Second Annual International SIGIR Conference, 1999.

[4] David M. Blei. 2012. Probabilistic topic models. Communications of the ACM, 55(4):77–84.

[5] Shashanka, M., Raj, B., Smaragdis, P.: Sparse overcomplete latent variable decomposition of counts data. In Platt, J.C., Koller, D., Singer, Y., Roweis, S., eds.: Advances in Neural Information Processing Systems, NIPS-2007. MIT Press, Cambridge, MA (2008) 1313–1320.

[6] Wang, C., Blei, D.M.: Decoupling sparsity and smoothness in the discrete hierarchical dirichlet process. In: NIPS, Curran Associates, Inc. (2009) 1982–1989.

[7] Ke Zhai, Jordan Boyd-Graber. Online Latent Dirichlet Allocation with Infinite Vocabulary Proceedings of the 30th International Conference on Machine Learning, PMLR 28(1):561-569, 2013.

[8] Jagarlamudi, Jagadeesh et al. "Incorporating Lexical Priors into Topic Models." EACL (2012).

[9] Yuan Zuo, Jichang Zhao, Jichang Zhao, Ke Xu. Word network topic model: a simple but general solution for short and imbalanced texts. Knowledge and Information

[10] Vorontsov, K.V.: Additive regularization for topic models of text collections. Doklady Mathematics 88(3) (2014).

[11] Dempster, A.P.; Laird, N.M.; Rubin, D.B. (1977). "Maximum Likelihood from Incomplete Data via the EM Algorithm". Journal of the Royal Statistical Society, Series B. 39 (1): 1–38. JSTOR 2984875. MR 0501537.

[12] Salton, G. & Buckley, C. (1988). Term-weighting approaches in automatic text retrieval. Inf. Process. Manage., Vol. 24, No. 5, pp. 513-523

[13] S. Kotz; N. Balakrishnan; N. L. Johnson (2000). Continuous Multivariate Distributions. Volume 1: Models and Applications. New York: Wiley. ISBN 978-0-471-18387-7. (Chapter 49: Dirichlet and Inverted Dirichlet Distributions).

[14] Blei, David M.; Ng, Andrew Y.; Jordan, Michael I (January 2003). Lafferty, John (ed.). "Latent Dirichlet Allocation". Journal of Machine Learning Research. 3 (4–5): pp. 993–1022.

State Information Policy. Cyber Security As A Component Of Ukraine's National Security

Roman Efimenko, Vladyslav Khotunov, Kateryna Kholupnyak *

ISMA University of Applied Science, Latvia

Cherkasy state business college, Ukraine

**Corresponding author's e-mail: vkhotunov@gmail.com, Katyakholupnyak@gmail.com, romanefimen322@gmail.com*

Abstract

The formation of the information society not only allows us to expect greater efficiency and a successful society, but also gives new impetus to traditional threats without the security of the state and creates new challenges for the national security system. In such conditions, the search for new opportunities to secure the security of the state becomes especially important, given the formation of a new field of confrontation - cyberspace. Given the level of penetration of ICT in all critical areas of life of people and nations, so it is possible to provide confrontation in cyberspace and cyberwarfare.

Keywords: security system, cybercrime, cyber security

1 Introduction

Ukraine needs to create an adequate security system in a transforming world, where the challenges of national security are increasingly becoming different from the traditions of threats. [1].

In Ukraine, the system of protection of cybersecurity of the state involved low military and law enforcement agencies. Among them are the Ministry of Defense of Ukraine (and its special units - in particular the Main Intelligence Directorate), the Security Service of Ukraine. At the same time, the activities of these agencies are not always adequately secured..

Overview

In terms of efficiency and consequences of the use of air weapons, which is the term that is often used, it can be equated to a weapon of mass cinema. Therefore, cyber is one of the main security concerns.

Russia launched a hybrid war against Ukraine four years ago. This type of war that the aggressor country may remain publicly uninvolved in such a conflict and covert military operations. A number of leading Western experts rightly call it the "war of the new generation" or the "war of the new generation." [6]

Thus, the functioning and protection of the homeland as information, cyberspace is a military task of the state in the context of actions with Russia in the course of our country [4].

It is known that in recent years various sectors of the Ukrainian economy and the social life of ordinary citizens have become very vulnerable in cyberspace. Public and private companies are constantly suffering from periodic cyberattacks, for which, as it turned out, they were not ready at all. It is a pity, but we must also state the fact that Ukraine does not have even today any effective tools to prevent attacks and their effective counteraction, and all existing cybersecurity measures are mostly unsystematic and, as a result, unsuccessful. [3]

The threat to state cybersecurity in the form of cyber intervention can be both external and internal.

In addition, every society needs rules, standards, norms, regulations, instructions and other documents to feel protected in cyberspace, at least in legal terms. Sectoral regulations on cyber risks are now emerging, and there is growing interest in this area from the legislature. Ukraine is developing safety standards for critical infrastructure.

Decision

Anyone who has access to the Internet can become a victim of cybercrime. Today, there are many schemes and tools used by cybercriminals, the most common of which are:

- Carding - fraud with payment card data and systems.
- Phishing is the substitution of a website or web page.
- Vishing - taking the confidential data of the cardholder, using phone calls under the guise of a bank employee.
- Online fraud - the creation of fictitious online stores, imitation sales of goods or services.
- Piracy is the illegal use or distribution of intellectual property.
- Card-sharing - hacking access to watch satellite and cable TV.
- Social engineering is a tool for manipulating and managing people.
- Malware - the creation and distribution of malware.
- Dissemination of illegal content - information that promotes extremism, terrorism, drug addiction and

violence.

By following the personal rules of protection, you will be able to turn the weakness of the human factor into an advantage that will serve as a reliable protection. Here are some tips to help you protect yourself from cybercrime:

- Installing and updating antivirus software on your computer.
- Create passwords with different numbers, characters and special characters, as well as change them periodically.
- Do not use the same password on all sites, devices.
- Store data backups on devices that do not have network access.
- Prevention of theft of personal information.

These rules and guidelines will help reduce the risk of personal data leakage and should be followed by every Internet user.

Conclusion

The main goal of the "Cyber Security Strategy of Ukraine" (one of the fundamental legislative documents) is to create conditions for the safe functioning of cyberspace of the state, its use in the interests of society and the individual. The document also provides a set of measures aimed at combating cyber threats, deepening international cooperation in this area, ensuring the protection of state electronic information resources and information infrastructure. To implement this strategy, the National Security and Defense Council established the National Cyber Security Coordination Center as a working body of the Council. [5]

References

[1] In the world, two dozen countries are engaged in cyber weapons - McAfee // Cybersecurity.ua.

[2] MilitaryandSecurityDeploymentsInvolvingthePeople'sRepublicofChina.

[3] Buryachok VL Cyber security - the main factor of sustainable development of modern information society / A.L. Beetroot // Modern special equipment: coll. Science. work. - 2011

[4] Lukyanchuk RV State policy in the field of cyber security in the conditions of anti-terrorist operation / R.V. Lukyanchuk // Bulletin of the NAPA: Coll. Science. work. - 2015. - Issue. 3. - P. 110-116.

[5] On the decision of the National Security and Defense Council of Ukraine of April 28, 2014 "On measures to improve the formation and implementation of state policy in the field of information security of Ukraine" / Decree of the President of Ukraine of 1 May. 2014, № 449/2014. [Electronic resource]. - Available from http://www.prezident.gov.ua

[6] Wojciechowski, AV Cybersecurity as an important component of the system of protection of national security of European countries [Electronic resource] / AV Wojciechowski // Journal of Eastern European Law. - 2018. - № 53. - P. 26-37.

Unsustainable process products: recognising & resolving

Karajevs Vsevolods

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: karajevs@inbox.eu

Abstracts

The relevance of the following research consists of finding methods of method of accelerated distribution of management products. Its use gives an opportunity to remove distrust to the new forms of convolution of a voluminous information space into a capacious form. Such a representation gives an opportunity to identify the reasons for the negative attitude towards open-ended knowledge.

Keywords: product, co-modification, destruction, weak link, moderation, effectiveness, conclusion

1 Introduction

The ease of the open access is viewed on the background of *contradictions,* which is caused by the inconsistency of the usual requirements, that are required to increase the set of service functions, and improved offerings, that are limiting norms for assessing user satisfaction with the value of the changed product. In fact, we are now talking about the introduction of more compact forms of management, which was the basis for identifying the research problem, reduced to the following wording: "It is impossible to accept the simplification of a management product in the absence of means of proving its effectiveness."

2 Main Part

The object of the research is an algorithm for the formation of an expert opinion in the conditions of an organization being in an unstable process [1, 2]. The goal of the research is directed on the development of a procedure that provides a way to translate user doubts about new forms of management product into an organization problem [3, 4].

In accordance with the *goal,* these *tasks* were formulated:

1. Conducting a current analysis of the shortcomings of the product of collective labor;
2. Choosing an effective option for disseminating knowledge about managing through the organization of the transition from the collective form of presentation of material to the individual form of education, built like a communications laboratory.
3. Implementation of the medium-term scenario for the transformation of the organization within the existing landfill [as part of a communication laboratory requiring the involvement of the management of persons undergoing training (PUT).
4. Organization of effective interaction of participants of the organization under conditions of an unstable process.

3 Conclusions

As practical results it is worth pointing out the event organization, that allow to inform about the potential losses of those companies, where PUT work, as well as throughout their whole life cycle. The research novelty consists of shifting the focus of interest in a new management product, which is distributed from PUT to employer. Approbation of the developed procedure is carried out during the preparation and organization of three scientific and practical conferences.

References

[1] Dangele V., Karayev V., Bazarbaev T. Methods of Estimation of the Demands to Professionals in Bus iness Management Based on the Greiner's Model. /*The 16th INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2018, April 27-28, ISMA University, Riga, Latvia,* Information Systems Management Institute, Riga, Latvia, p.222.

[2] Amangeldyiev A., Karajevs V., Sitnikovs P., Uglanovs V. Drucker paradox in comprehension of systemic convictions of a concept /*The 18th INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2020, April 23-24, ISMA University, Riga, Latvia,* Information Systems Management Institute, Riga, Latvia.

[3] Karajevs V. *Unstable process improvement. /19th International Conference Open Learning and Distance Education 2021, January 27-28, 2021,* ISMA University, Riga, Latvia.

[4] Karajevs V. Remedy for an Unstable Process. //The 19th International Scientific Conference Information Technologies and Management, 2021, April 22-23, ISMA, Riga, Latvia

DEVELOPMENT OF THE ORGANIZATIONAL CULTURE OF EDUCATIONAL INSTITUTIONS IN CONDITIONS OF MODERN CHALLENGES

Sandra Plota

Latvia Culture college (Latvia, Riga)

Corresponding author's e-mail: sandra.plota@lkk.gov.lv

Abstract

In modern conditions, the number of challenges affecting the activities of educational institutions is significantly increasing: the COVID-19 pandemic and other epidemic threats, russia's aggression against Ukraine, further globalization of the educational services market, a global socio-economic crisis, the clear evidence of which are difficult to control inflationary processes and other factors that change the usual organization of business processes of educational institutions.

Keywords: organizational culture, COVID-19, russian aggression against Ukraine, global educational services market.

1 Introduction

Under the influence of the changes taking place in the modern world, for many educational institutions the need to develop anti-crisis strategies covering the main aspects of their activities is actualized. Russia's war against Ukraine has a significant impact on all spheres of public life on a global scale, causing human casualties and financial losses. For the countries of the European Union, it is associated primarily with a new round of the socio-economic crisis, the rapid growth of inflation, as well as the difficulty of predicting macroeconomic indicators. In such difficult conditions for educational institutions, one of the most important aspects is to ensure the required quality of educational services, maintaining the existing scientific and educational potential. It should also be noted that the current crisis was preceded by a long period of the COVID-19 pandemic, which led to the development of distance learning technologies, as well as other significant changes in the organization of the educational process. The process of providing educational services is becoming global. After the start of the war in Ukraine, the presence of a significant number of English-language programs in the educational institutions of the European Union contributes to the strengthening of the educational migration of Ukrainians, an important selection criterion for which is safety in the country of residence.

2 Overview of the study area

Modern problems in the field of higher education, as well as various aspects of improving its competitiveness and quality, issues of organizational culture development are considered in the papers of L. Antonyuk, E. Grishnova, D. Denison, I. Kalenyuk, K. Cameron, E. Shein and others. The need for the development and implementation of an anti-crisis strategy for educational institutions, the development of organizational culture in the system of improving the quality of higher education in modern conditions is increasing. It is the strengthening and development of organizational culture in the face of a lack of financial resources that can be the direction of activity of educational institutions that will provide the greatest efficiency at minimal cost.

Analyzing modern challenges that affect the activities of educational institutions, it should certainly be noted that the COVID-19 pandemic was an important factor that largely changed the activities of educational institutions. For their corporate culture, this influence was manifested primarily in the fact that a smaller amount of direct communication, live work and informal communication led to a partial loss of a sense of belonging to a particular organization or team and contributed to the formation of the model of a "global employee", whose workplace is at his home. Such an employee can work simultaneously in several organizations, his attention is focused on the performance of certain labor functions, and the level of loyalty and commitment to the values of a particular organization may be minimal.

Bringing together such employees with similar values can be quite a difficult task, requiring additional efforts to ensure involvement in the activities of the educational institution. It should also be noted that the period in which classes at universities were conducted mainly in a distance format was difficult for students, teachers and university administration. In addition to the stress of possible infection and uncertainty in the future due to the exacerbation of crisis trends in the socio-economic sphere, there was also increased strain on the eyes and nervous system due to changes in lifestyle, less opportunity for direct communication between people.

It is also quite common opinion about the low efficiency of distance learning, as the level of adaptation to this format of knowledge of each participant in the educational process was different, not everyone was able to organize their activities as effectively as possible, resist the flow of

negative information. mutual understanding and involvement, as in the usual format of offline work.

In the conditions of the full-scale war of Russia against Ukraine, analyzing the situation in the sphere of higher education, it should be noted that the war caused great losses, many universities have already been damaged or destroyed. To capture the consequences of Russian aggression, the Ministry of Education and Science of Ukraine has launched an interactive map of destroyed and damaged educational institutions [5]. According to this map, as of April 2022, 1,499 educational institutions were affected by bombings and shelling, of which 102 were completely destroyed [5]. This includes educational institutions in Ukraine, but these indicators make it possible to characterize the current state of affairs and identify the preconditions for the crisis in higher education, the consequences of which will be felt not only in Ukraine but throughout Europe long after the war.

Conclusion

In the system of factors ensuring the quality of higher education in times of crisis, organizational culture is of particular importance. To reduce the impact of negative factors on the activities of educational institutions are important: change the management style in organizations to ensure higher quality educational services and the necessary level of academic culture of all participants in the educational process; ensuring a high level of academic integrity; raising the level of social responsibility of educational institutions, implementation of the values of social responsibility in their activities; improving the effectiveness of interaction with stakeholders participating in the educational community and building a monitoring system; further development of distance learning technologies (use of modern applications for conducting the online learning process; development of corporate business process management systems of educational institutions, etc.); increasing the involvement of employees working online in the activities of the educational institution.

References:

[1] Grishnova, O.A, Brintseva, O.H. (2018). Competitiveness of higher education and the competitiveness of workers: how is fictitious human capital created? Labor market and employment. - No. 1 (54). - P. 15-22.

[2] Grishnova O.A., Golyaka O.M. (2007). Corporate culture and enterprise strategy: relationship and interdependence [Electronic resource]. - Access mode: https://core.ac.uk/download/pdf/197258918.pdf

[3] Grishnova, O.A., Brintseva, O.H. (2015). Fictitious human capital: essence, characteristics, formation factors. Demography and social economy, vol. 1 (23), P. 90-101.

[4] Kalenyuk I.S. (2017). Directions of transformation of mechanisms of financing of education in the modern world [Electronic resource]. - Access mode: http://nbuv.gov.ua/UJRN/dse_2017_1_4

[5] Ministry of Education and Science of Ukraine (2022). Interactive map of destroyed and damaged educational institutions [Electronic resource]. - Access mode: https://saveschools.in.ua/

Building secure networks based on VPN

Slesar Maksym, Vladyslav Khotunov *

ISMA University of Applied Science, Latvia

Cherkasy state business college, Ukraine

**Corresponding author's e-mail:taldram375@gmail.com , vkhotunov@gmail.com*

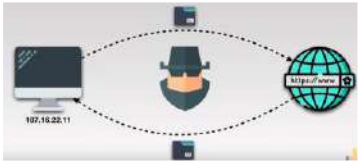
Abstract

Network security is becoming one of the main ideas of the present time. Internet provides tremendous ease in almost all industries such as online banking, online shopping, communications, businesses or organizations. Thus, the communication network requires the security of sensitive data that is stored or transmitted over the internet. Due to the rapid emergence of computerized gadgets and their access to the Internet has caused the unreliability of user data. Nowadays, security and privacy threats are becoming more and more complex, making increased demands on data protection on the Internet. In this article, a virtual private network (VPN) is introduced - a great way to protect devices and information from hackers. A VPN is a private network that operates over a public network, encrypting information so that attackers cannot use it. The main purpose of a VPN is to provide various elements of security, such as authenticity, confidentiality, and data integrity. VPN services are also available for smartphones, computers and tablets. VPN is an evolving technology that plays an important role in the WLAN by providing secure transmission of data over the Internet.

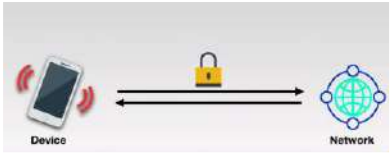
Keywords: encryption, protocol, virtual private network (VPN).

1 Introduction

A VPN is a network structure that affects public networks to protect sensitive data available for public access on the network. It is a cost-effective and correct solution in various networking and telecommunication organizations. A virtual private network (VPN) is the most important part of any IT business because it saves huge infrastructure costs, using the public Internet to create a secure communication environment from the corporate office to users' websites.



Typically, a VPN is a subscription-based service. This means the user has to download an app from their ISP and subscribe to use their private network to protect various devices. Free VPN apps are also available in the App Store for various OS. Before you use a VPN, keep in mind that your VPN provider may keep records of Internet activity that may well be available authorities.



Overview

Why do we use VPNs? From a consumer's perspective, the main advantages of VPNs are that they are much more cost-effective. The solution to using VPN technologies is a high-speed dedicated line. Such lines are expensive, difficult to manage and difficult to maintain. The Internet provides reliability for VPN users. Even in very remote locations, there are dial-up modem connections to the Internet. Virtual private networks guarantee a secure connection for users with a telephone connection. The Internet provides VPN precision services. Mobile users may not be able to use dedicated lines to connect to the corporate site, so VPN technology is the only possible solution.

Benefits of

- Virtual private networks get rid of geo-restrictions.
- Internet privacy is no longer compromised.
- Protects against cyber criminals.
- Data transmission is encrypted.
- Regional leased lines or even cable networks are all you need to connect to the Internet and use the public network to tunnel a private connection.
- Cost savings.

Decision

Potential customers have a wide range of hardware and software for VPN deployment: from integrated multifunctional and specialized devices to pure software products.

The main types of VPN solutions are as follows:

- software-based;
- integrated;
- specialized;

Software-implemented VPN products are inferior in

performance to dedicated devices, but have enough power to implement VPN networks. It should be noted that in the case of remote access, very little bandwidth is required Thus, pure software products can easily provide sufficient performance for remote access. The undoubted advantages of this approach are flexibility and ease of use, as well as relatively low cost. An integrated VPN solution includes, routing and switching functions. The main advantage of this method is the centralization of element management. For companies that do not need a high-performance corporate network, reducing the cost of network equipment is one of the primary objectives, and the most effective is an integrated solution that allows you to concentrate all functions on a single device. However, it should be noted that the more functions the device performs, the more obvious the performance loss will be. High performance is the main advantage of specialized VPN hardware. The higher speed of this type of system is due to the encryption performed by a special chip. The amount of computation needed to handle VPN packets is 50 to 100 times greater than the amount of computation needed to handle regular packets. If the enterprise network performs various activities that require high traffic exchange, it is recommended to use special equipment for efficient processing of VPN data packets. Dedicated VPN equipment provides a high level of security, but at a high cost.

Conclusion

Virtual private networks allow users and businesses to communicate over the public Internet with remote servers, branches or businesses while maintaining secure communications. A VPN is a highly reliable, versatile and inexpensive communication tool. In this article, we determined that various VPN technologies are popular, including SSL and IPsec. We also listed the different types of VPNs and noted that their versatility allows the user to choose which tool they want. Virtual private networks can provide a range of authentication, integrity and encryption algorithms.

Virtual private networks are expected to be used for secure communications in the future. The VPN industry is predicted to grow in the coming years. It is important that the requirements meet the needs of the consumer and maintain their universality.

Analyzing the main problems of information security in local or global networks as virtual private networks, we can conclude that such systems should provide detection of internal and external threats and intrusions, filtering of external traffic, control over the use of corporate network resources and prevent leaks of confidential information.

References

[1] 1. Kanuga Karuna Jyothi, Dr. B. Indira Reddy “Study on Virtual Private Network (VPN), VPN’s Protocols And Security”, Int © 2018 IJSRCSEIT | Volume 3 | Issue 5.
[2] Komalpreet Kaur, Arshdeep Kaur “A Survey of Working on Virtual Private Network” © 2019 IRJET | Volume 6 | Issue 9.
[3] https://scholar.google.com/citations?hl=en&user=OOI01CwAAAAJ
[4] https://www.servercake.blog/types-virtual-private-network-vpn/
[5] https://www.geeksforgeeks.org/types-of-virtual-private-network-vpn-and-its-protocols/
[6] D. Simion, M.F. Ursuleanu, A. Graur, A.D. Potorac, A. Lavric “Efficiency Consideration for Data Packets Encryption with in Wireless Tunneling for Video Streaming” INT J COMPUT COMMUN 8(1):136-145
[7] https://whatismyipaddress.com/vpn-comparison
[8] https://scholar.google.com/citations?hl=en&pli=1&user=ks9yhS0AAAAJ
[9] Charlie Scotte et al., “Virtual Private Network” Second Edition, O’Reilly, January 1999
[10] Ayhan ERDOĞAN, Dz. Yzb. “Virtual Private Networks (VPNs): A Survey”, https://pdfs.semanticscholar.org/bd27/4a3195cb2de780c87727ec6e6248dffb80e5.pdf
[11] https://scholar.google.com/citations?user=Js1wB70AAAAJ&h1=en&scioq=Dr.+Yogesh+kumar+sharma

Robotics In Our Life

Yevhenii Kapeliushnyi, Vladyslav Khotunov, Kutsevskyi Serhii*

ISMA University of Applied Science, Latvia

Cherkasy state business college, Ukraine

**Corresponding author's e-mail: akonvict160@gmail.com vkhotunov@gmail.com, greynny@gmail.com,*

Abstract

Will artificial intelligence help humanity or destroy it? This is disputed by the most prominent scientists and developers. Inventor Elon Musk, physicist Stephen Hawking and Microsoft chairman Bill Gates warn against the development of artificial intelligence, but other scientists and celebrities such as Mark Zuckerberg, programmer and founder of Facebook, see the benefits for all mankind in the use of artificial intelligence.

Keywords: robotic, work, robot

1 Introduction

Hiroshi Ishiguro is a Japanese who creates robots, known for developing realistic androids, created a new robot boy who looks 10 years old and copies human facial expressions. The facial expressions of the android actually repeat the human, plus the added involuntary movements that an ordinary person makes - blinking, movement of the head and eyes. The robotic boy has a transparent "skull". The professor believes that it is important to create such robots, because someday robots will become a part of our lives.

The inventor thinks that human-like work will be truly integrated into society - not only to automate production or as a labor-saving device, but also as a replacement for the physical presence of man...

Overview

A robot is an electromechanical, pneumatic, hydraulic device, program, or a combination of both that works without human intervention.

Every year the works improve and become smarter, but still their artificial intelligence is not equal to human.

Consider the top 5 original robots today:

- Fashion robot - This robot is designed to clearly show how the clothes that the user liked will look on it. The robot is created from fragmented pieces, each of which is able to change its location. As a result, the robot can change its size from minimum to maximum. This robot was created by Estonian developers.
- Robot that washes hair from Panasonic - Of course, you can't call this work practical - it's so easy to wash your own hair or entrust this responsible task to a hairdresser. Well, if a person likes modern devices, he will probably like this robot, which is able to remember the individual characteristics of man, using those procedures for his hair, which is necessary for this individual. The robot scans the head, translates it all into a 3D model to determine the optimal amount of shampoo or massage treatments, which the robot is also able to do.
- Robot bartender with Lego - This robot knows how to mix cocktails and does it well. The robot understands language, so it is able to accept any order, if you say it clearly enough.
- Robot neurosurgeon - This is one of the most advanced devices of today. In order to create a robot that is really capable of performing complex brain surgery, it was necessary to spend a lot of time and money. As a result, the robot surgeon is ready and recently performed his first operation, removing the tumor from the patient's brain. The operation lasted 9 hours and was very successful.
- Cubinator - The robot that quickly makes up the most intricate Rubik's Cube is capable of doing so in just 18.2 seconds. The robot was entered in the Guinness Book of Records in 2010.

Decision

Consider areas of activity in medicine in which it is advisable to use robots:

1) Works – couriers Specialized "couriers" who will deliver medicines, tools, linen, food and everything else that can be transported will also be useful for medical institutions. One of the most famous such machines - TransCar LTC 2 (a platform on which you can put including bulk containers) or Tug (reminiscent of a mobile cabinet).

In turn, the Omnicell M5000 optimizes drug handling. Often patients are prescribed several drugs at the same time, and this machine forms the appropriate "kits" for each patient for several days, spreading tablets and capsules in blisters. The speed of the Omnicell M5000 is 50 sets per

hour, while the average human specialist has 4 sets per hour. The robot helps patients by packing medicines according to the doctor's prescription for several days.

This device is a great example of how intelligent robotics can take on routine tasks to free up time for something more important.

2) The use of robots in surgery - Of course, the use of robots in medicine is advisable in cases where only fine work is required. Intelligent devices can make treatment more effective and less traumatic for the patient, reduce the risk of complications. One of the most "robotic" areas of medicine is surgery. The work literally becomes the hands of doctors, participating in complex operations.

Perhaps the most famous and high-tech robotic surgeon can be called the da Vinci system. At this stage, the robot does not operate alone, but only obeys the commands of the doctor. The latter sits behind a special console and controls the machine with joysticks and pedals. He watches his work through a special screen, which displays a magnified 3D image in HD quality. Another assistant is in the robot itself and helps to switch between tools. The tasks of da Vinci medical robots are very broad: they are used to perform operations (including complex and atypical) on the heart, thyroid gland, pelvic organs and abdomen. The da Vinci system is actively used by doctors in many countries.

3) Works – secretaries - As in many other fields, robotics in medicine helps doctors with the same type of tasks that take a lot of effort and time, but which do not require significant mental effort or decision-making. These include patient registration, working with electronic cards, providing background information. Many secretarial robots have already been developed and are used in a variety of fields. It is likely that in the future intellectual work will take over much of the administrative work in medical institutions.

Conclusion

Positive impact on human life from the introduction of robots:

- The works can work in harsh and dangerous climatic conditions, they are used in the development of mineral deposits.
- Using robots to perform typical actions.
- Since the works themselves are a product of high technology, their development and implementation in production requires the development of an entire branch of science and industry, which provides a large number of jobs. The knowledge gained in the development of robots can be applied in a variety of areas.
- Negative impact on human life from the introduction of robots:
- Today, many scientists are concerned about the introduction of robots in our personal lives, especially "home robots", which will be able to collect personal data about the house and the user and pass it on to others.
- Equally important is the perception of humanoid robots as living organisms.
- The Swiss think tank estimates that 75 million jobs could be lost by 2022 due to robotics.

According to other scientists, advances in computer technology will provide approximately 133 million new jobs.

Therefore, the question of the benefits or dangers of robots remains open.

The future is coming now and we need to give robots the right place in our lives so that we do not feel their superiority over us.

References

[1] What is robotics ?: URL: https://academyua.com/ua/stati/32-shcho-take-robototekhnika

[2] Intelligent machines: URL: https://www.everest.ua/robototehnika-dlya-osoblyvo-nebezpechnyh-robit/

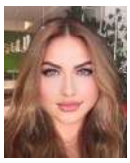
[3] Robotics: URL: https://robotica.in.ua/

Mechanisms for implementing the ecosystem approach in Austria

Uninets Iryna

PhD, doctoral student Kyiv national economic university named after Vadym Hetman,

Corresponding author's e-mail: germanirina777@gmail.com



Abstract: The economic development of the world is accompanied by the formation of a new economic format. Countries of the world form a balanced and specific policy of their own development, taking into account the peculiarities of global development at the present stage. The paper analyzes the experience of Austrian economic development, taking into account the needs and opportunities for compliance with leading models of environmental legislation.

Keywords: smart-economy, economic development, Austria's model

The formation of environmental awareness, a holistic ecosystem approach that can be implemented at all stages of economic and economic activity is becoming a priority in the formation of a smart society and smart economy. Each country pursues its own interests, based on needs and opportunities, developing mechanisms and tools that can ensure the development of the country in the context of sustainable development. Each country implements such a policy in accordance with its own development goals, consider examples.

Austria's environmental policy strategy is being implemented at the level of Ministries, Departments and Municipalities. In general, there is the Conference of Regional Ministers for the Environment, the Austrian Committee on Sustainable Development and the National Climate Change Committee. In Austria, sustainable development policy is implemented through two key strategies aimed at integrating environmental savings policy and sustainable economic development policy. These key strategies include the National Strategy for Sustainable Development, adopted in 2002, and the Austrian Strategy for Sustainable Development, adopted in 2010 [1]. The first of these strategies focuses on the integration of sustainable development principles into national policy, the key ones are 20 goals, covering various aspects of quality of life, building competitiveness, preserving the environment, responsibility in the international arena. The Sustainable Development Strategy 2010 aims to provide a common basis for policy-making at various levels of government and economic activity (both national and subnational, from the federal government, communities, regions to municipalities or provinces) [2]. However, some articles and provisions are duplicated in these two strategies and somewhat hinder the effectiveness of sustainable development and the achievement of certain goals [3]. These strategies also determine the further legal framework related to certain elements of economic development, such as the Law on Green Energy, the Law on Climate Protection and the Law on Energy Efficiency, etc. In this format, the key goals of increasing energy efficiency by 1.5%, increasing investment in electricity production from green sources (renewable) have been identified. A popular tool for sustainable development is fiscal policy, the application of environmental taxes has brought Austria 9.6 billion euros, which is a total of 57% of all tax revenues for energy, 34% of transport taxes, 8% of resource taxes, 1% tax on pollution [3]. It should be noted that the bulk of environmental taxation falls on the energy tax, in second place - the transport tax. The share of the pollution tax, although rather insignificant, is gradually increasing over the specified period of time. However, in general, the level of revenues from environmental taxation does not indicate a general environmental policy or environmental awareness in Austria. Indicators can indicate both a high level of use of products with a high level of pollution and a high level of use of products with a low level of pollution and environmental taxation.

The key goal of Austria's strategic development is energy independence by 2050, which requires a combination of financial instruments and development models that involve the development of smart cities and the government program in general [4]. At the city level, developed countries solve a number of problems that may delay or hinder the implementation of long-term projects for the formation of new innovative ecosystems, the development of which is possible through highly educated talents, high-tech industries, networking and others. In general, one of the key elements in the development of a smart society is the development of sustainable innovation, such as the Climate and Energy Fund on Smart Cities initiative in Austria to promote sustainable energy, reduce greenhouse gas emissions and develop a climate strategy. In total, about € 150 million is spent on such projects each year to support "pilot projects" to combine technical and social innovation. In general, this is formed within the framework of the Climate and Energy Fund, the strategic goals of which are the formation of a specific system of intelligent, network and integrated solutions in cities for the sustainable

development of the energy system; formation of technical and social systems through a combination of energy networks, systems of utilization, communication, mobility, etc.

Such projects in Austria are being implemented in Vienna (about 2 million inhabitants), in the city of Graz (about 300 thousand inhabitants), focusing on smart city initiatives, in particular in terms of reducing pollutant emissions, "greening" the energy system, increasing technological innovation and etc. In general, the key conceptual characteristics of building a smart economy at different levels of government are “Policy and Initiatives”, “Sustainability”, “Public Participation” and “Observation” [4]. Thus, we can note that Austria is quite actively developing the concept of smart economy and smart cities, implementing greening projects at different levels of government.

References:

[1] Climate change legislation in Austria. Grantham Research Institute. 2015. URL: https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/AUSTRIA.pdf

[2] The Austrian Strategy for Sustainable Development. Federal Ministry of Agriculture, Forestry, Environment and Water Management. URL: http://sdgtoolkit.org/wp-content/uploads/2017/02/The-Austrian-Strategy-forSustainableDevelopment_en.pd

[3] OECD Environmental Performance Reviews: Austria. 2013. URL: http://www.oecd.org/environment/oecd-environmental-performance-reviews-austria2013-9789264202924-en.htm

[4] SMART CITIES AS SUSTAINABLE INNOVATION ACTORS. https://www.zsi.at/object/news/3239/attach/0_CASI_Policy_brief_No1_Smart_Cities_As_Sustainable_Innovation_Actors_Insights_from_and_for_Austria.pdf

Automated tests as part of SD and ST life cycles

Kadola Mykhailo*, Alexander Mrochko

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: kadola.mykhailo@gmail.com*

Abstract

Testing is a key activity in software development due to the common systems complexity, environmental variations or product specifics (e.g. based on some risks). This all causes the quality of a product and reflects the high presence of defects. Using manual or automation test activities these defects should be found and prevented from appearing again. Usually, to improve the testing process QA team applies automation activities, as example in CI/CD pipelines. But since all projects are unique and can include some risks or known problems, there is no best or the only practice or standard formulated that can be used in any project. Currently there are many frameworks in the market, or your automation testing team can even create your own and unique framework. Some of the ready to go frameworks are useful and actually can save companies human resources and money. However, using an unsuitable framework or creating an incorrect framework can lead to waste of time and resources. This work is an attempt to show the role of automation in both Software Development and Software Testing processes.

Keywords: manual testing, automation testing, test automation frameworks, CI/CD pipelines

Introduction

Nowadays, software testing is an important aspect of the software development process. However, as the IT market has grown, the efficient and flawless operations of a product have become increasingly vital for mass-market software.

Testing is a sub-process of the entire Software Development Life Cycle, and it is a critical aspect of product development. Processes for testing should begin as soon as possible. This early start will help to improve future product quality and cost. Testing in a timely manner assists a business to save money by letting defects in the program be discovered before they enter the final product or at later stages.

The test automation technique can be used in practically any project to find flaws in the system faster and at an earlier stage of development. Test automation, like the name suggests, is the process of employing test scripts to verify the program being tested. It's usually a third-party tool, script, or framework that simulates real-world interaction with an application. To a greater or lesser extent. For example, unit tests are almost not similar to human interactions but take a short time to run, so the end-to-end tests are vice versa.

Automation tests, like development, can be done wrong, resulting in a lot of wasted time and money. As a result, the early stages of the process are crucial. Figure 1 depicts the steps.

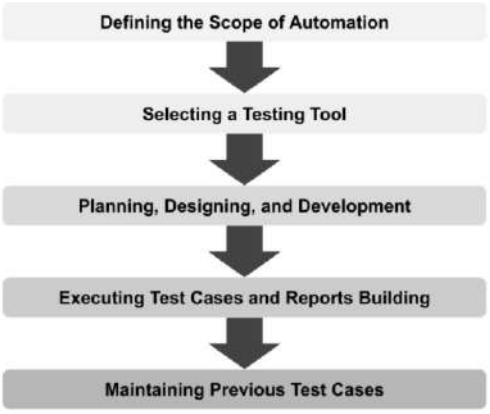


Figure 1 Automated Testing Process

The issues are: how automation processes contribute in product development and overall testing processes including coverage of some activities with automated tests, and how they contribute to overall product quality, the pros, cons and misconceptions of automation testing and how they can be used in Continuous integration, Continuous delivery and Continuous deployment.

Overview

This work discusses the advantages, disadvantages and conclusions on the following issues:

- Automation process as a part of development and testing processes.
- Pros, cons and misconceptions of automation testing.
- Automation in CI/CD context.
- Success Factors in Test Automation.
- Automation frameworks and Tools.
- Automation design patterns.

Decision

Describes the role of automation in the development and testing processes while explaining some ways how it can

be applied to improve efficiency of testing process, and how to build more stable, rigour and robustness with applying design patterns.

Different testing frameworks and types of them are shown, with analysing some popular ready to use solutions. Based on personal experience shown the role of automated tests in Continuous Integration, Continuous Delivery and Continuous Deployment and the real benefits from them.

Conclusion

Success of automation depends on applying design patterns and principles of "robust" tests and understanding of basic success factors.

Test Automation is the best way to increase the effectiveness, efficiency and coverage of software testing. Decisions to apply automation or not should be context related, based on the needs of a concrete project.

When automation testing begins, the timing varies depending on the project requirements. Depending on the project, automation in the software testing process can be attributed as both a supplementary and a key procedure, but it cannot replace all manual testing effort.

References

[1] ISTQB Certified Tester Advanced Level Test Automation Engineer. -https://www.istqb.org/downloads/send/48-advanced-level-test-automation-engineer-documents/201-advanced-test-automation-engineer-syllabus-ga-2016.html

[2] Automation Testing 101: What, Why and How. - https://www.katalon.com/resources-center/blog/what-is-automation-testing/

[3] Test Automation Best Practices. - https://smartbear.com/learn/automated-testing/best-practices-for-automation/

Intellectual component of global trade leadership

Liudmyla Tsymbal

Prof. Dr., Prof. Dr., prof. of department of international economy, Kyiv National Economic University Named After Vadym Hetman, Kyiv, Ukraine,

Corresponding author's e-mail: l.tsimbal@ukr.net

Abstract. The formation of a new global system and systemic global interdependence generates new factors of competitiveness of market participants, determining their appropriate strategic behavior to ensure a high competitive position and leadership. Based on the author's methodology for assessing the intellectual leadership of countries, the clustering of countries in the global economy is determined. The evaluation algorithm was based on three stages: first - the resource level; secondly - the level of intermediate results of intellectual activity; third - the level of the final results of overall progress. Using the multifactor regression model and cluster analysis, four clusters of countries were identified according to key indicators of intellectual leadership. The specialization of the two countries in terms of merchandise exports was analyzed, namely, 1 cluster - the United States and Germany; 2nd cluster - Israel and Italy; 3rd cluster - Brazil and Ukraine; Cluster 4 - China and the Republic of Korea. The index of economic complexity by the given countries is allocated and the change of position of each country of a cluster in a rating for 10 years is defined.

Keywords: Index of economic complexity, intellectualization, clustering of countries, commodity exports.

Exploring the preconditions for leadership and specialization of countries is an important issue in the context of globalization. The influence of individual factors on the ability of individual countries to achieve leadership positions is an important scientific issue that requires the study of a significant body of data. It is necessary to carry out clustering of countries in order to understand the peculiarities of the development of countries selected for analysis. Clustering is based on the author's methodology for assessing the intellectual leadership of countries in the system of global economies, which provides a three-step assessment algorithm - and allows a comprehensive assessment and comparison of the main functional areas of the phenomenon and follow the experience of innovative systems of intellectual leaders [1]. Clustering indicates significant differences between countries in terms of development, so cluster 1 is characterized by high rates of development, cluster 2 includes countries with moderate rates of development and covers mostly European countries, cluster 3 is characterized by geographical diversity and relatively low rates of development, cluster 4 combines Asian countries that have emerged as a result of economic and mathematical modeling into a separate group. The paper examines the export specialization of individual countries within each cluster, as well as the level of economic complexity of the products they export. UN trade statistics were used in the analysis [2], and information from the Center for International Development at Harvard University [3]. Countries belonging to the same cluster, when specializing, have significant common features in their export profile and have reached a similar level of economic complexity. We will consider features of the countries of the first cluster on an example of the USA and Germany. The commodity exports of both countries are dominated by high-tech goods (machinery and transport equipment, chemical products, electronic integrated circuits, medicines) [2].

A comparison of the development of countries' leadership in terms of the Economic Complexity Index, which takes into account the complexity and diversification of the country's exports, determined a sufficient proximity of countries within one cluster. For the USA reached 1,55, and Germany has one of the best results in the world on this index 2,09. The positions of these countries in the ranking of economic complexity are quite close. In 2020 Germany ranked 4th out of 133 countries, and the United States was in 11th place [3]. If we consider the countries of the 2nd cluster, which include Italy and Israel, as of 2018 they are in the top ten of the 133 countries participating in the ranking. Italy ranks 14th on the economic complexity index of 1,44, its rating has improved by 3 positions over the past ten years. Israel is characterized by a fairly high share of machinery and transport equipment. In Italy's merchandise exports, this position generally dominates. According to the SITC, approximately the same share in Italian exports is occupied by goods of the group "Chemicals", "Goods classified mainly by materials", "Various manufactured goods". Among the TOP-10 goods of Italian exports are medicines, cars, engine parts, shoes. In Israel exports, a significant place is occupied by goods belonging to the group "Chemicals", "Goods classified mainly by materials", "Various manufactured goods" [2].

The group of third cluster countries is considered on the example of Brazil and Ukraine. Both countries have rather low indicators of economic complexity and have not shown significant progress in this area for the period 2008-2020. Thus, Ukraine with an index of economic complexity of 0,37 ranks 44th in the ranking and for ten years its positioning has not changed. Brazil's economy is less complex than Ukraine's - ECI is 0,21 and 49th in the ranking and the deterioration of the position by 1 point. In contrast to the countries of the previous clusters, the specialization of both countries is dominated by products with a low degree of processing, in particular, agricultural products. For Brazil, the leading exports are soybeans and iron ores and concentrates, the SITC commodity group "Raw

materials+oils of animal and vegetable origin" accounts for almost a third of Brazilian exports, "Food, animals + beverages, tobacco". Commodity groups SITC "Food, animals + beverages, tobacco" and "Raw materials+oils of animal and vegetable origin" in 2018 accounted for almost half of Ukrainian exports of goods. A significant volume of exports of both Ukraine and Brazil accounted for the group "Goods classified mainly by materials". Regarding the export of machinery and transport equipment, both countries are not strong enough in this segment. Only 11,2% of Ukrainian exports were machinery and equipment. [2]. This commodity group dominates the imports of the two countries. The peculiarities of the countries that were assigned to the 4th cluster are their significant export specialization in machinery and transport equipment, as well as significant progress in increasing the level of economic complexity of national economies. Consider the Republic of Korea, as well as China as examples of countries in the 4th cluster. The Republic of Korea ranks third in the world in terms of economic complexity. Over the ten-year period, the country has risen 8 positions in the rankings, ahead of even Germany today. During the same period, China increased its place in the world ranking of economic complexity by 6 positions with an ECI of 1,34 (18th place). Machinery and transport equipment predominate in the exports of both countries. For China, the share of machinery in the country's exports is 48%. Regarding the Republic of Korea, machinery and transport equipment in 2020 accounted for 57,5% of the country's merchandise exports. The main export items of China were radio and television transmitters, television cameras, digital cameras and video recorders; computers; electronic integrated circuits; parts and accessories for office equipment, special equipment; semiconductor devices; phones. The exports of the Republic of Korea were represented by the following commodity items: electronic integrated circuits; refined petroleum oils; cars; ships, boats; engine parts; parts and accessories for office equipment special equipment; liquid crystal devices, lasers; other optical instruments and instruments [2].

Thus, the study confirms the existence within the cluster of common features in the specialization of countries, as well as the achievement by countries of similar levels of economic complexity and diversification of export goods. We can note that the clustering of countries on the basis of key indicators of intellectualization is also confirmed by the analysis of the specialization of each cluster in the production of certain goods. For the countries of one cluster is characterized by the proximity of indicators of complexity of economic activity, close structure of production of goods and export-import activities. The countries of the first and second clusters are characterized by goods with a high degree of processing and the level of added value. Third cluster countries (including CEE and Baltic countries) specialize in commodities and occupy rather low positions in terms of economic complexity. The countries of the fourth cluster unite mainly the Asian region and have high rates of economic complexity, mostly high-tech exports and specialize in both high value-added and ICT goods. The criteria of development of the countries revealed by means of mathematical model and the formed clustering according to the indicator of the international specialization in an export profile confirms economic closeness and similarity of economic structure of the countries. This is in line with current trends in the formation of leadership positions in the global market.

References:

[1] I. Kalenyuk, L. Tsymbal. Assessment of the intellectual component in economic development. Scientometrics (2021)

[2] 2020. International Trade Statistics Yearbook. Volume I. Trade by Country. Available at: https://comtrade.un.org/pb/downloads/2020/VolI2020.pdf

[3] The Atlas of Economic Complexity. Available at: http://atlas.cid.harvard.edu/countries

Quality Assurance through the Software Development Life Cycle

Vladyslav Petrenko*, Alexander Mrochko

ISMA University of Applied Science, Latviaa

**Corresponding author's e-mail: vlad.wozl@gmail.com*

Abstract

These days, business requires the creation of their own information systems. They can have different goals, but the main purpose is to save man-hours, automate some processes and, of course, improve calculation speed, where needed. Developed products became definitely bigger with a kind of more really complex business logic (e.g., banking) and integrations with other platforms and/or microservices.

Throughout the history of computing, many software and systems to be delivered into operation subsequently had high impact failures or were not able to meet the needs of stakeholders due to existing flaws. If the software doesn't work properly, it can cause many problems such as money, time or reputation. Quality Assurance (QA) is a way to reduce the risk of software failures during operation.

Keywords: quality assurance, context-based testing school, testing methodologies applicability

Introduction

Software problems will always exist in every software product: not because developers are irresponsible or careless, but because software complexity is hard to determine – and humans have limited capacity to handle complexity. Design flaws can never be totally eliminated in any complicated system. Detecting the design defects in software is just as difficult, for the same complex reason. Since the software and digital systems are not continuous, testing boundary values are not sufficient to guarantee accuracy.

Software Testing is the process of evaluating and verifying that a software product or application works as expected. It may include activities aimed at assessing the attributes or features of a program or system to determine if it meets the requirements. Quality assurance in deeper understanding also involves verification activities for some project documentation through the static testing techniques.

Quality assurance has become a weighty part of the software development life cycle. Modern and popular SDLCs, such as Scrum or V-Shaped models, involve testing as early as possible. The key purpose is to mitigate possible risks of intractable defects in the final stages of development. Quality assurance only makes sense in the case conducted against project needs, the system under test is suitable to final Users' needs and works as expected according to specification.

Summarizing described above: all of the mentioned meanings are called to achieve delivering high-quality software development and saving money by issues identification as early as possible.

From an official point of view, we have an ISO 29119 standard that reflects the software testing practices from most popular institutes (such as ISTQB or TMMI) and even some IEEE standards for testing documentation (f.e. IEEE 829) [2,3]. But the real business prefers to apply context-based testing approaches.

Quite important thing is to build project processes (not only testing) by taking into account possible risks and decreasing their influence on the final product. There is no actual (or standardised) and full set of risks that suits every project – every business has their own, but the following types can be common in one or another interpretation:

- imprecise time estimates;
- mistaken identification of complexities, functionalities, or operations;
- insufficient regression time;
- incomplete validation;
- poor risk control.

However, the problem is that standards of testing avoid taking into account context. They mostly describe widely used software testing methods and activities (defined by testing institutes) but avoid business problems. Standard-based testing is applicable only for projects that use linear-sequential life cycle models (f.e. Waterfall).

As we know, agile software development models is a combination of iterative and incremental models with the main focus on adaptability, customer needs and rapid delivery of software that is ready to use in production. In other words, it is non-traditional SDLC models that have the main priority on the flexibility of the development process. ISO 29119 standard cannot guarantee flexibility for the quality assurance process through software development.

Nowadays development processes would like to involve the QA team in the early stages of negotiations with customers concerning the future project and real practice shows that they can be very useful because project managers focus on business and scope, developers focus on technical implementation and architecture structure, in turn, QA engineers analyse final user's needs, common user flows (with the required set of features) and can even define high-level quality characteristics that should be met at the end of development.

Overview

This article discusses the advantages, disadvantages and conclusions on the following issues:

- quality assurance role in modern SDLC models;
- context-based testing approaches;
- testing standardization perspectives.

Decision

The experience of big software companies (f.e. Apple, Google, Microsoft) shows that ISO standards that refer to software testing are not suitable for modern SDLC models.

Real businesses prefer to use context-based software testing school introduced by James Marcus Bach and Cem Kaner. Furthermore, the statistic shows that applying context-oriented testing activities is cost-effective in a longe range perspective. Mentioned testing approaches are based on the following principles [1]:

- the value of any practise depends on its context
- there are good practices in context, but there are no best practices;
- people, working together, are the most important part of any project's context;
- projects unfold over time in ways that are often not predictable;
- the product is a solution. If the problem isn't solved, the product doesn't work;
- good software testing is a challenging intellectual process;
- only through judgment and skill, exercised cooperatively throughout the entire project, are we able to do the right things at the right times to effectively test our products.

Sometimes the cost of a mistake can be comparable to the cost of developing a system or part of this system from scratch.

Quality assurance only makes sense in the case conducted against project needs, the system under test solves the final Users' problem and works as expected according to specification.

Conclusion

Software development, of the course, is fraught with risks. Some of them can be minor and easily surmountable, but other ones can have a huge and even destructive impact on the developed system and/or project. In an ideal world, risks must be handled by the whole project team and processes have to be established with appropriate risk analysis and control. But the statistic shows, applying testing activities (and the QA team formation) against context improves the effectiveness of the testing process.

Testing should take into account risks all the time and optimize processes in order to reduce the risk of their happening and decrease their impact on the project. From the cost of bug statistics, we know that the cheapest way to predict bugs is to fix mistakes in the documentation. The best bug is the one that never happened.

Investments into the Quality Assurance are usually returned as mitigation cost of bugs by identifying them in early stages. So, today managers and stakeholders prefer to integrate testing activities as early as possible and conduct it against the project (and/or business) concern.

References

[1] Cem Kaner, James Bach: "Lessons Learned in Software Testing: A Context-Driven Approach". ISBN: 9780471081128

[2] Syllabus for ISTQB Foundation Level 2018 V3.1 URL: https://isqi.org/en/index.php?controller=attachment&id_attachment=362

[3] ISTQB Certified Tester Advance Level Test Analyst Syllabus Version 3.1.0. URL: https://isqi.org/en/index.php?controller=attachment&id_attachment=402

Cross-platform mobile app development

Rybitskyi Nazar, Vladyslav Khotunov *

ISMA University of Applied Science, Latvia

Cherkasy state business college, Ukraine

**Corresponding author's e-mail: nazarrybickij@gmail.com, vkhotunov@gmail.com*

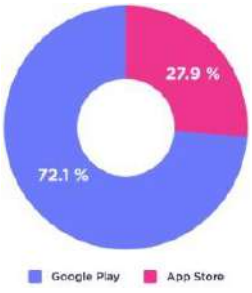
Abstract

Currently, due to the increasing availability of mobile Internet, there is a trend towards the use of mobile applications. Apps are popular not only among Internet users, but also quite profitable for their owners. Putting these two factors together, we can conclude that almost any business development strategy can include the creation of an application. The dilemma, however, lies in choosing the right way to develop mobile applications. There are over five billion smartphones in the world. Of these, about 99% work on Android and iOS, according to StatCounter. To optimize the process and avoid programming a mobile application for each of the operating systems, you can resort to cross-platform development. It is based on a single source code and technology stack. Once the application code is written, it can be deployed across devices and platforms without worrying about incompatibility issues. This is a generic approach that is widely used to save development time and money.

Keywords: cross platform, mobile apps, kotlin multiplatform, flutter.

1 Introduction

Cross-platform is the ability of software to run on multiple platforms. Cross-platform mobile development allows you to cover two operating systems, iOS and Android, with one code. It does not involve writing code in a native programming language, but provides an almost native experience through a visualization interface using native controls. At the moment, many companies use cross-platform solutions, someone is already seriously considering switching to them in the near future. Cross-platform development of applications for iOS and Android allows you to significantly optimize development processes. Any cross-platform application can be compiled for various platforms with minimal effort.



And the result will be different executable files. So, in the solution for iOS, the executable file will receive the extension ".ipa", and the application for devices running Android will start the application from the file ".apk". There are many articles that analyze in detail all the advantages of cross-platform applications. However, the pros and cons should be considered on the Framework, which has every chance of becoming the most popular among developers.

Overview

Cross-platform entails the creation of applications that can run on different operating systems. Once the application code is written, it can be deployed across devices and platforms without worrying about incompatibility issues. This is a one-stop approach that is widely used to save time and money. Cross-platform development opens up new business opportunities and allows you to launch as soon as possible. If the product is not too complicated, understandable, performs certain tasks, then this is the best solution for a quick and efficient launch.

Benefits of

- If customers use both Android and IOS, then covering all types of mobile devices will help to get a wide segment of users.
- A single stack of technologies is used, both for android and for iPhones.
- Deployment is much faster due to the fact that there is a single code base that can be easily integrated into any operating system.
- The speed of creating a mobile application

increases significantly.

- It is much easier to launch a cross-platform application to the market. It is enough to take into account a number of requirements that the stores set.

Decision

At the moment, the market for operating systems for mobile devices (phones, tablets, smart watches, TVs, etc.) has formed and is focused on two main platforms - Android and iOS.

There is now a wide range of cross-platform technologies, including Flutter, React Native and Kotlin Multiplatform.

Flutter is a cross-platform mobile development framework by Google that uses the Dart programming language. It is an open-source SDK that helps to create beautiful, native-looking, mobile, web, and desktop applications using a single codebase. It is a reactive framework that comes with plenty of ready-to-use widgets and offers better performance because of compiling with machine language.

React Native is a popular JavaScript-based mobile app framework that allows you to create native mobile apps for iOS and Android. The framework allows you to create applications for different platforms using the same code base.

Kotlin multi-platform is an experimental language feature that allows developers to use a single codebase to develop applications for both Android and iOS. Kotlin multiplatform leverages the advanced features and capabilities of the programming language across iOS, Android, iOS, Windows, Mac, Linux, Web, etc. By making it possible to share code between all these platforms, it significantly reduces the development time.

Conclusion

Cross-platform application development is a great solution for business tasks. If the emphasis is not on the visual design, but the functionality itself is important, this development method can significantly reduce time, reduce the budget and make an effective application that will benefit the business. If you immediately need to reach a larger audience and the application's functionality is not complicated, it's easier and cheaper to use a cross-platform approach.

Thus, a single codebase will undoubtedly impact every aspect of application development, down to reducing the number of developers required, allowing a company to save money that would normally be spent fixing and updating two separate codebases.

References

[4] StatCounter is a web traffic analysis - https://gs.statcounter.com/
[5] ASOMobile is a comprehensive mobile app analytics for developers, marketers and ASO specialists - https://asomobile.net/.
[6] Official site for React Native developers - https://reactnative.dev/
[7] Official site for Flutter developers - https://flutter.dev/
[8] Official site for Kotlin Multiplatform developers - https://kotlinlang.org/docs/multiplatform.htm

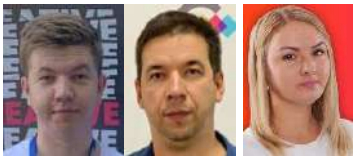
6g Networks: New Generation Cellular Communication

Alexander Gubar, Vladyslav Khotunov, Kateryna Kholupnyak*

ISMA University of Applied Science, Latvia

Cherkasy state business college, Ukraine

**Corresponding author's e-mail: alexandr.hubar1999@gmail.com, vkhotunov@gmail.com, Katyakholupnyak@gmail.com*



Abstract

The development of 5G services has caused a wave of competition around the world and, more importantly, launched a race to develop 6G. Whoever manages the telecommunications technology sector sets standards for products and services and plays a major role in the future development of the industry.

Keywords: telecommunication, technology, digital

1 Introduction

In November 2019, the official Chinese research group on 6G was established. Developed countries such as the United States, Japan, South Korea and some European countries have begun to develop research and development plans for 6G, as the telecommunications sector has always been a competition point.

5G technology aims to create a comprehensive sensor system in which you can easily access information and tools. On the other hand, 6G will help build a perceptual nervous system that integrates artificial intelligence (AI) and wireless cognition, which can give intelligent responses.

Overview

Compared to 5G technology, 6G will have less latency, higher speed and higher bandwidth. And this advanced technology will help connect the real world with the virtual digital world. It will also make design, research and development and experiments much more efficient and significantly reduce their costs, enabling the production of digital products in the physical world using high-tech technologies, including 3D printing.

In terms of economic development, 3G promoted e-commerce, while 4G promoted e-commerce and mobile payments. The construction and application of 5G infrastructure marked the beginning of the intelligent production of Chinese enterprises and served as a basis for the rapid development of the sector. Similarly, the wireless cognitive technology associated with 6G technology, once it matures, will further contribute to the development of the digital economy. [1]

In the digital economy, big data intelligence will be a real impetus for innovation, and 6G networks will not only become backbones for data transmission, but will also integrate edge and core computing much more seamlessly as part of a combined communications and computing infrastructure. This will provide many potential benefits as 6G technology begins to work, including access to AI capabilities.

The 6G-based digital economy will be a determinant of a country's competitiveness. And 6G technology, wireless cognition as its main feature, will become the main technology and the main driver of the digital economy.

6G is expected to support speeds of up to terabytes per second, unprecedented capacity and latency, which will increase the performance of 5G applications, in addition to expanding the scope to support new and innovative applications in wireless cognition, sounding and visualization.

Prior to the introduction of 4G services, China remained a passive player in the field of advanced technology, mainly following the United States and European countries, and did not set standards for telecommunications technology.

But by developing 4G technology at the same time as a developed economy, China has become a major player in this field and contributed to the rule-making process. The fact that 4G in China is the most advanced and widespread in the world has also contributed to the rapid development of mobile payments in the country.

Decision

Starting with 5G, the Chinese telecommunications industry, thanks to its extensive research, has taken a leading position in the standardization and production of 5G telecommunications equipment.

And now that the United States and Europe are lagging behind China in 5G development, they want to drag China through uncompetitive means, such as limiting the development of Chinese companies such as Huawei, and launching 6G research and development before China to make money on the advantage they enjoy in the millimeter-wave industrial circuit.

In terms of R&D in 5G technology, China has two advantages. First, it is a world leader in the telecommunications sector and has a strong pool of talent.

Second, it has a relatively complete industrial network covering R&D, design, production and application, and is home to Huawei's leading 5G equipment manufacturer. [2]

Recent history shows that those who lead the telecommunications sector set standards for telecommunications products and services and play a greater role in the future development of the industry.

And as 6G becomes the engine of a new round of economic development, the Chinese government, businesses and research organizations need to step up cooperation to succeed in 6G's competition.

Conclusion

Ukraine is gradually closing the gap with Western countries in the process of launching new generations of communications. Thus, if 3G in our country appeared in 2015, lagging behind the developed world by more than a decade, the gap between the active development of our 4G (2018) and European 4G - 5-8 years. Fifth-generation networks, which appeared in the world en masse in the early 2020s, are likely to reach our country fairly quickly - by 2022.

Therefore, the introduction of 6G, if it appears in the world by 2030, should affect our market. [3]

References

[1] Vasil Tkachenko. Networking and Business. Pp. 83-87. URL: http://sib.com.ua/sib-06-115-2020/6g.html

[2] HI-TECH Magazine [Electronic resource]. - Access mode: https://hi-tech.ua/catalog/

[3] Information resource [Electronic resource]. - Access mode: https://www.pcweek.ua

Adapting the Website Design Method WSDM towards Recent Common Practices in Web Development

Abdulla Maliyekkal

ISMA University of Applied Science, Latvia

Corresponding author's e-mail: abdullamscatriga@gmail.com

Abstract

To describe informational, functional, and conceptual structures in a website a model is used for it and that model is called Web Semantic design method. In a website for various tasks and functions same information, functional and conceptual structure is used. The design pattern is used to solve the issue. The challenge, therefore, was to enlarge, and that is to say, to produce a design pattern from a high-level perspective, in particular, when considering "web genres". Therefore, the focus of the first part of this proposal is to identify the different types of sites, and then to develop a few designs for each of them. In web design, the content management system is a challenge for it. Current system approaches were created before the web content management frameworks became popular and matured to further the development of web frameworks. Apart from the fact that there are certain systemic processes in which the system or rather the decision to make use of a web content management framework is considered, their strategies are specific to a specific web content management framework and do not provide the whole arrangement. In this research, WSDM is combined with Web genres for different design patterns of websites.

Keywords: WSDM, Web Genres, and Design patterns

Introduction

Wakil and Jawawi [1] stated that an important aspect of the Project of any industry is the design of the project before the implementation of the project. Similarly, in web designing, proper design of the web is very important. In the context of industry, different design methodologies were created and used. Web Semantic Design Method WSDM is the best design methodology in web design. In this research, the Web Semantic Design Method is used. This thesis focus on basically two points:

- In particular website genric, a lot of websites included in it and all that websites have the same functionality
- In implementing a web system, a Content management system is used.

In 1998, Professor De Troyer and Leune developed a website design methodology named WSDM. Presently, WSDM stands for Web Semantic Design Method while in past WSDM stands for Web System Design Method. Audience Driven is the unique feature in WSDM that makes it different from all other design methods [3]. Along with primitives modeling, WSDM also provides systematic guidelines for website development is the unique feature in WSDM. The WSDM strategy consists of several sections that include: a statement of purpose, a public display, a theoretical plan, an initial implementation plan [2].

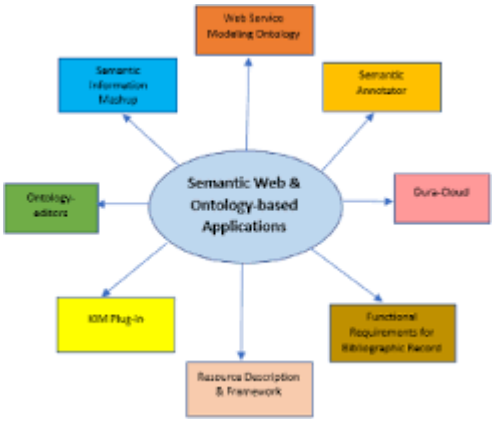


Figure 1- Web Semantic Design Methodology based Application

The new concept of suspension designs, which will be introduced in this concept, is an undeniable standard. The first motive behind this proposal was to explore the feasibility of integrating Web applications into WSDM and how WSDM should be streamlined to achieve this, and that means separating configuration designs for specific site types or types and then joining the WSDM system. The concept of configuration planning is very much linked to the standard functionality that is important between sites with a similar type or location. These high-level stop projects should be captured and reported and alternatives to the WSDM system should be investigated [4].

Overview:

This research discusses adapting the Website Design Method WSDM towards recent common practices in web development. The conclusion is based on the following research objectives:

- To look at the genres previously made in the classification of sites because of their type.
- Research on past genres to characterize configuration designs for sites and relate them to explicit sorts.
- To consolidate site sorts and related plan designs into WSDM.
- To analyze the limits current web architecture philosophies have as far as the flexibility to late execution instruments and systems.
- To adjust WSDM appropriately to conquer these limits.
- To exhibit the adequacy of the adjusted WSDM variant through a model.

Decision:

To design the websites WSDM method is used in which different models are used for the informational, functional, and conceptual structure of websites. It is decided to design a pattern to solve the issue of using the same information, functional and conceptual structure for different websites. The thesis aims to design such a pattern that applies to all websites and this can be done through a combination of WSDM with a web content management system

Conclusion:

In this thesis, different design patterns are collected for corporate websites, e-commerce websites, websites genres, and social network websites. Different design patterns used for the genre are presented in a model, there are different models for different genres. To deal with design patterns and website genre, WSDM is used.

References:

[1] Wakil, K. and Jawawi, D.N., 2018, January. A new adaptive model for web engineering methods to develop modern web applications. In Proceedings of the 2018 International Conference on Software Engineering and Information Management (pp. 32-39).

[2] Weichselbraun, A., Kuntschik, P., Francolino, V., Saner, M., Dahinden, U. and Wyss, V., 2021. Adapting data-driven research to the fields of social sciences and the humanities. Future Internet, 13(3), p.59.

[3] Lei, W., He, X., Miao, Y., Wu, Q., Hong, R., Kan, M.Y. and Chua, T.S., 2020, January. Estimation-action-reflection: Towards deep interaction between conversational and recommender systems. In Proceedings of the 13th International Conference on Web Search and Data Mining (pp. 304-312).

[4] Allilomis, L., 2018. Creaton: A proposal for a new web platform.

Use of Artifical Intelligence in Finance

Mohammed Ajmal

ISMA University of Applied Science, Latvia

Corresponding author's e-mail:mohammedajmal5012@gmail.com

Abstract

The main aim of this study is to determine the usage of artificial intelligence in finance. Artificial intelligence is most widely used in every field. In this research work, we study the history of artificial intelligence, opportunities, and challenges faced by a business while using artificial intelligence. In this research, we used the qualitative research method to answer all the research questions. In it, different literature is studied and analyzed to determine the impact of artificial intelligence on business, especially the finance sector. This study concluded that throughout the financial system whether it is analysis, analysis, or investment, there will be a lot of technology that you can afford to do things.

Keywords: Artificial Intelligence, Machine Learning, Business, Future, and Technology

Introduction:

Buchanan [1] stated that Artificial Intelligence (AI) is a major factor in the invention of everyone who communicates in the creative world. In terms of AI, it includes its regions, for example, AI (ML) and machine learning. While AI may be portrayed as a mechanical ability to stabilize in intelligent and human-like selections over time, ML incorporates construction models, often realistic models that provide predictable and unstructured results. People who are not very educated about our Artificial Intelligence AI partner with robots that mimic human activities and understanding in their work.

This is obvious as the world of entertainment has taken up so much time as we need to persuade AI to target robots. While this is valid, there are other differences between facial confession, fingerprint confession, chatbots, design confession, clever apps, and mindless investigations. Previously, the inclusion of AI in product development was considered by large organizations that had the equipment to hire highly trained professionals. Over time, AI systems with higher levels of meditation were created, and with a few lines of code in any programming language of decision-making, one could have the option to integrate an artificial system [2].

Lin [3] stated that the predictive models could be coordinated into genuine domains costs assessments, stock trade costs, monetary and bookkeeping models, market expectation models, and somewhat wistful examination which gives how purchasers respond to a given item. Its mix in the business world has prompted superior deals where Amazon records more than 60% deals from its proposal frameworks. With the expansion in web-based clients from huge organizations, supplanting human help with chatbots has been an extraordinary achievement by which these Chatbots are supplanting the human labor force in giving computerized and continuous help.

Giudici [4] stated that few businesses are going to AI to finish tasks that were prior achieved by individuals. The financial Service industry consolidates AI to deal with huge information, find fraud by distinguishing uncommon activities, convey online with clients, and fill a few other fundamental roles. Concerning facial recognition, voice acknowledgment, and ML there are very a few extraordinary gainful cases. New advancements are giving extraordinary advantages to improve client offers to drive proficiency and adequacy in the association.

Artificial intelligence instruments can carry fundamental advantages to the universe of finance, which empowers a few assignments to be mechanized, which gives a lift for scientific limit in research with conventional methods that are presently quickly becoming obsolete. However, these disregarding the extraordinary advantages AI applications offer, they additionally come with various restrictions, which can make them not be reasonable for playing out certain exercises, coupled with a scope of dangers that must be enough overseen properly.

As we are presently living in an innovation, cash-filled society, monetary business sectors are gradually starting to incline more on Artificial Intelligence using: Underwriting, Managing Risk, Quantitative Trading, Personalized Banking, Cybersecurity, and Fraud Protection. Guaranteeing is characterized as "the cycle through which an individual or organization faces monetary gamble challenges an expense". Guaranteeing typically manages circumstances including ventures, credits, and protection. A new article states, "AI can take endorsing from a distinguish and-fix mentality to a foresee and-forestall theory". The utilization of Artificial Intelligence in Underwriting considers a faster, more precise portrayal of monetary examinations as far as dangers and choices for a business. In hazard the board, "Computerized reasoning can be utilized to combine approaches, methodology, and controls with the controllers and administrative changes to further

develop their associations' consistency". Computerized reasoning is extremely useful while dealing with and assessing, both, organized and unstructured information, particularly information that doesn't fit on a bookkeeping page. Besides, man-made brainpower comparable to chance permits monetary establishments to work on their scientific capacities in administration and consistence, assisting with recognizing takes a chance in a more ideal way. Quantitative exchanging is "a kind of market procedure that depends on numerical and factual models to recognize and regularly execute open doors". Computerized reasoning assists with assessing stock costs in the exchanging area, permitting the dealer to settle on a better choice in light of more precise expectations of hazard. Using man-made brainpower and calculations in PCs, the exchanging system is becoming simpler for clients,

assisting them with characterizing where to exchange, at what cost, and what amount.. With the essential utilization of online media, banks and different organizations can follow how they market their items and administrations, including item and administration configuration, hazard the executives, and business gauging, Research states, "by dissecting the huge volumes of information accessible via web-based media, banks can separate key bits of knowledge that will empower them to further develop an item and services improvement, client care, advertising, hazard the board and business execution". With this, banks and different organizations can all the more productively investigate their opposition and give important client training [4].

Overview:

This work discusses the advantages of using artificial intelligence in finance. Conclusion of the work on the following points:

- Different opportunities and challenges faced by businesses when they used Artificial Intelligence.
- The effect of Artificial intelligence on the financial corporate sector.
- Globally usage of artificial intelligence.
- The future of Artificial Intelligence.
- The process is adopted by organizations to gain a competitive edge in this technological era.

Decision:

The trend of using Artificial Intelligence in every sector of the world is increasing day by day. Artificial Intelligent is increasingly used in the financial sector of business. It is decided to use a qualitative method of research to identify how AI is used in finance, how AI is globally adopted, what are the challenges and opportunities faced by businesses when going toward AI and What is the future of Artificial Intelligence. The main aim of this research is to find the answer to how different industries especially the finance sector used artificial intelligence.

Conclusion:

Artificial Intelligence is widely used in every sector of business. In finance, artificial intelligence is used in different processes. There is a continued improvement in it and it is determined by reviewing different literature on artificial intelligence in finance.

References:

[1] Buchanan, B., 2019. Artificial intelligence in finance.
[2] Tadapaneni, N.R., 2019. Artificial intelligence in finance and investments. International journal of innovative research in science, engineering and technology, 9(5).
[3] Lin, T.C., 2019. Artificial intelligence, finance, and the law. Fordham L. Rev., 88, p.531.
[4] Kunwar, M., 2019. Artificial intelligence in finance: Understanding how automation and machine learning is transforming the financial industry.

Beyond productivity algorithms

Amangeldiyev Abilkhan, Mikryukova Zhanna

*ISMA University of Applied Sciences, **Latvia***

Corresponding author's e-mail: ab080161@gmail.com, zannaabece@inbox.lv

Abstract

This study shows that full-scale efficiency estimation is based on a set of well-established mechanisms. Such mechanisms are primarily focused on recovering the loss of value to the organisation due to unreasonable postponement of important business for "one day". As a result, the skill of conducting effective changes throughout the life cycle of entrepreneurship is being practiced. Putting off such tasks is often the result of business managers being overloaded with other responsibilities and it being considered as an perspective antidote in preventing a crisis within an organization.

Keywords: symptoms, revenue, loss, potential, change, performance, value, improvements

1 Introduction

In the terminology of creating efficiency "Barnard" rules, this means that the presence of useful cures for business illnesses is an adequate immune protection for the organization. Meanwhile, it is possible to tap into the growth reserves of an organisation, when managers end up failing to follow the principles of an effective business management. Primary problems this research is addressing are the uncreative means of control to use of capital during its turnover process. The methodology of the value oriented management is the best approach for monitoring unsustainable operations for the organisation [1].

2 Formulation of the problem

The study requires maintaining the opening target through a set of control tools which make to identify the liabilities in the working capital cycle. Main objective of the study is to develop a procedure to assess the effectiveness of the changes made to the system, limited in time and resources. To achieve the task following tasks have to be executed:

1. Ability to notice a set of attributes of breaches to formulate control principles until achievement of the objective.
2. Select an alternative with the best value for the entrepreneurship out of choices available.
3. Execute a value-based control scenario, considering the medium-term sustainable growth rate
4. Develop a performance handbook of research on trends in product design and development in the long-term perspective.

In this approach, those who wish to acquire the skill of restoring the lost sustainability of an organization throughout its life cycle [2]. Hidden vacancies in the organisational structure of the company can be recognised. In reality the potential is realised in accordance with accepted capitalisation norms [3]. Changing the algorithms to centre on the key factors and the symptoms of organisation's development allows managers to identify the consequences of tasks that were unjustifiably pushed aside due to the negative impact of the external environment on the organisation's development at the time.

3 Conclusions

The results of the study suggest, increasing the evaluation mark leads to a more efficient redistribution of functional responsibilities among those involved in the capital cycle. This determines the degree of loss and assesses the willingness of the organisation control team not only to implement their existing and future plans, but also take corrective measures to restore the lost operational potential.

The novelty of the study is due to the results construction which incorporates a set of well-established mechanisms to ensure that instances of loss in value due to disruptions of management principles.

References

[1] Mikrjukova Z. (2017). Innovators in management: position of growth and decline of organization. /*The 15th INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2017, April 27-28, ISMA University, Riga, Latvia*, Information Systems Management Institute, Riga, Latvia, p.200.

[2] Amangeldiyev A. (2017). Problem Management and Business-projects Analysis. /*The 15th INTERNATIONAL CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT 2017, April 27-28, ISMA University, Riga, Latvia*, Information Systems Management Institute, Riga, Latvia, p.191-192

[3] Akimov G., Amangeldiyev A., Mikryukova Zh. (2021). Capitalisation of Large-scale Responsibilities. / *The 19TH INTERNATIONAL SCIENTIFIC CONFERENCE INFORMATION TECHNOLOGIES AND MANAGEMENT, 2021, April 22-23, ISMA, Riga, Latvia*