



## Abstracts

of scientific publications

of **Assoc. Prof. Silvia Parusheva, PhD**

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for participation in a competition for “Professor” in the field of higher education

4. Natural sciences, mathematics and informatics,  
professional field 4.6. Informatics and Computer Science,  
scientific specialty “Informatics”

### I. Monograph

**№ 1. Parusheva, S. (2021). Methods of Authentication for protection of individual users of internet banking. Monographic library “Prof. Tsani Kalyandzhiev“, 71. ISBN 978-954-21-1082-8**

#### *Abstract of the monograph*

The global Internet and other advances in information technology, communications, software, and hardware have had a huge impact and have transformed both the provision of financial services and the structure of the financial market. They have influenced the activities of financial institutions, companies and organizations. Software systems and applications in the field of electronic finance affect the banking business, change the appearance of banking services, influence the interaction between banking institutions and their customers, which is increasingly realized with digital methods and means.

Internet banking has already established positions in the wide range of electronic products and services that financial institutions offer to their individual customers. Over the past few decades, banks have been developing and improving both the functionality of online banking and its security and protection measures in order to create a relationship of trust with their customers. Individual user authentication issues are a key factor playing a leading role in the various security dimensions of online banking systems. By implementing strong authentication schemes, banks reliably verify their customers and help prevent or reduce online banking fraud.



The focus of the monograph is precisely the security problems of online banking, specifically related to the authentication that banking institutions in Bulgaria apply to individual users. In order to contribute to increasing the security of Internet banking, the **monographic study aims to offer a methodology and methodological notes for the selection and implementation of schemes for reliable multi-factor user authentication.**

In the **first chapter**, Internet banking is presented as a leading digital service offered by banks. On the basis of shorter and more comprehensive definitions of the term “Internet banking”, an author's definition was derived. The issue of its use in Bulgaria and the European Union was also examined, and a relatively low share of the online distribution channel in our country was established. Empirical research using a respondent sample consisting mostly of students has shown a better level of Internet banking usage among young people.

The **second chapter** presents the threats against online banking and its individual users, which can be categorized into four main areas: threats against users, against users' devices, against communication networks and identity theft.

The **third chapter** emphasizes the importance of reliable authentication and authentication of the identity of online banking users. The three main authentication approaches based on knowledge, possession and inherence methods are presented with their essential features. More innovative authentication approaches based on blockchain technology are also explored. A clear distinction is made between entity authentication and transactional authentication (of financial transactions), the latter being important in preventing fraud with user funds.

The **fourth chapter** presents a study of the state of authentication that banks operating on the Bulgarian market do to individual users of online banking. Banks can permanently take steps to improve the security of their internet banking customers, and the verification of the authentication status in the survey is as of mid-2019. The survey includes the full list of banks operating in Bulgaria. The results of the study are presented, summarized, and analyzed.

The **fifth chapter** presents some opportunities for improving the authentication schemes applied by banks in our country to individual users. The main emphasis is on the proposal of a methodology to support the selection and implementation by banks of a multi-factor authentication scheme. Basic methodological guidelines and notes for the correct



application of the seven stages are also presented. The study of the user authentication mechanisms used by the banks and the analysis and summaries made on its basis allow the derivation of important recommendations to the banks in Bulgaria.

The developed methodology provides banking institutions with opportunities to improve the authentication schemes they apply to their online banking customers. In this way, the methodology can contribute to increasing the security of the electronic banking service.

## II. Other monographs

**№ 2. Atanasova, T., Parusheva, S., Aleksandrova, Y., Stoyanova, M., Radev, M. (2020). Digitalization strategies in „Real Estate Management“ and „Construction Economics“. Varna: Publishing house “Knowledge and business”. ISBN: 978-954-21-1033-0**

### *Abstract of the whole monograph*

The monograph examines various aspects of digitization and digital transformation with application in the construction sector from the point of view of its importance for the country's economy, and not from the regional aspect. The fields that have been selected for research are “Real Estate Management” and “Construction Economics”. Good practices are analyzed and compared, benchmarking of business processes with the best global and national achievements is proposed.

A methodology for implementing a digitization project and preparing a conceptual budget for the digitization of a construction company is proposed, as well as key indicators for measuring the degree of digitization achieved. The authors provide guidelines for training on the issues under consideration and recommendations for updating existing curricula.

### *Summary of the parts developed by Assoc. Prof. Silvia Parusheva*

Assoc. Prof. S. Parusheva participated in bringing out the essence of digitization and digital transformation in the field of construction (p. 1.1.) and the influencing factors and drivers in their development (p. 1.2.). The leading policies, strategies and legislation related to digitization in construction are defined (p. 1.3.). A system of indicators and indicators has been developed to assess its level (p. 1.4.). The main advantages and challenges of digitization are indicated (p. 1.5.), as well as its place as a component of the company's overall business strategy (p. 2.1.). The existing methodologies and approaches for the implementation of



digital transformation projects were examined (p. 2.3.). In order to achieve the necessary increase in the degree of digitization, the necessary resources are specified (p. 4.5.). An important element is the identification of existing good practices for digitization in construction (p. 5.1.), as well as benchmarking tools for its evaluation (p. 6.1.). Guidelines and recommendations for successful digitization are also presented (p. 6.5.).

**№ 3. Parusheva, S. (2017). Social Media Banking Models: A Case Study of a Practical Implementation in Banking Sector. Ikonomicheski Izsledvania, 26, 3, Sofia: Bulgarian Academy of Science, pp. 125-141. ISSN 02053292**

### *Abstract*

Social media are a part of the top IT trends of the technology world together with mobility, big data, cloud, and others. Banks and most business organizations are aware of the power of social media and are active on social platforms. They are valuing this media not only as a means to reach out to customers but also to conduct business. In banks' practice there are four main models for applying of social media banking – use of social platforms as a marketing tool, as a communication channel, as a channel for feedback and reactions and for transactional social banking, where banks allow their customers to realize active operations. Worldwide there are already present successful examples from banks to implement transactional social banking.

Our study focus is on the use of the models of social media banking in the five largest banks in Bulgaria. The results indicate that the banks use the first three models, but currently underestimate the use of transactional social banking with the possibility of active operations on social media platforms.

With the purpose of checking the actual attitudes of one of the main target groups of banks - young customers in Bulgaria, a research with the help of an online questionnaire about the use of social platforms and consumer attitudes on social banking for active operations is conducted. Among active young users and especially ones aged 18-24 in academics, social platforms, mainly Facebook, are very popular and are visited every day. However, their current views on active social banking are overwhelmingly negative caused mainly by doubts about security. Our research shows that in perspective customers alter their attitudes and are



viewing positively the possibility for transactional social media banking in case banks guarantee higher security levels. Because of the wide reach of social networking among Bulgarian users but also the change in views about the transactional social banking a forecast can be made for growth and affirmation of transactional social banking as an innovative digital channel if banks on Bulgarian market offer adequate level of security.

**№ 4. Parusheva, S. (2019). Social Media Banking Usage From Banks' Perspective. International Journal of E-Business Research (IJEBR), Hershey: IGI Global Publishing, 15(1), pp. 38-54. ISSN 1548-1131, 1548-114X**

*Abstract*

Social media is a fundamental trend in both the social and economic life of modern society. This study examines how banks, in the case of the top ten banks in Bulgaria according to their assets, are active in using different types of social media tools. A definition of the concept of social media banking and its scope is proposed. Based on significant amount of data collected from different sources including from an online questionnaire from a sample of mainly young people, an in-depth analysis of banks' use of social networking sites and other types of social media tools is provided. A special focus is placed on the assessment of the intensity of banks' presence on Facebook with a system of quantitative and qualitative indicators being proposed. The article finally identifies conclusions, and recommendations regarding the banks' practices, limitations, and directions for future research.

**№ 5. Parusheva, S., Pencheva, D. (2020). Model of a business intelligence system for managing orders to suppliers in a retail chain. Godishnik. University of Economics - Varna, Varna: Publishing house "Knowledge and business", 90, 1, pp. 188 - 227. ISSN 0861-6752**

*Abstract*

The study focuses on some aspects connected with the established trends in the design of business intelligence systems (BIS) that are specialized for use in retail chains for fastmoving consumer goods. There are considered current concepts concerning business



intelligence and their application in retail systems for sending orders to suppliers. Modern methods for building a business intelligence module have been used, aimed at increasing the productivity of the retailing system and specifying the product quantities needed for sales. The proposed model has been created with the help of the object-oriented modeling language Unified Modeling Language (UML), associated with the leading trends in the design of business intelligence systems.

There are presented technical diagrams, which illustrate visually the main functionalities of the developed model and show the interaction between the user and the system.

**№ 6. Zabukovšek, S., Deželak, Z., Parusheva, S., Bobek, S. (2022). Attractiveness of Collaborative Platforms for Sustainable E-Learning in Business Studies. Sustainability, Basel, Switzerland: Multidisciplinary Digital Publishing Institute, 14, 14, 8257, pp. 1-25. ISSN 2071-1050**

### *Abstract*

E-learning platforms have become more and more complex. Their functionality included in learning management systems is extended with collaborative platforms, which allow better communication, group collaboration, and face-to-face lectures. Universities are facing the challenge of advanced use of these platforms to fulfil sustainable learning goals. Better usability and attractiveness became essential in successful e-learning platforms, especially due to the more intensive interactivity expected from students. In the study, we researched the user experience of students who have used Moodle, Microsoft Teams, and Google Meet. User experience is, in most cases, connected with a person's perception, person's feelings, and satisfaction with the platform used. Data were collected using a standard UEQ questionnaire. With this research, we examined whether user experience factors: perceived efficiency, perceived perspicuity, perceived dependability, perceived stimulation, and perceived novelty affect perceived attractiveness, which is an important factor in the sustainability of e-learning tools. The collected data were processed using SmartPLS. The research study showed that all studied factors have a statistically significant impact on perceived attractiveness. Factor perceived stimulation has the strongest



statistically significant impact on the perceived attractiveness of e-learning platforms, followed by perceived efficiency, perceived perspicuity, perceived novelty, and perceived dependability.

### III. Scientific articles

**№ 7. Parusheva, S. (2011). Концепцията „Архитектура, ориентирана към услугите“ – приложимост в банковите информационни системи. “Izvestiya” journal of University of Economics - Varna, Varna: Publishing house “Knowledge and business”, 3, pp. 30-39. ISSN 1310-0343 (print), ISSN 2367-6949 (online)**

#### *Abstract*

In accordance with the concept of „Service-Oriented Architecture” (SOA) business processes in banks are viewed as a set of interacting operations - services. The topicality of the introduction of SOA projects into banks is determined by the need for fast adaptation to changing business processes, the heterogeneous banking IT environment with a multitude of different applications by various developers, which must be integrated, etc. In times of crisis the realization of SOA projects continues to be a topical undertaking.

**№ 8. Parusheva, S. (2015). A comparative study on the application of biometric technologies for authentication in online banking, Egyptian Computer Science Journal, 39(4), pp. 116-127. ISSN 1110-2586**

#### *Abstract*

In recent years online banking is gaining more and more acceptance thanks to the many advantages and conveniences it provides both for customers and financial institutions. One of the main challenges for the banks, however, is the reliable confirmation of the identity of their customers via the authentication procedure so as to prevent financial fraud. The traditional knowledge- and possession-based authentication methods have proved as not sufficiently strong. As one possible solution to overcome the abovementioned challenge are biometric-based authentication systems, which are generally considered to be more reliable.

The paper proposes a methodology for overall quantitative assessment of biometric features for choosing the most appropriate of them for inclusion in biometric authentication



systems in online banking. The methodology includes evaluation in two stages - basic and advanced assessment of several biometric features like fingerprint, hand vein, hand geometry, iris, voice, and others. The evaluation is based on selected characteristics of theirs which are used as criteria, respectively indicators for comparison. Examples include universality, performance, resistance to circumvention, acceptability, etc.

The results of the study at the first stage - basic assessment of eight biometric authenticators with seven criteria, showed that the four most suitable of them are DNA, fingerprint, iris and face. The subsequent advanced assessment includes additional criteria and proves DNA is to be removed because of the conflict with some important specifics of biometric authentications systems in online banking. The first three ranked authenticators show the following outcome - fingerprint has the highest final score, followed by iris and face. The received results would help financial institutions to choose the most suitable biometric authentication technology, respectively authenticator, and it would be required for them to take into account other important factors.

**№ 9. Parusheva, S. (2015). Card-not-present fraud – challenges and counteractions. Narodnostopanski arhiv, Svishtov: Academic publishing house “Tsenov” – Svishtov, 2, pp. 40-56. ISSN 0323-9004 (print), ISSN 2367-9301 (online)**

### *Abstract*

Due to the rapid development of electronic commerce, the percentage of card-not-present payments over the Internet and fraud related to these, have increased. The relative importance of card-not-present fraud (CNPF) has increased permanently on a global and European scale mainly due to the gradual solution to problems connected with the protection of card present transactions through the transition to the EMV chip standard and transfer of fraud to more vulnerable card-not-present transactions in which it is difficult to verify the identity of the cardholder in a reliable way. For the protection of card transactions, it is necessary to take adequate measures by introducing common harmonized compulsory minimum security requirements across the EU. First, we propose these requirements to include methods for checking the authentication of users. We consider the 3-D Secure Protocol in a version with dynamic authentication the most suitable method because in the





EU many steps towards its implementation have already been made. This is of great importance for the systems used by banks and merchants for the prevention of card-not-present fraud and for detecting and blocking of fraudulent transactions.

**№ 10. Parusheva, S. (2015). Use of payment cards and prevention of fraud related to them in Europe and in our country. Economic and social alternatives, Sofia: UNSS, 4, 99-113. ISSN 1314-6556 (print), ISSN 2534-8965 (online)**

### *Abstract*

Payment cards are the main and most used electronic payment instrument for retail payments in Europe. Their relative importance among other payment instruments is paramount. Analysis of European Central Bank (ECB) data shows that their use for the studied 14-year period from 2000 to 2013 has steadily increased in absolute and relative terms. At the same time, the problem with the security of payment card transactions remains relevant. After some reduction in the number and value of card fraud in the years following their peak in 2008, in 2012 they again marked an increase. As the main type of fraud, card-not-present frauds are confirmed, which form the predominant share in the value of transactions. To overcome them, a number of measures are possible, and the main one is the use of two-factor authentication for users, especially in the Internet environment in e-commerce. It reduces the importance of ATM and POS device fraud thanks to the almost complete migration to the use of chip cards in accordance with the EMV standard, which is established as the main means of combating card-based fraud. Despite the relatively weak development of the card market in Bulgaria, the importance of card fraud should not be underestimated, as regulatory changes are imperative in order to ensure the reliable collection of information on their number and value and their effective countermeasures.

**№11. Parusheva, S. (2016). Banks and Their Models for Modern Communication and Business via Social Media. International Journal of Economics and Management Systems, Vol. 1, pp. 64-68. ISSN 2367-8925**



## *Abstract*

Widely recognized as it is, bank institutions but also most business institutions are active in social media and are valuing this medium not only as a means to reach out to customers but also to realize business. In banks' practice there are four main models for applying of social media banking – use of social platforms as a marketing tool, as a communication channel as well, also as a channel for feedback and reactions and lastly, but most important - for transactional social banking. For the latter, banks allow their customers to realize active operations. There are successful examples already present from banks to implement transactional social banking. In this paper a case-study is presented about applying the models of social media banking in the five largest banks in Bulgaria. The outcomes point out that the banks have been using the first three models successfully already but are rather indecisive about applying and ultimately neglecting the use of transactional social banking with the opportunity of active operations on social media platforms. Since the reach of social networking but also of social banking is widening, a forecast can be made for growth and affirmation of transactional social banking as a new, innovative digital banking channel.

**№12. Parusheva, S. (2018). A Study on Adoption of Internet Banking and New Direct Banking Channels with Reference to Young Bulgarian Consumers. Journal of Applied Economic Sciences, Volume XIII, Spring 2(56), pp. 510 – 519. ISSN 2393 – 5162, ISSN-L 1843 - 6110**

## *Abstract*

The direct banking channels, specifically Internet banking have a high importance both for bank institutions and consumers. There is a clear tendency for expanding the perception of Internet banking by more consumers, especially in EU countries, albeit with some variations.

This research aims to examine the Internet banking adoption (IBA) rate of young Bulgarian people and to compare it with the rate at national level in Bulgaria. The data used is obtained through a distribution of online questionnaire among Bulgarian young users aged mainly 18-34 on the example of academic audience. The results of the study show that there are significant differences between official data on IBA rate for all Bulgarian population with



those found for young people – the last one is about 50% and is more than 10 times the national level of the rate. Contrary to expectations, this study reveals that the majority of young Bulgarian people prefer to visit the traditional bank office for feedback and communication with their banks instead to use remote electronic channels. The findings also indicate that young consumers are not yet ready to complement Internet banking with a new channel such as social media banking. There are good preconditions for this in the future.

**№13. Parusheva, S., Aleksandrova, Y., Hadzhikolev, A. (2018). Use of Social Media in Higher Education Institutions – an Empirical Study Based on Bulgarian Learning Experience. TEM Journal - Technology, Education, Management, Informatics, Novi Pazar, Serbia: UIKTEN, 7(1), pp. 171 - 181. ISSN 2217-8309 (Print), eISSN 2217-8333 (Online)**

### *Abstract*

Social media have enormous power and trigger changes in whole spectrum of businesses, as well as learning and education. A study of students' adoption of social media at the University of Economics – Varna (UE-Varna), Bulgaria, has proven its significant impact on young people. Using online questionnaire among 378 students, the high popularity of social media has been confirmed. An important research question is whether higher education institutions teaching students mainly in the fields of social, economic and legal sciences use the benefits of the social media in the context of Learning Management Systems (LMSs) and integrated social media tools. The majority of the examined 24 universities use two LMSs - Moodle and Blackboard Learn. Both possess tools like forums, chat, wikis, internal messaging, blogs, learning groups, collaboration tools. The study of the two Moodle platforms implemented at the UE-Varna shows use of discussion forums, chat, and internal messaging.

**№ 14. Salem, A., Parusheva, S. (2018). Developing a Web-Based Ontology for E-Business. International Journal of Electronic Commerce Studies. 9(2), pp. 119-132. ISSN 2073-9729**



## *Abstract*

Ontological engineering (OE) is a subset of knowledge science. Ontology is a powerful technique for knowledge management and reasoning tasks. Recently, most research of OE is related to developing robust, smart, knowledge-based systems in different domains. Nowadays, e-business, or electronic business, is the integrated execution of all business analytics processes of an enterprise by means of smart computing and informatics. The objective of this study is to develop a web-based ontology for e-business paradigms. In this work, five web-based ontologies were designed for the following: (a) e-business applications; (b) e-business participants; (c) e-business infrastructure; (d) e-business support areas, and (e) fields in e-business. The developed ontologies were implemented in ontology web-based language OWL2 using the Protégé smart tool version 5.0.0 editing environment.

**№ 15. Salem, A., Parusheva, S. (2018). Exploiting the Knowledge Engineering Paradigms for Designing Smart Learning Systems. Eastern-European Journal of Enterprise Technologies, Kharkov: PC Technology Center, 2 (92), pp. 38-44. ISSN 1729-3774, ISSN 1729-4061**

## *Abstract*

Knowledge engineering (KE) is a subarea of artificial intelligence(AI). Recently, KE paradigms have become more widespread within the fields of smart education and learning. Developing of Smart learning Systems (SLS) is very difficult from the technological perspective and a challenging task. In this paper, three KE paradigms, namely: case-based reasoning, data mining, and intelligent agents are discussed. This article demonstrates how SLS can take advantage of the innovative KE paradigms. Therefore, the paper addresses the pros of such smart computing approaches for the industry of SLS. Moreover, we concentrate our discussion on the challenges faced by knowledge engineers and software developers in developing and deploying efficient and robust SLS. Overall, this study introduces the reader the KE techniques, approaches and algorithms currently in use and the open research issues in designing the smart learning systems.

**№16. Aleksandrova, Y., Parusheva, S. (2019). Social Media Usage Patterns in Higher Education Institutions - An Empirical Study. International Journal of Emerging**



**Technologies in Learning [iJET], Vienna: International Association of Online Engineering, 14(5), pp. 108-121. ISSN 1868-8799, ISSN 1863-0383**

### *Abstract*

The main goal of this research is to identify some notable trends, opportunities, and limitations regarding the application of social media in higher education based on studying the way students use social media during their education. The research is focused on the impact of social media on the process of learning, creation and distribution of education related content, as well as on education related communication. The target groups of the research are students in University of Economics - Varna enrolled in different bachelor and master programs.

An association analysis was implemented to identify the most common patterns regarding the application of social media in the education process. Statistical methods for testing hypothesis were used to assess the relationship between students' specialty and derived social media patterns.

The findings show that Facebook groups are a preferable social media tool for communication with colleagues, content sharing and distribution, while wiki and university Learning Management Systems (LMSs) are most used for content creation and additional learning. Some social media channels are preferable for content creation and additional learning compared to scientific databases and e-books.

Following the research results a conclusion can be drawn regarding the leading part of the students in initiating the use of social media compared to the relatively smaller role of the academic staff in this process. A medium to small relationships were discovered between students' specialty and the application of content sharing communities and forums in knowledge process with students in computer science more likely to use these social media types compared to students in economics.

**№17. Parusheva, S., Hadzhikolev, A. Social Media as a People Sensing for the City Government in Smart Cities Context. (2020). TEM Journal - Technology, Education, Management, Informatics, Novi Pazar, Serbia: UIKTEN, 9(1), pp. 55-66. ISSN 2217-8309, ISSN 2217-8333**



## *Abstract*

Social media have a huge impact on different areas of modern life. In smart city context, they can be used as a tool for enhancing dialogue between citizens and municipalities. Based on present research, empirical evidence is provided on insufficient use of social media capabilities. Relationship between smart cities and social media power is examined through study on the example of Varna municipality. An analysis of city government presence in social media was conducted. Through online questionnaire the citizens' attitude towards smart city concept was studied. Suggestions for improving the communication between citizens and municipal administration of Varna are given.

**№18. Parusheva, S., Aleksandrova, Y. (2021). Digital Technologies and Tools - Drivers of Digitalization in Construction. Izvestia Journal of the Union of Scientists – Varna, Economic Sciences Series, Union of Scientists – Varna, 10(1), pp. 63-71. ISSN (print) 1314-7390**

## *Abstract*

Construction is a structural sector that creates the infrastructure for the functioning of other sectors, which is why its development is essential for the national economy. For this reason, the digitalization of construction is paramount. It is characterized by great complexity of production processes and typical conservatism, which is why it is known for its difficulties in the transition to digitalization. Digital technologies and tools are the engines of digitalization in construction. The paper explores the importance of some key technologies and tools for its digitization – first, the role of building information modeling, along with the application of virtual, augmented, and mixed reality, mobile technologies, and cloud computing. Sensors and other tools and technologies belonging to the Internet of Things, as well as the use of drones, have great potential for revolutionizing the construction sector. Artificial Intelligence and Machine Learning help analyze large amounts of data in construction and help make timely, accurate and efficient decisions. The study highlights the importance of resources as basis for the digitalization of construction with focus on human resources.



**№19. Aleksandrova, Y., Parusheva, S. (2021). Performance Evaluation of Machine Learning Models for Credit Risk Prediction. Izvestia Journal of the Union of Scientists - Varna. Economic Sciences Series, Union of Scientists – Varna, 10(2), pp. 89-98. ISSN (print) 1314-7390**

### *Abstract*

The purpose of this research paper is to propose an approach for calculating the optimal threshold for predictions generated by binomial classification models for credit risk prediction. Our approach is considering the cost matrix and cumulative profit chart for setting the threshold value. In the paper we examine the performance of several models trained with homogeneous (Random Forest, XGBoost, etc.) and heterogeneous (Stacked Ensemble) ensemble classifiers. Models are trained on data extracted from Lending Club website. Different evaluation measures are derived to compare and rank the fitted models. Further analysis reveals that application of trained models with the set according to the proposed approach threshold leads to significantly reduced default loans ratio and at the same time improves the credit portfolio structure of the Peer-to-Peer lending platform. We evaluate the models performance and demonstrate that with machine learning models Peer-to-Peer lending platform can decrease the default loan ratio by 8% and generate profit lift of 16%.

**№20. Abdel-Maboud, N.F., Tawfik, M. A., Parusheva, S., Salem, A.-B. M. (2022). Advances of Machine Learning in Electromyography (EMG) Signal Classification. World Journal of Engineering research and Technology, 8(2), pp. 1-20. ISSN 2454-695X1**

### *Abstract*

In the last decades artificial intelligence techniques are used widely by researchers of neuromuscular disorders to increase the diagnostic performance and accuracy. The Electromyography (EMG) is a commonly used technique to record and analyse myoelectric signals. The processing and classification of EMG signals play a major role in the diagnosis of neuromuscular disorders such as Amyotrophic Lateral Sclerosis (ALS). The article aims to give a brief explanation of the different feature extraction and classification techniques that have been applied for the diagnosis of neuromuscular disorders through EMG signal analysis



and presents a review of the recent applications in this field. Wavelet Transform (WT), Principal Component Analysis (PCA) and Empirical Mode Decomposition (EMD) are the most common used feature extraction techniques. Classification techniques such as Artificial Neural Network (ANN), Multilayer Perceptron (MLP), Support Vector Machine (SVM), K-Nearest neighbours (kNN) and deep learning re-used to classify EMG signal.

**№21. Parusheva, S., Aleksandrova, Y. (2022). Legislation and Policies for Digitalization Supporting Construction Innovation. Engineering Sciences, Sofia: Institute of Metal Science, Equipment and Technologies, 59, 1, c. 71-79. ISSN 1312-5702, ISSN 2603-3542**

*Abstract*

The structural role of construction predetermines the importance of the processes of its digitalization. Legislation and policies for the digitalization of construction are essential for stimulating digital transformation. Specific legislative policies and digital initiatives have been taken at European and national level to stimulate the penetration of information and communication technologies and digitalization processes in construction. The leading importance of European initiatives such as Digital Single Market Strategy for Europe, Digitizing European Industry initiative, Strategy for the sustainable competitiveness of the construction sector, etc. should be emphasized. They contribute to strengthening the processes of digitalization in construction and to overcome its lag in the perception of innovation from other sectors.

**№22. Parusheva, S., Aleksandrova, Y. (2022). Digitization in construction in the context of impacting drivers and factors. Journal of the Bulgarian Academy of Sciences, Sofia: Acad. Publ. house Prof. M. Drinov, 2, Year 135, pp. 65-70. ISSN 0007-3989 (print), ISSN 2683-0302 (online)**

*Abstract*

Digitalization has a leading impact on stimulating economic growth, job creation and a complete change in the functioning of all sectors of the economy, including construction. Despite a certain lag in the perception of digital technologies, the construction sector is





striving to catch up. The processes of digitalization are under the influence of a number of drivers and factors that stimulate their acceleration.

The impact of drivers in construction is associated with the need to increase productivity, achieve greater profitability and operational efficiency, competitiveness, resource, and energy efficiency. The influence of internal and external factors on the digitalization of processes in construction companies is significant. As a result of the research, a distinction is made between the factors influencing digitalization into two main groups - national factors and factors related to European initiatives and projects. Among the national factors as leading are the production and communication infrastructure, incl. the use of digital instruments, sensors, 3D scanning, “Digital twins” technology, etc. technologies. Based on them, analyzes are performed to support the decision-making process in the management of construction projects.

European factors include the EU Strategy for Building a Digital Single Market, initiatives related to digital cities and regions, etc. Emphasis is placed on the concepts of the Internet of Things and Smart Cities, as well as the importance of the European Green Pact, which has an important impact on the digitalization process in the construction industry.

The processes of digitalization in construction are directly related to achieving better productivity of construction companies, higher profitability, and improved innovation opportunities. As a result, the digitalization of construction contributes to the successful realization of important pan-European and national goals, such as achieving better well-being of citizens, resource and energy efficiency and compliance with the European Green Deal.

#### IV. Scientific papers

**№23. Peneva, P., Parusheva, S. (2010). Payroll outsourcing in small and medium-sized enterprises - opportunities and prospects. Proc. of the International scientific conference „Business management systems in small and medium enterprises“, Svishtov: Acad. publ. house „Cenov“, pp. 154-160. ISBN 978-954-23-0455-5 (print)**

#### *Abstract*

Outsourcing of services has been actively developing in Bulgaria in recent years. The concept means assigning the execution of separate functions or business processes of the



company to another (external) contractor having the necessary resources for this. The goal is to achieve better quality and efficiency in the work of companies, freedom from labor-intensive, non-specific or difficult-to-serve operations and functions. Very often, outsourcing is associated with the outsourcing of activities to other countries. Typical examples are countries such as India, China, Russia and, last but not least, Bulgaria, especially in the field of software development.

The report examines some issues of the effective organization of the information systems of small and medium-sized enterprises (SMEs) by using the outsourcing of data processing services (for example, payroll services). The possibilities of Payroll services, their scope and structure are outlined. Their applicability is defined and the positive sides and possible problems for users are evaluated.

**№24. Parusheva, S. (2011). Bulgaria as an offshoring destination - place and opportunities. Proc. of the International scientific and practical conference “ Modern problems of applied informatics ”, Saint Petersburg, pp. 112-117. ISBN 978-5-7422-2597-3**

### *Abstract*

Outsourcing of services and business processes has been used in practice for a long time, and with the development of communication technologies and globalization, outsourcing is becoming more and more attractive.

Offshore outsourcing (offshore outsourcing) or offshoring as a variety of outsourcing is an order for the execution of some company business processes of foreign companies organized in other countries.

The aim of the report is to analyze the competitive positions of Bulgaria as a country suitable for offshoring. And also, to point out some problems arising from the point of view of the development of the offshoring business in our country.

**№25. Parusheva, S. (2011). Applicability and issues of cloud services in the banking sector. Proc. of the International Scientific Conference “ Information technologies - a**



**strategic priority in the knowledge economy ”, Svishtov: Acad. publ. house „Cenov“, pp. 180-184. ISBN 978-954-23-0675-7**

### *Abstract*

The impact of the economic crisis on the various sectors of the economy is primarily expressed in the desire to achieve greater efficiency in business and the related cost optimization. The banking sector, which is characterized by a very strong competitive environment, does not differ from the indicated trend. One of the ways to follow it is the entry into the banking sphere of the increasingly necessary and promising technology related to cloud services.

The highly competitive environment in the banking sector and the need to optimize costs are driving banks to move to cloud technology, which offers banks unlimited IT resources on a consumption-based pricing model. Starting with the private and hybrid cloud, banks are now moving core banking systems to a public cloud environment. A key challenge for this innovative technology is data security as a major risk for financial organizations.

**№26. Parusheva, S. (2012). Using a customer relationship management system in banks - a strategic approach to managing their business. Proc. of the International Scientific Conference „Trends and challenges in the development of the economy ”, Vol I, Varna: Publishing house “Knowledge and business”, pp. 302-308. ISBN 978-954-21-0600-5**

### *Abstract*

In the conditions of intense competition in the banking sector, global financial crisis and rapid development of information technologies, banks are forced to focus on their customers more than ever, to acquire in-depth knowledge about them and to realize interaction with them, specifically aimed at the needs and high their expectations.

The report aims to justify the need for customer relationship management (CRM) in the banking business and the use of a system to support this management, and to derive the determining factors for the success of a system of this class.

Customer relationship support systems can be referred to as the most effective business model in financial institutions. It should also be borne in mind that CRM is not limited to



information technology but is an important part of the strategy for the development and optimization of the banking business.

**№27. Parusheva, S. (2013). Cyber-attacks in internet banking - challenges for financial institutions. Proc. Of the International Scientific Conference “ Modern methods and technologies in scientific research ”, Varna: Publishing house “Knowledge and business”, pp. 158-165. ISBN 978-954-21-0630-2**

### *Abstract*

Internet banking provides customers of financial institutions with new and traditional banking products and services directly over the public Internet. It includes systems that allow customers - individuals and corporates - to access their accounts, carry out transactions, receive information about financial products and services, etc. The popularity of Internet banking makes it a priority target for criminal entities looking for ways to illicitly acquire user funds. Due to the good protection of banking systems, malicious entities concentrate attacks not on the banks themselves, but on their customers.

The report focuses on the main threats to online banking users such as phishing, pharming, malware/Trojan horses and the role of mules in cybercriminals' fraudulent attacks. In addition to measures to authenticate their customers, banks are working on customer awareness and education. In this area, the practice of the five largest banks in the country was studied.

**№28. Parusheva, S. (2014). Banks and modern relationships with their customers through social media. Proc. of the International scientific conference „Information technologies in business and education“, Varna: Publishing house “Knowledge and business”, pp. 115-122. ISBN 978-954-21-0780-4**

### *Abstract*

Social media is an important phenomenon in modern life, which in recent years has been significantly linked to the global Internet network.



For banking institutions, social media is not only an opportunity to communicate with customers and an important marketing tool. Social media is used by banks, including as a distribution channel for remote financial transactions.

The purpose of the report is to explore possible ways to establish modern modern relationships of banks with their customers using social media, incl. to examine the relevant practice in this direction of some of the financial institutions operating on the Bulgarian banking market.

**№29. Parusheva, S., Atanasova, T. (2016). Card Fraud Prevention Capabilities with Intelligent Methods. 16th International Multidisciplinary Scientific Geoconference SGEM 2016: Conference Proceedings, June 28 - July 6 2016, Albena, Bulgaria: Vol. 1, Book 2, Sofia: STEF92 Technology Ltd., pp. 117-124. ISSN 1314-2704**

### *Abstract*

In the recent years card frauds on a global level present a big challenge for the banks, card organizations, merchants and last but not least for the cardholders. The latter's trust in bank cards as a main electronic payment instrument has been severely compromised. Therefore, preventing card fraud is of paramount importance to everyone. There are different means of counteraction available including: migration to chip cards according to EMV standard – those substitute the potentially vulnerable cards with a magnetic tape; for online transactions – systems for checking card security codes, applying 3-D Secure safety protocol; use of systems to identify fraud transactions and others. Currently intelligent methods are being very popular to prevent card fraud and those include techniques applying neural networks. Having the access to data of 400 000 card transactions made with 16 000 different bank cards over a period of six months, we have put into practice experiments to analyze data with intelligent methods. Through rule induction we have reached dependencies which are confirmed using the neural network Alyuda NeuroIntelligence. The most important characteristics of a payment card transaction, that ought to be closely monitored by banks in order to prevent fraud, are the currency and the time of the execution of the transaction (month, day and time). Those dependencies can be used effectively by the banks to identify suspicious and potentially fraudulent transactions.



**№30. Atanasova, T., Parusheva, S., Kostadinova, E. (2016). Spam Filtering Through Neural Network. 16th International Multidisciplinary Scientific Geoconference SGEM 2016: Conference Proceedings, June 28 - July 6 2016, Albena, Bulgaria : Vol. 1, Book 2, Sofia: STEF92 Technology Ltd. pp. 383-388. ISSN 1314-2704**

### *Abstract*

The changing characteristics of email spam messages together with the inefficient spam filters require new approaches for spam reduction. One of them is using machine based system learning – a neural network. This approach is used for recognition of spam characteristics and spam correct classification. The ability of neural networks to “learn” from examples makes them highly adaptable and powerful. 1600 messages (spam and not spam) in English, received in a period of several months, have been used in the current research for the training of a neural network of type multilayer perceptron. A system, which does preliminary processing of email messages, is created. The language used to create the system is Java. The platform Eclipse IDE for Java Developers is used. Alyuda NeuroIntelligence is used to create the neural network. The developed system for preliminary processing downloads the messages directly from the mail box through Internet Message Access Protocol. This is done through JavaMail API. The list of downloaded messages is processed according to certain characteristics. A vector with the received results is generated for each processed email, after which all vectors are recorded in CSV file. This file is uploaded to the software for neural networks Alyuda NeuroIntelligence. A multilayer perceptron is created (15-12-1). It is trained through the algorithm Limited Memory Quasi-Newton. Experiments made show that trained network in such way, classify correctly the spam and a mistake has been made in only 50 cases out of total 1200. Therefore a filtering spam system with the use of neural network can be built on the base of the descriptive characteristics of the email messages.

**№31. Medvedeva, M., Parusheva, S. (2016). Application of Information Technologies in Management of Greenhouse Gases and Wastes. 16th International Multidisciplinary Scientific GeoConference SGEM 2016, June 30-July 6, 2016, Albena, Bulgaria:**



**Conference Proceedings : Book 2. Vol. 1. Informatics, Geoinformatics and Remote Sensing, Sofia: STEF92 Technology Ltd., Vol. 1, Book 2, pp. 49-54. ISSN 1314-2704**

*Abstract*

This paper addresses the example of information technologies application in management of greenhouse gases and wastes. There was developed an information system for conducting a greenhouse gas inventory at a regional level. It is designed in accordance with the recommendations of “Guidelines for National Greenhouse Gas Inventories” (IPCC 2006). The system provides collection, storage, processing, and analysis of the information, as well as preparation of the required forms and reports on greenhouse gases emissions and removals. The ability of the system use in the field of waste management is ensured by the presence of the module “Waste” in its structure. This module consists of the following four blocks: “Solid waste”, “Incineration and open burning”, “Treatment of the municipal waste water”, “Biological treatment of solid waste”. The information about some types of waste is presented in other modules. In particular, the module “Agriculture” takes into account the greenhouse gases emissions resulting from the cultivation of domestic animals, as well as from systems of harvesting, storage and using of manure and litter. Such information can be also useful for estimation of bio resources which could be used in producing of biogas and energy. System is implemented as a program (executable file), a database file and auxiliary files. It includes five subsystems: “Database processing”, “Report generation”, “Data export and import”, “System kernel” and “Analytical block”. The system was successfully tested in the Khanty-Mansiysk Autonomous District of Russia and now is used as decision support tool by the District's Administration.

**№32. Medvedeva, M., Davletbaev, R., Berg, D., Naarova, J., Parusheva, S. (2016). Industrial Entrepreneurial Network: Structural and Functional Analysis. Applications of Mathematics In Engineering and Economics (AMEE'16): Proceedings of the 42nd International Conference, 8-13 June 2016, Sozopol, Bulgaria, Melville, NY: AIP [American Institute of Physics] Publ., pp. 020018-1 - 020018-4. - Ser. (AIP Conference Proc.; Vol. 1789; № 1). ISSN 0094-243X, ISBN 978-0-7354-1453-2**



## *Abstract*

Structure and functioning of two model industrial entrepreneurial networks are investigated in the present paper. One of these networks is forming when implementing an integrated project and consists of eight agents, which interact with each other and external environment. The other one is obtained from the municipal economy and is based on the set of the 12 real business entities. Analysis of the networks is carried out on the basis of the matrix of mutual payments aggregated over the certain time period. The matrix is created by the methods of experimental economics. Social Network Analysis (SNA) methods and instruments were used in the present research. The set of basic structural characteristics was investigated: set of quantitative parameters such as density, diameter, clustering coefficient, different kinds of centrality, etc. They were compared with the random Bernoulli graphs of the corresponding size and density. Discovered variations of random and entrepreneurial networks structure are explained by the peculiarities of agents functioning in production network. Separately, were identified the closed exchange circuits (cyclically closed contours of graph) forming an autopoietic (self-replicating) network pattern. The purpose of the functional analysis was to identify the contribution of the autopoietic network pattern in its gross product. It was found that the magnitude of this contribution is more than 20%. Such value allows using of the complementary currency in order to stimulate economic activity of network agents.

**№33. Parusheva, S., Atanasova, T. (2016). Card fraud - prevention with intelligent methods. Proc. of the Jubilee scientific conference dedicated to the 50th anniversary of the Department of Business Informatics “ Challenges to information technologies in the context of Horizon 2020“, Svishtov: Acad. publ. house „Cenov“, pp. 95-100. ISBN: 978-954-23-1188-1**

## *Abstract*

Card fraud is a serious challenge for all participants in transactions - banks, card organizations, merchants, cardholders. Consumer confidence in payment cards as a primary electronic payment instrument has been seriously compromised. Therefore, the prevention of card fraud is of paramount importance. Different countermeasures are applied. Intelligent





methods for preventing card fraud and those involving techniques using neural networks are currently being actively worked on. Having real data of over 400,000 card transactions made with over 16,000 bank cards over a period of 6 months, in our research we implemented practical experiments to analyze the data with intelligent methods. Through rule induction, we derived specific dependencies that were confirmed using a neural network. The most significant characteristics of card transactions that banks should monitor in order to prevent fraud are the type of currency and the time of their execution (month, hour and day). These dependencies can be used by banks in the most effective way to recognize suspicious transactions.

**№34. Parusheva, S., Aleksandrova, Y., Petrov, P. (2017). A Study of the Use of Social Media in Higher Education Institutions in Bulgaria. 4th International Multidisciplinary Scientific Conferences on Social Sciences & Arts SGEM 2017, Albena, SGEM, 4, Book 1, pp. 19-26. ISSN: 2367-5659**

### *Abstract*

Social media have become a driver for substantial changes in a number of fields, including business, education and learning practices. They are present in a dominating way in lives of young people in Bulgaria. This study examined the university students' perceptions/adoption of social media based on the example of the students at the University of Economics – Varna (UE-Varna), Bulgaria. Data was collected and analyzed from online survey of 378 undergraduate students both from bachelor and master degree programmes. This study found that social media are enjoying getting much attention from the students. Almost 100% of respondents possess a Facebook account, and every second student has an account also in YouTube, Google+ and Instagram simultaneously. Most frequently visited are Facebook and YouTube – above 90% and 67% of the user respectively log in daily. This intense presence motivates our study whether state HEIs, teaching students mainly in the fields of social, economic and legal sciences use the potential help of social media in education adequately. One of the possibilities is examined - through the use of Learning Management Systems (LMSs) and integrated social media tools by universities. The results of the study reveal the majority of state HEIs use two LMSs - Moodle and Blackboard Learn,



which possess integrated social media tools like discussion forums, chat, wikis, internal messaging, creating learning groups, collaboration tools, etc. Counting on those incorporated in LMSs social media practices Bulgarian HEIs have the possibility to stimulate and motivate the participation, engagement, collaborative learning of students in formal higher education and to achieve better teaching and academic results.

**№35. Aleksandrova, Y., Parusheva, S. (2017). Social Media in Higher Education from Students' Perspective. 4th International Multidisciplinary Scientific Conferences on Social Sciences & Arts SGEM 2017, 1(4), pp. 709-716. ISSN: 2367-5659**

### *Abstract*

Nowadays we are witnessing the growing proliferation of social media in almost every sphere of our lives – from economics, to politics, society and education. Undoubtedly, the new opportunities of various social media applications such as social networking sites, collaborative projects, blogs, wikis, content communities, forums, etc., have their impact on educational process for both teachers and students. The main goal of this research is to identify some notable trends, opportunities and limitations regarding the application of social media in higher education based on studying the way students use social media during the course of their education. The target groups of the research are students in University of Economics Varna enrolled in different bachelors and master programs. Data is collected with online survey specially designed for the purpose of this research. During the research process, we have formulated three main area of interest, namely using the social media in the process of learning, creation and distribution of education related content. The study examines the usage of and the attitude to various social media applications. Results show that the application of social media is largely initiated by students and not so much by teachers. Facebook groups are preferable social media for communication with colleagues and content sharing and distribution, while Wikis and Learning Management Systems (LMSs) are most used for content creation and additional learning. Some possible future research topics are given in the conclusion.



**№36. Petrov, P., Dimitrov, G., Parusheva, S., Nikolov, N., Petrova, S. (2017). Improving the Performance of Social Assisted Search in Library Information Systems. 4th International Multidisciplinary Scientific Conferences on Social Sciences & Arts SGEM 2017, 4(1), pp. 311-318. ISSN: 2367-5659**

*Abstract*

This study focuses on the performance improving of social assisted search by using the Redis system as a cache layer between an application and a MySQL system which stores data extracted from the behavior of many users. Since searches made by one particular user can be viewed as a Markov chain, there is need for a lot of data to be read and displayed to the user, and simultaneously small piece of the user behavior data should be written in the database in order to serve in the future searches made by other users. As it is well known, the speed of execution of the “insert”/”update” commands compared to the “select” command are slow, because indexes used in the databases need to be refreshed. Series of benchmark tests have been executed with aim to determine in which cases there will be advantage of using such caching layer approach for saving system resources and increasing the performance. The term “relative performance” has been defined and this indicator is used to determine relative performance between popular SQL и NoSQL systems such as MySQL and Redis.

**№37. Petrov, P., Sulov, V., Parusheva, S., Penchev, B., Collins, J. (2017). Web Technologies Used in the Home Pages of the Irish Banks. 4th International Multidisciplinary Scientific Conference on Social Sciences & Arts SGEM 2017, 1(5), pp. 1135-1142. ISSN: 2367-5659**

*Abstract*

The publication presents the results of empirical research on technologies used in the home pages of the Irish credit institutions authorized under Irish Legislation to carry on banking business in the state according to the Irish Credit Institutions Register, Section 1 (a) in 2017. The home web pages of 10 banks were studied. Our survey reveals some interesting details about the proportion of the used web technologies. The average home page size is around 1.4 MB and the share of the images is around 50%. The share of other technologies is



as follows: JavaScript programs - around 30%, CSS files - 9%, Font files - 8%. The size of the main HTML file is only 3% of the size of whole web page. The average total number of requests that the web browser makes in order to display the home page is around 71 separate requests - 23 requests for images, 21 for JavaScript, 9 for CSS files, 3 for Font files. None of the surveyed web sites are using HTTP/2. All of them are using as minimum HTTP 1.1. Near 40% of the sites are using 1 year-long Symantec SSL certificate. Web server settings for the Keep-Alive parameter vary from 5 to 15 seconds timeout for the opened network connection with maximum of 100 served requests.

**№38. Dubinin, N., Kalinin, V., Kokovin, A., Guseva, O., Lapshina, S., Dolganov, A., Parusheva, S. (2018). Shewhart's Control Charts in the Education Quality Management System. Proceedings of 15th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2017), Thessaloniki, Greece, AIP Conference Proceedings, 1978 (1), September 2017, pp. 440016-1 - 440016-4. ISBN: 978-0-7354-1690-1**

### *Abstract*

In this paper, an attempt is made to outline the ways of constructing a technology for identifying problem zones in the mathematical preparation of students to create the possibility of preparing targeted corrective educational modules that ensure the students learn the subject in accordance with educational standards. The paper presents the technological chain of activities for the education quality management. The technique for analyzing the results of quality diagnostics is applied, which uses for each control measure the method of constructing Shewhart's control charts, as well as statistical coefficients of association and contingency.

**№39. Shangina, E., Ilysheva, N., Shangin, G., Lapshina, S., Parusheva, S. (2018). Model of Mobile Learning and Its Application in the Educational Process. Proceedings of 15th International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2017), Thessaloniki, Greece, AIP Conference Proceedings, 1978 (1), September 2017, pp. 440017-1 - 440017-4. ISBN: 978-0-7354-1690-1**



## *Abstract*

The article presents the author's interpretation of mobile cloud learning (Mobile learning or M-Learning). This technology is the next stage of development of E-Learning. Disclosed methods and learning principles considered by the pedagogical system model of mobile cloud learning, the results of the experiment on introduction of the components of mobile cloud learning. Theoretical studies are verified. It is shown that the proportion of students willing to learn through the mobile-cloud using a wireless access increases, and these technologies are effective.

**№40. Berg, D., Demina, M., Isaichik, K., Panachev, A., Popkov, V., Parusheva, S. (2018). Competition of payment systems in Russia: Numerical analysis. Proc. of the International Conference of Computational Methods in Sciences and Engineering 2018 (ICCMSE-2018), Thessaloniki, Greece, AIP Conference Proceedings 2040 (1), 050014 (2018), pp. 050014-1- 050014-4. ISBN: 978-0-7354-1766-3**

## *Abstract*

In this article, on the basis of author's technique, a comparative analysis of behavior strategies of public and private payment systems in Russia is conducted. The analysis is carried out using the datasets published on the Central Bank of the Russian Federation website. The article also presents the classifications and behavioral strategies of payment systems for the formulation of further vector of research.

**№41. Kalinin, V., Berg, D., Nazarova, Y., Parusheva, S., Dolganov, A. (2018). R/S-analysis of cash-flow: Cases of business eco community and separate enterprise. Proc. of the International Conference of Computational Methods in Sciences and Engineering 2018 (ICCMSE-2018), Thessaloniki, Greece, AIP Conference Proceedings, 2040 (1), 050015 (2018), pp. 050015-1- 050015-4. ISBN: 978-0-7354-1766-3**

## *Abstract*

The article is devoted to the fractal analysis of time series of payments. The method of normalized range (R/S analysis) was used, which makes it possible to compare series of different duration. The series of payments carried out by agents in the local payment system



(LPS) for two months, as well as by one agent outside the LPS during one calendar year were investigated. In the first case, the data was aggregated weekly, in the second case, monthly. The values of the Hurst index obtained for the two series studied turned out to be significantly different: for LPS it turned out to be close to 0.5 (the current value has little effect on the future), and for an individual agent it is 0.73 (a trend-resistant series with a tendency to increase in value with time). Differences in the values are explained by the fact that the two studied months accounted for the full life cycle of the LPS, and the annual period for the agent outside the LPS is only a small part of its life cycle.

**№42. Parusheva, S. (2019). Digitalization and Digital Transformation in Construction - Benefits and Challenges. Information and Communication Technologies in Business and Education: Proceedings of the International Conference Dedicated to the 50th Anniversary of the Department of Informatics, Varna: Science a. Economic Publ. House, pp. 126-134. ISBN 978-954-21-1004-0**

### *Abstract*

Digitalization is essential for the development of the construction sector with the opportunities it offers to change and optimize the construction business. Digitalization affects every stage and process, the whole value chain. As for a number of other industries, as well as in the construction sector, it provides a number of advantages and benefits, including: increased productivity; increased speed of construction and saving time in the implementation of construction projects, significantly higher quality of accompanying construction documentation, etc. At the same time, there are some challenges related to the lag of digital transformation in construction, compared to other sectors, the presence of some specific technical challenges, different degree of application of new IT in smaller construction companies, which are often in the role of subcontractors and others. Despite the challenges, digital transformation has no alternative in view of the future upward development of the construction sector.

**№43. Trofimov, S.P., Medvedeva, M.A., Berg, D.B., Parusheva, S. (2019). Calculation of cash-flow based on the complex interest rate. Proc. of the International Conference**



**of Numerical Analysis and Applied Mathematics (ICNAAM 2018), Rhodes, Greece, AIP Conference Proceedings, 2116 (1), 200029 (2019), pp. 200029-1- 200029-4. ISBN: 978-0-7354-1854-7**

### *Abstrat*

The article considers a new way of increasing capital at a complex interest rate with a “square root of minus one”. This method is compared with the traditional formulas of increasing: simple and compound. In the process of accumulation, complex money is formed. In practice, the real components of complex money are used. The advantage of a complex interest rate for the banking sector is shown. This method allows eliminating the risk of early closure of deposits or early termination of contracts. The complex rate has two parameters, which allow one to choose a rate with a specified period of interest accrual and the capital growth coefficient.

**№44. Berg, B., Apanasenko, V., Medvedeva, A., Parusheva, S. (2020). The Entrepreneurial Network Simulation Model for the Supporting System of Management Decisions Making at a Municipal Level. International Conference of Numerical Analysis and Applied Mathematics (ICNAAM 2019), Rhodes, Greece, 23 - 28 September : Conference Proceedings, Melville, NY: AIP [American Institute of Physics] Publ., AIP Conference Proc.; 2293, 1, November 25, pp. 120024-1 - 120024-4. ISSN 0094-243X, ISBN 978-073544025**

### *Abstract*

The article deals with a system dynamic model implemented in the AnyLogic simulation environment. It gives proof of its advantages concerning the municipality entrepreneurial network model, which was previously realised in Powersim environment. It also formulates the prospects of this investigation development. This is the working out of an information support system of management decisions making based on a java-application. Such an application can be obtained by the simulation model exporting to java-code by means of AnyLogic. Data warehouses, interfaces and other applications can be integrated with this application. The system obtained in this way will become even a more effective tool for the management decisions making support.



**№45. Parusheva, S., Aleksandrova, Y. (2021). Technologies, tools, and resources - driving forces in construction sector digitalization. Proc. of the Tenth IEEE International Conference on Intelligent Computing and Information Systems, ICICIS 2021, IEEE Xplore, December 5-6, 2021, Cairo, Egypt, pp. 222-226. ISBN 978-166544076-9**

*Abstract*

The construction sector is characterized by a high degree of complexity of production processes and greater conservatism, which determines the difficulties in the digitalization transformation. Information technologies and tools are the main driving forces of its digitalization. The paper highlights the role of building information modeling as a leading technology in construction, along with the application of virtual, augmented, and mixed reality and mobile technologies. Sensors and other tools and technologies belonging to the Internet of Things, as well as the use of drones, have great potential for revolutionizing the construction sector. Artificial Intelligence and Machine Learning help analyze large amounts of data in construction and help make timely, accurate and efficient decisions. The study highlights the importance of resources as a driving force for the digitalization of construction with a special emphasis on the field of human resources.

**№46. Aleksandrova, Y., Parusheva, S. (2021). Optimizing financial results for credit risk prediction in peer to peer lending platforms using machine learning. Proc. of the Tenth IEEE International Conference on Intelligent Computing and Information Systems, ICICIS 2021, IEEE Xplore, December 5-6, 2021, Cairo, Egypt, pp. 378-383. ISBN 978-166544076-9**

*Abstract*

The purpose of this research paper is to propose an approach for optimizing the profit in Peer-to-Peer lending platforms by setting an optimal threshold for predictions generated by machine learning models. During the model training machine learning algorithms set the threshold in such a way as to achieve best evaluation measures, specifically highest values of F1 score. The empirical results from conducted experiments show that automatically set





threshold is not generating the maximum profit regarding financial results – loss and profit. We propose approach to calculate threshold to achieve a maximum profit. Further analysis reveals that application of trained models with the set threshold leads to significantly reduced default loans ratio and at the same time improves the credit portfolio structure of the Peer-to-Peer lending platform. The experiments are conducted in h2o environment and R programming language is used for coding. Machine learning models are trained using homogeneous and heterogeneous ensemble algorithms like XGBoost, gradient boosting machine (GBM), Random Forest, Stacked Ensembles, etc. Models are trained on data extracted from Lending Club website. Different evaluation measures are derived to compare and rank the fitted models. The best performing algorithms proved to be Stacked Ensembles and XGBoost. We simulate the application of trained machine learning models with calculated according to the proposed methodology threshold and results demonstrate that with machine learning models Peer-to-Peer lending platform can decrease the default loan ratio from 20% to 12% and at the same time generate profit lift of 16%.

**№47. Parusheva, S., Aleksandrova, Y. (2021). Factors and drivers for digitization and digital transformation in construction. Proc. of the 36th International Scientific and Practical Conference “Construction entrepreneurship and real estate”, November 26, 2021, Varna: Publishing house “Knowledge and business”, pp. 75-81. ISSN 2683-0280**

### *Abstract*

Digitalization and the processes of digital transformation are changing the face of all sectors of the economy, including the construction sector. Their performance is influenced by a number of driving forces and factors that stimulate these processes. In construction, the impact of driving forces is identified as the pursuit of operational efficiency, the realization of additional revenue, customer satisfaction and others. The influence of internal and external factors on the digitalization of the processes in the construction company, as well as national and international factors is significant. Concepts related to the „Internet of Things“ and „Smart Cities“ as well as the European Green Deal have an important impact on the processes of digitalisation in the construction industry.



**№48. Parusheva, S., Aleksandrova, Y. (2021). Innovation in the construction sector through legislation and policies for its digitization. Proc. of the 36th International Scientific and Practical Conference “Construction entrepreneurship and real estate”, November 26, 2021, Varna: Publishing house “Knowledge and business”, pp. 82-88. ISSN 2683-0280**

*Abstract*

Construction is a sector that is significantly influenced by the penetration of information and communication technologies and digitalization processes. A number of legislative initiatives and measures have been taken to stimulate their use at European and national level, as well as policies have been initiated with a view to its digitalisation. Leading in this direction is the importance of European initiatives such as the Digital Single Market Strategy, the Digitising European Industry initiative, the European cloud computing initiative, and others. All of them have their impact on the activity of the construction sector and increase its efficiency and competitiveness. In recent years, special emphasis has been placed on green construction technology.

**№49. Aleksandrova, Y., Parusheva, S. (2021). Guidelines for the development of training related to digitization in the field of construction. Proc. of the 36th International Scientific and Practical Conference “Construction entrepreneurship and real estate”, November 26, 2021, Varna: Publishing house “Knowledge and business”, pp. 121-126. ISSN 2683-0280**

*Abstract*

The research aims to study and systematize the offered educational programs in the Bulgarian universities for preparation of specialists with knowledge in the field of digitalization and digital transformation. The curricula of bachelor's and master's programs in the professional field of “Architecture, Construction and Geodesy”, as well as in other professional fields related to the construction and management of real estate have been studied. The studied disciplines are classified and systematized and on this basis conclusions and recommendations for updating existing programs and courses are formulated.



**№50. Aleksandrova, Y., Parusheva, S. (2021). Methodology for digital transformation in construction. Proc. of the 36th International Scientific and Practical Conference „Construction entrepreneurship and real estate“, November 26, 2021, Varna: Publishing house “Knowledge and business”, 2021, pp. 115-120. ISSN 2683-0280**

*Abstract*

The digital transformation project in a construction company must be part of a comprehensive digital strategy that the organization follows. The digital transformation of a company is a protracted and iterative process. In the course of this process, different stages can be set up with a view to structuring the digital transformation and its management. Based on a comparative analysis of existing methodologies, this paper proposes a new methodology for implementing a digital transformation project. Important principles, specificities and requirements are set out with regard to the activities carried out at each stage.

**№51. Parusheva, S., Pencheva, D. (2022). Modeling a Business Intelligent System for Managing Orders to Supplier in the Retail Chain with Unified Model Language. In: Magdi, D.A., Helmy, Y.K., Mamdouh, M., Joshi, A. (Eds.) Digital Transformation Technology. Proceedings of ITAF 2020, December 16 – 17, 2020, Springer, Lecture Notes in Networks and Systems, Vol. 224, pp. 375-393. ISBN 978-981-16-2275-5**

*Abstract*

The study focuses on some aspects related to the established trends in the design of business intelligent systems (BIS), specialized for use in retail chains for fast-moving consumer goods. Current concepts concerning the design of information systems and their application in commercial systems for managing orders to suppliers are considered. Modern methods have been applied for building a business intelligent module model in order to increase the productivity of the commercial system and to refine the product quantities needed for sales. The proposed model was created with the help of the object-oriented modeling language Unified Model Language (UML), referring to the leading trends in the design of business intelligent systems. Technical diagrams that illustrate the main



functionalities of the developed model and represent the interaction between the user and the information system are presented.

**№52. Abdel-Maboud, N., Alfonse, M., Parusheva, S., Salem, A. (2022). Comparative Study of Machine Learning Techniques Based on TQWT for EMG Signal Classification. 5th International Conference on Computing and Informatics (ICCI, 2022): Proceedings, 9 - 10 March 2022, New Cairo, Egypt, New Cayro, Egipt: Future University in Egypt, IEEE Xplore, pp. 129-132. ISBN 978-166549972-9**

### *Abstract*

Machine learning methods can be used to diagnose neuromuscular illnesses using electromyographic (EMG) signals. This research examines the tunable-Q factor wavelet transform (TQWT) for feature extraction and analyses various learning methods for classifying EMG signals in order to detect neuromuscular diseases. TQWT decomposes each type of EMG signal into sub-bands first. From each sub-band, statistical parameters such as mean absolute values (MAV), inter quartile range (IQR), kurtosis, mode, standard deviation, skewness, and ratio are calculated. Finally, the extracted features are fed into classifiers to differentiate between ALS, myopathy, and normal EMG data. The random forest classifier with TQWT achieved higher classification results in neuromuscular disorders diagnosis than the other classifiers tested in this study, according to experimental results. The accuracy of the random forest approach using TQWT was 98.64%, with an F-measure of 0.986 and a kappa value of 0.979.

**№53. Deželak, Z., Parusheva, S., Ashok, A., Bobek, S. Zabukovšek, S.S. (2022). A Comparative Analysis of User Experience of the Microsoft Teams, Google Meet and Moodle E-Learning Platforms. In: Nedelko, Z. (Ed.) Proc. of 6th FEB International Scientific Conference: Challenges in Economics and Business in the Post-COVID Times, University of Maribor, Maribor: University Press, pp. 99-110.**

### *Abstract*

Lately, user experience (UX) has become an important and frequently used approach to determine the perception of digital products and services. UX measures what users feel



and sense directly while getting to know and using these products and services regularly. In this study, which was conducted in Slovenia and in Bulgaria, we have researched the UX of students related to the Microsoft Teams (MS Teams), Google Meet and Moodle e-learning platforms. We used a standard and freely available User Experience Questionnaire (UEQ) that was developed to measure the UX of interactive products and services. The preliminary research showed that the MS Teams obtained the highest score among all the measured UX scales. Google Meet had slightly lower values, while Moodle had the lowest average values. The data also show that in terms of pragmatic quality, MS Teams was rated the best followed by Moodle and Google Meet. The students find Google Meet the weakest in terms of the quality of its task-related aspects. The hedonic quality data shows MS Teams first, followed by Google Meet and Moodle. The results of the research have been analysed and discussed, and future research suggestions have been defined.

## V. Textbooks

**№54. Kancheva, A., Parusheva, S., Todorova, M., Aleksandrova, Y., Yankov, V. (2010). MS Office Excel 2007 Theory and practice. Varna: Dedraks. ISBN 978-954-8576-20-8**

### *Abstract*

The main purpose of the textbook is to present the possibilities of MS Office Excel 2007, which will help prepare students from the first year at the University of Economics - Varna for their work in the modern automated office. The first chapter examines the main capabilities of Excel 2007 and the tools that implement them. In the second chapter, many and varied tasks for independent learning are presented, through which students can consolidate and apply in practice the theoretical knowledge acquired in the first chapter. Assignments are also offered, which aim to assist students in formulating and developing coursework.

Developed by Assoc. Prof. Silvia Parusheva are the complex tasks in the second chapter "Development of MS Excel applications", which aim, with the help of real examples from practice, to help students gain practical skills for working with the spreadsheet product.



**№55. Kancheva, A., Parusheva, S., Todorova, M., Aleksandrova, Y., Yankov, V. (2012).  
Microsoft Word 2010. Microsoft Excel 2010. Varna: Dedraks. ISBN 978-954-8576-32-1**

*Abstract*

The textbook is intended to support the theoretical and practical training in the discipline “Informatics” of the first-year students at the University of Economics - Varna, as the object of consideration are two of the most used applications in the Microsoft Office suite - Word 2010 and Excel 2010. They are presented the functional capabilities of the two products and the technology of their use in the modern automated office. The first chapter examines the tools of Microsoft Word - the most widely used product for electronic document circulation. In the second chapter, Microsoft Excel is considered, and the content of the chapter is structured in 9 parts. In the third chapter, tasks for independent work are presented.

*Summary of the parts developed by Assoc. Prof. Silvia Parusheva.* Developed by Silvia Parusheva is the first chapter “Word processing with MS Word 2010”, in which the functional capabilities of the product are discussed. The presentation is in 6 parts, in which Word's capabilities for entering, editing text, basic and some advanced formatting capabilities, working with tables, etc. are presented. In paragraph 3.1. “Tasks for working with MS Word 2010” in the third chapter, several tasks are presented, which aim to provide an opportunity for practical work in the environment of the word processing application. Silvia Parusheva participated in the preparation of many and varied tasks in 3.2. “Tasks for working with MS Excel”, intended for independent training. They are aimed at consolidating and applying in practice the knowledge acquired from the first and second chapters.

**№56. Parusheva, S., Zelenkov, G. (2013). MS WORD 2010. For advanced, Varna:  
Publishing house “Knowledge and business”. ISBN 978-954-21-0656-2**

*Abstract*

The textbook is a continuation of “MS Word 2010 - the mandatory minimum”, providing basic knowledge of working with Microsoft Word 2010. This second part of the tutorial is therefore intended for Word 2010 users who have basic knowledge and already



have experience working with the product for word processing. Having acquired the mandatory minimum knowledge and techniques for working with the product, users have built the foundation on which to step on them and move on to mastering the next, more complex functionalities of MS Word 2010, intended for advanced users. The exposition of the textbook is structured in 10 chapters.

Summary of the parts developed by Assoc. Prof. Silvia Parusheva. Silvia Parusheva has developed the preface and the first six chapters. They consider the advanced possibilities for entering, editing, and correcting text, the additional possibilities for working with tables and graphic objects, for layout and working with documents, the possibilities for exchanging data between Word and other applications, as well as the means and tools for work with large documents.

**№57. Parusheva, S., Nestorov, K. (2013). Electronic business 2 part. Electronic textbook, Varna: Publishing house “Knowledge and business”. ISBN 978-954-21-0710-1**

### *Abstract*

The textbook is dedicated to issues related to e-finance and e-government, which are two of the main directions in the field of e-business and have a fundamental importance in the modern business processes of companies and also for end users.

There are two main modules included in the textbook – „E-Finance“ and „E-Government“.

The preface and the “E-finance” module, including the first seven chapters, were developed by Assoc. Prof. Silvia Parusheva. They present many aspects related to electronic finance.

**№58. Sulov, V., Iliev, P., Kancheva, A., Atanasova, T., Filipova, N., Parusheva, S., Sulova, S., Todoranova, L. (2013). Informatics. Varna: Publishing house “Knowledge and business”. ISBN 978-954-21-0664-7**

### *Abstract*



The textbook “Informatics” is intended for all students in professional fields “3.7. Administration and management”, “3.8. Economics” and “3.9. Tourism” in the bachelor's degree of the University of Economics - Varna, studying the discipline of the same name.

The material is in accordance with the curriculum of the discipline approved by the “Informatics” department and includes topics related to computer hardware and software, the Windows 7 operating system, the Microsoft Office 2010 office suite, computer networks and security.

*Development of Assoc. Prof. Silvia Parusheva* is the fifth chapter, in which an introduction to the Microsoft Office suite is first made, and then, within 6 subsections, the main capabilities of the word processing application MS Word are presented.

**№59. Parusheva, S., Nestorov, K. (2014). Electronic business 2 part. Varna: Publishing house “Knowledge and business”. ISBN 978-954-21-0748-4**

### *Abstract*

The textbook on Electronic Business Part 2 was developed in connection with the discipline of the same name, and it consists of two main modules – “E-Finance” and “E-Government” module, which correspond to two important directions in electronic business - electronic finance and electronic government. They have a fundamental importance in the modern business processes of companies, as well as for end users.

The introduction and topics within the “E-Finance” module were *developed by Assoc. Prof. Silvia Parusheva*. The training on the seven topics within the module aims to give students knowledge about the theoretical and practical aspects of electronic financial services in their entire spectrum, covering electronic trading of securities and currency, electronic banking, internet insurance, electronic payment systems etc.

**№60. Parusheva, S., Nestorov, K., Marinova, O. (2015). Electronic Business 2nd Part. Software Development Management. Varna: Publishing house „Science and Economy”, University of Economics – Varna. ISBN 978-954-21-0837-5**

### *Abstract*





E-textbook in English containing study materials for the disciplines “E-Business Second Part” and “Management of Software Development”.

Assoc. Prof. Silvia Parusheva is the author of the four topics that are part of the “E-Finance” module. They are dedicated on the issues related to online trading, electronic banking, security and protection of Internet banking and online insurance.

**№61. Parusheva, S. (2015). Financial calculations and analyzes with Microsoft Excel. Varna: Extreme. ISBN 978-954-8576-12-3**

### *Abstract*

The textbook is intended for students of the “Business Information Systems” and “Informatics” majors, regular training in the “Information and Communication Technologies in the Financial Sector” discipline. It aims to give students theoretical knowledge and form practical skills for using the tools and capabilities of the Microsoft Excel product in the field of financial calculations, analyzes and forecasts, incl. and problem solving and application development skills specific to the financial sector.

The textbook consists of two chapters. In the first chapter, the basic tools of MS Excel for financial calculations and analysis are examined in a theoretical aspect. The presentation is supported by many solved examples, illustrating the specifics and features of using the considered means. In the second chapter, numerous (over 100) tasks are offered for independent work. They are accompanied by the necessary instructions and tables for work, and the more complex ones by the formulas for solving them. For the purpose of verification, for the majority of the tasks, their answers are also given. The proposed set of tasks covers a sufficiently representative part of the wide range of issues that are specific to those working in the financial sector and can be solved with the tools discussed in the first chapter.

**№62. Filipova, N., Parusheva, S., Aleksandrova, Y. (2017). Fundamentals of information systems. . Varna: Publishing house „Science and Economy”. ISBN 978-954-21-0920-4**

### *Abstract*



The textbook was developed in accordance with the curriculum of the discipline of the same name, studied in the specialty "Business Information Systems" at the University of Economics - Varna. The main goal of the authors in writing the textbook is to summarize the achievements of the theory of information systems and to provide students with modern knowledge about their elements and architecture, about their construction and management, about the types of information systems and their place in the organization and in the chain of delivery, for their technological and information base, for their security and protection.

*Summary of the parts developed by Assoc. Prof. Silvia Parusheva.* Silvia Parusheva independently developed the fifth, sixth and seventh of the textbook. The fifth chapter ("Information base of information systems") presents the ways of data organization (in traditional files, databases) and their management through DBMS, the types of databases models and the organization of data through data warehouses and data showcases . Some business intelligence tools are also covered. In the sixth chapter – "Systems for electronic business", the definitions of e-commerce and e-business are examined, the effects of e-commerce and digital markets are presented. The types of e-commerce depending on the participants are presented, as well as e-commerce business models and revenue models. Chapter seven ("Security of information systems") presents the types of threats to information systems. Special attention is paid to the protection of information resources, security policy and controls to limit risk.

**№63. Sulov, V., Atanasova, T., Filipova, N., Parusheva, S., Sulova, S., Todoranova, L., Marinava, O. (2013). Informatics. Varna: Publishing house "Knowledge and business". ISBN 978-954-21-0905-1**

### *Abstract*

The textbook is intended for bachelor students in professional fields "3.7. Administration and management", "3.8. Economy" and "3.9. Tourism". The material is in accordance with the curriculum of the discipline approved by the "Informatics" department and includes topics related to computer hardware and software, the Windows 10 operating system, the Microsoft Office 2016 office suite, computer networks and security.



In modern conditions, advanced computer literacy is a prerequisite for successful implementation in all spheres of the economy and society. This textbook can be useful for both students and anyone who wants to improve their knowledge in the field of information technology.

*Development of Assoc. Prof. Silvia Parusheva* is the fifth chapter, in which an introduction to the Microsoft Office suite is made at the beginning, and then the main functional capabilities of the word processing application MS Word are presented within 6 subsections.

**№64. Medvedeva, M., Medvedev, M., Parusheva, S., Nestorov, K. (2017). Electronic Business. 2nd Part, Ekaterinburg: Ural University Publishing House. ISBN: 978-5-7996-1792-9**

### *Abstract*

The book is prepared in English and covers three main aspects of E-business: E-finance, E-government, and E-business web application development. It is intended for students studying economics. The material is structurally divided into chapters and subchapters, at the end of each chapter there are literature and Internet sources, as well as self-study questions.

Assoc. Prof. Silvia Parusheva is the author of the “E-Finance” module. It provides knowledge on the theoretical and practical aspects of the development of electronic financial services, online trading of securities and currencies, electronic banking, online insurance, security, and protection of Internet banking.

**№65. Sulov, V., Atanasova, T., Filipova, N., Parusheva, S., Petrov, P., Sulova, S., Todoranova, L., Marinava, O. (2019). Informatics. Varna: Publishing house “Knowledge and business”. ISBN 978-954-21-1003-3**

### *Abstract*

The textbook “Informatics” is intended for all students in professional fields “3.7. Administration and management”, “3.8. Economy” and “3.9. Tourism” in the bachelor's degree of the University of Economics - Varna, studying the discipline of the same name.



The material is in accordance with the curriculum of the discipline approved by the “Informatics” department and includes topics related to computer hardware and software, the Windows 10 operating system, the Microsoft Office 2019 office suite, computer networks and security.

In modern conditions, advanced computer literacy is a prerequisite for successful implementation in all spheres of the economy and society. The textbook can be useful to both students and anyone who wants to improve their knowledge in the field of information technology.

*Assoc. Prof. Silvia Parusheva is the author* of the fifth chapter of the textbook. At the beginning of the chapter, an introduction to the office suite Microsoft Office is made, and then, within 6 subsections, the main functional capabilities of the word processing application MS Word are presented.

## VI. Other publications

**№66. Parusheva, S. (2015). Prof. Vladimir Sulov, PHD. The professors of the University of Economics - Varna: 1920 - 2015 г., Varna: Publishing house “Knowledge and business”. pp. 354 - 357. ISBN 978-954-21-0810-8**

### *Abstract*

The book is the second supplemented edition of “Professors”, dedicated to the 95th anniversary of the University of Economics - Varna. It includes dozens of biographical sketches, covering the entire history of the higher school from its foundation in 1920 to 2015. The texts are written by professors from the collegium of the university - in this way, the authorship is solved in an original way and the idea of the academic is emphasized continuity.

*Assoc. Prof. Silvia Parusheva is the author* of the section dedicated to the professional development and academic growth of Prof. Vladimir Sulov, PHD from the Department of Informatics.