Abstracts

of scientific publications

of Assoc. Prof. Snezhana Sulova, 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. Sulova, S. 2021. Knowledge extraction and analysis of data from internet sources. Monographic library "Prof. Tsani Kalyandzhiev", 77. ISBN 978-954-21-1082-8

Abstract of the monograph

The wide usability of the Internet and large variety of services, which it provides, lead to the emergence of a huge amount of diverse and new types of data. The increased information sources in the Internet space are a useful additional source of knowledge for the business, but due to their specificity they also create many challenges, related to their extraction, processing, management and analysis. In this regard, the monograph proposes a model for the extraction of knowledge and the analysis of data from various internet sources, which allows for the integrated usage of the data and the application of flexible approaches for their processing.

The first chapter "The Internet environment as a data source" discusses the theoretical aspects of the Internet as a data source. The evolution of the web service and the concepts which arise with its development are presented. The types of data in the Internet space are identified.

The second chapter "Approaches to extracting knowledge from Internet sources" is aimed at reviewing and analysing the available ways of extracting knowledge from the Internet. The approaches to extracting data from the content, structure and usability of the internet sources are considered. Since most of the approaches are based on a specific algorithm, it is concluded that there is a necessity to develop a unified model for the analysis of data from Internet sources, which would allow data integration and the creation of flexible and dynamic schemes and approaches to making analyses.

Chapter three "A model for knowledge extraction and analysis of data from Internet sources" proposes a model for knowledge extraction and data analysis, which considers the specific characteristics and diversity of data in the Internet. It allows the usage of different approaches and architectural solutions for data organization. It also allows a cyclic repetition of the processes and a model search in data from Internet sources.

In the fourth chapter the software technologies and tools for the implementation of the proposed knowledge extraction model are examined. The requirements for them are defined.

In the 5th chapter the application of the model for the extraction and analysis of data from Internet sources is demonstrated. E-shop data and data extracted from social networks are used. The software product RapidMiner is used for the approbation.

The application of the developed model for knowledge extraction and analysis of data from Internet sources shows that the acquired new knowledge significantly helps the management decision-making processes and generally improves the competitiveness of companies.

II. Other monographs

№ 2. Atanasova, T., Filipova, N., Sulova, S., Aleksandrova, Y., Vasilev, J. 2019. Intelligent analysis of students dataset. Publishing house "Knowledge and business" Varna, 4. ISBN 978-619-210-045-2

Abstract of the whole monograph

The purpose of this work is to create a methodology for intelligent data analysis for students, which includes: data collection and processing with different methods of analysis, in the environment of different software products, using them by researchers with knowledge in various aspects of the intelligent analysis of data and study of the studied dataset in several perspectives. In particular, the proposed methodology uses: statistical methods, neural networks, decision trees and specialized methods for processing unstructured information. The subject of study is the students of the "Informatics" and "Business Information Systems" specialties from the second and fourth year, trained at the University of Economics Varna. The subject of this research is their opinions, attitudes and assessments related to the learning process. The research team processed data from two consecutive years using modern analytical methods using the following specialized software products: Rapid Miner, Alyuda NeuroIntelligence and PSPP. A knowledge database for students is formed. In this work, the intelligent data analysis methodology is validated by empirical research.

Abstract of the parts, developed by Assoc. Prof. Snezhana Sulova

The characteristics of social networks are analyzed and those that contribute to their increasing usage for educational purposes, for discussions on topics related to the educational process are highlighted. (p. 2.1.2). The methods that are suitable for processing unstructured data are indicated and considering the objectives of the monographic research the emphasis is on the extraction of knowledge from text (p. 2.2.3). The student opinions are processed and classified, the key words in the text are

identified, which helps find the subject of the conversation or discussion and gives essential information about the topic of the discussions (p. 3.6).

№ 3. Petrov, P., Sulova, S., Radev, M., Aleksandrova , Y., Stoyanova, M., Mileva, L., Yankov, P. 2020. Digitalization of business processes in construction and logistics. Publishing house "Knowledge and business" Varna, 8. ISBN 978-619-210-049-0

Abstract of the whole monograph

The economy in the late ten and early twenties of the XXI century is characterized by high rates of digitalization in all spheres of economic and social life. One of the ways to increase the efficiency of individual business organizations and entire sectors of the economy is to improve and develop the information systems used for business management based on the digitalization of management and business operations. The development of new ways of organizing the activity in the conditions of digitalization requires a rethinking of the existing practices for the implementation of the main business operations and the activities that support them. There is an objective need in business operations and activities to use new methods and tools to replace traditional ones smoothly and gradually. The purpose of the present study is to review and theoretically substantiate the possibilities for application of digitalization in the construction and logistics sectors. The authors try to consider from different points of view the main problems in digitalization based on research of modern scientific publications on the topic to determine the objective course of development of information and communication technologies.

Summary of Chapter 4, written by Assoc. Prof. Snezhana Sulova, PhD

The problems related to the innovative digital processing of the emerging new types of data, as well as the existing ones in the construction and logistics sectors are considered. An overview and analysis of the changes in working with data in the

conditions of innovative digital processing in these sectors is done. The basic principles for data selection in a digital environment are defined. Frameworks for innovative digital data processing in construction and logistics are developed, and they are useful to organizations for building a concept for data storage and data management that would help them in the overall process of transformation and digitalization of their business processes.

№ 4. Sulova, S., Bankov, B. 2019. Approach for Social Media Content-Based Analysis for Vacation Resorts. Journal of Communications Software and Systems (JCOMSS), Croatia, Split: Croatian Communications and Information Society in cooperation with the University of Split, FESB, 15, 3, pp. 262-271. ISBN ISSN 1845-6421

Abstract

The impact of social networks on our lives keeps increasing because they provide content, generated and controlled by users, that is constantly evolving. They aid us in spreading news, statements, ideas and comments very quickly. Social platforms are currently one of the richest sources of customer feedback on a variety of topics. A topic that is frequently discussed is the resort and holiday villages and the tourist services offered there. Customer comments are valuable to both travel planners and tour operators. The accumulation of opinions in the web space is a prerequisite for using and applying appropriate tools for their computer processing and for extracting useful knowledge from them. While working with unstructured data, such as social media messages, there isn't a universal text processing algorithm because each social network and its resources have their own characteristics. In this article, we propose a new approach for an automated analysis of a static set of historical data of user messages about holiday and vacation resorts, published on Twitter. The approach is

based on natural language processing techniques and the application of machine learning methods. The experiments are conducted using software product RapidMiner.

№ 5. Sulova, S. 2021. Big data processing in the logistics industry. Economics and Computer Science, Varna: Knowledge and business, Bulgaria, Vol. 7 Issue 1, pp. 6-19. ISSN 2367-7791

Abstract

The aim of modern logistics is to achieve maximum connectivity in the supply chain. Companies are using increasingly innovative technological solutions, which creates the opportunity of generating a wide variety of data. This leads to several challenges and the need to change data storage and processing models. The aim of the study is to analyze the technological aspects of the digital transformation in logistics and to propose a conceptual framework for big data management and processing in the logistics industry. It is based on the discovery of existing prototype methodologies for big data processing which are used in all areas of business, as well as on the research of existing specific approaches to the processing of different types of big data in logistics. Basic principles for building a modern architecture for managing and processing big data in logistics are presented. The defined framework can be used by the companies to process structured, semi-structured and unstructured data in real time or for batch processing and to help optimize several business processes in the logistics industry. As a result, using it will help the analytical processes in these companies and it will be possible to make informed business decisions in dynamic conditions and in globalization. A software implementation of a conceptual framework with the Apache Hadoop open-source software is proposed.

III. Scientific articles

№ 6. Sulova, S. 2014. Evaluation of e-commerce websites on the basis of usability data. Izvestiya Journal of Varna University of Economics., Publishing house "Science and Economy", University of Economics – Varna, № 3, pp. 38-49. ISSN 1310-0343

Abstract

By processing the data on the use of e-commerce websites there can be derived useful information concerning consumer visits in an online store, information on the interests of the buyers and their behaviour, as well as on the functioning of the system for the placement of orders. In the article there is revealed the nature of the process of analyzing websites for e-commerce on the basis of data on their use and is proposed a system of indicators for the assessment of these websites. The proposed key assessment indicators are of significance for the development of the processes in customer relationship management and other marketing activities.

№ 7. Sulova, S. 2015. Application of Web Mining in Customer Relationship Managament. Journal of Union of Scientists Varna. "Economic Sciences" Series, pp. 105-110. ISBN 105-110. ISSN 1314-7390

Abstract

The main purpose of the article is to show the application of technologies for extracting knowledge from Internet sources in order to collect additional data about customers and use it to improve relationship management activities. It is argued that for more in-depth analyses, which can be the basis of a customer-oriented strategy, it is appropriate to process and use the available information on the Internet. The guidelines in which it is useful to apply the extraction of knowledge from Internet sources are defined and it is established from what sources are the data that need to be processed.

№ 8. Sulova, S. 2016. An Approach for Automatic Analysis of Online Store Product and Services Reviews. Journal of Varna University of Economics., Publishing house "Science and Economy", University of Economics – Varna, 60, 4, pp. 447-490. ISSN 1310-0343

Abstract

One of the advantages of e-commerce systems is that they enable customers and merchants to become acquainted with product and services reviews. Currently in the most popular online stores there are hundreds and even thousands of reviews for certain goods, which contain valuable information about the quality of the offered assortment. This is the reason to look for ways for their computer processing. The article proposes an approach for automated analysis of customer reviews, based on natural language processing technology and application of methods of machine learning. A model for analysis and its implementation with the software product RapidMiner are proposed.

№ 9. Sulova, S. 2016. Finding a Spam Email Messages Using Data Mining Methods. Journal of Union of Scientists Varna. "Economic Sciences" Series, 2, pp. 117-123. ISSN 1314-7390

Abstract

There are many software solutions that have been developed based on the use of various software technologies for identification of e-mail spam messages. This article presents how we may successfully use data mining methods for identifying spam messages. The proposed approach is based on Supervised Machine Learning methods – Support Vector Machines (SVM) and Naive Bayes (NB). The approach for analyzing the content of e-mail messages and identifying spam e-mails has been tested.

№10. Sulova, S. 2017. Trends in the Development of Open Source Software Platforms for the Creation of Online Stores. Journal of Union of Scientists Varna. "Economic Sciences" Series, 2, pp. 187-196. ISSN 1314-7390

Abstract

In order to meet the expectations of consumers and the businesses, open source software platforms for the creation of online shops are constantly being improved. The article analyzes the most popular software solutions of this kind in order to highlight the main trends in their development. The following ones have been analyzed: Magento Open Source, PrestaShop, OpenCart, Zen Cart, Drupal Commrece, Spree Commerce, WooCommerce, Jigoshop, VirtueMart, Ubercart and osCommerce. Systems improvement has been established in terms of functionality, content management capabilities, customer orientation, marketing tools, and integration with other enterprise applications.

№11. Sulova, S. 2017. Creating groups for marketing purposes from website usage data. Vestnik Udmurtskogo Universiteta: Matematika Mekhanika Komp'yuternye Nauki, Izhevsk: Udmurt State University, 27, 3, pp. 470-478. ISSN 1994-9197

Abstract

Customer grouping and knowledge extraction for these groups is important to online businesses because it allows purposeful application of marketing techniques. Individuals can be personally served with the groups, depending on the identified interests and preferences. In this article, we suggest a way to identify and create user groups by processing of website usage data. We use the logs stored in the server log data for the visit to a selected website then retrieve and process the text content of the visited web pages. The approach is based on the technology for natural language processing and uses the methods for clustering of text documents. The experimental

testing of this method is done with the software product Rapid Miner and data from visits to a Bulgarian e-shop.

№12. Nacheva, R., Sulova, S. 2018. Approach to exploring users' expectations of digital services' functionality. Ekonomiczne Problemy Usług, Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecinskiego, 131/2, 2, pp. 137-145. ISSN 1896-382X

Abstract

The rapid adaptation of the technologies in everyday life increases the competition between companies. The constant changes in customer preferences cause the businesses to look for new ways to increase market share and consumer loyalty. There is a need for a new customer service strategy, aimed at applying principles of user-oriented design of software applications. The main purpose of our study is to propose and approbate a survey-based approach to exploring users' expectations from digital services' functionality.

№ 13. Sulova, S. 2018. Analysis and Evaluation on Online Shops Customers Through Data Mining Methods. International Journal of Computer Networking, Wireless and Mobile Communications (IJCNWMC), TJPRC Pvt. Ltd., 8, 1, pp. 35 - 44. ISSN (P) 2250-1568; ISSN (E) 2278-9448

Abstract

Customer data analyzers of online stores are important for improving customer service and provide opportunities for greater personalization. In this paper, an approach is proposed for analyzing customer data based on data mining methods. Natural computer language processing technologies are also used to identify customers who are satisfied with the e-shop's service and those who are not. A decision tree is also built that allows for the choice of rational management decisions.

№ 14. Sulova, S. 2018. Association Rule Mining for Improvement of IT Project Management. TEM Journal – Technology, Education, Management, Informatics/Association for Information Communication Technology Education and Science, Novi Pazar, Serbia: UIKTEN – Association for Information Communication Technology Education and Science, 7, 4, pp. 717-722. ISSN 2217-8309

Abstract

In this research we extract knowledge from human resources data, accumulated in IT companies for the right selection of teams to work on software projects. We are looking for interesting and unknown dependencies and connections in the data, based on which managers can form more cohesive and professionally working project teams. The proposed approach to improve the selection of teams working on IT projects is based on association rule mining and can be used by IT managers to select the members of the teams. The approbation of the proposed approach is made using the software product RapidMiner.

№15. Sulova, S. 2018. Extracting Business Knowledge from Social Networks. Journal of Union of Scientists Varna. "Economic Sciences" Series, 2, pp. 241-249. ISSN 1314-7390

Abstract

Social networks provide an easy and quick way to connect, create groups, share information. This particularity makes them increasingly usable not only as a means of personal communication but also in the sphere of business. Their widespread usage, mostly as a marketing tool, leads to the accumulation of many and varied data in them. The article examines the opportunities for extracting business knowledge from social networks. The types of data sources and their distinctive features are presented. The main ways of transforming data and presenting it in a meaningful way suitable for

processing and extracting useful knowledge from them are discussed. It shows how social data analytics can help businesses improve their initiatives and effectively manage different business activities. An overview of social data mining software has been done.

№16. Nacheva, R., Todoranova, L., Sulova, S., Penchev, B. 2019. Concept Map Mining Approach Based on the Mental Models Retrieval. TEM Journal – Technology, Education, Management, Informatics, Novi Pazar, Serbia: UIKTEN – Association for Information Communication Technology Education and Science, 8, 4, 1484-1491. ISSN 2217-8309

Abstract

Studying the mental models of software users is not a new topic in the scientific literature, but we could point out that it is also not sufficiently researched. Still there is no universal method which could be used for exploration and visual presentation of mental models. Therefore, the aim of the current article is to propose an approach for concept map mining based on retrieving users' mental models. To achieve this, a combination of text mining techniques and concept map software is used in the research article.

№17. Sulova, S. 2019. An Approach to Storing Data Based on the Data Lake Concept to Facilitate Intelligence Data Analysis. Serdica Journal of Computing, Sofia: Institute of Mathematics and Informatics. BAS, 13, 3-4, 171-182. ISSN 1314-7897 – Online, ISSN 1312-6555 – Print

Abstract

Data analysis is now becoming increasingly more important for business. The accumulation of large amounts of different types of data in organizations is a prerequisite for seeking new ways of storing, processing and analyzing them. The

following article presents the nature of the data lake concept and an approach for organizing and storing all the data, both those generated by the software systems in the organizations and those extracted from Internet sources. The approach is based on the combined usage of the concepts data lake and data warehouse and allows the storage of large amounts of data, regardless of its type, structure, or format, allows for the integrated use of structured and unstructured data and the application of a variety of techniques for intelligent business analysis.

№18. Nacheva, R., Sulova, S. 2021. Research on the Overall Attitude Towards Mobile Learning in Social Media: Emotions Mining Approach. Digital Transformation, Cyber Security and Resilience of Modern Societies, Cham: Springer International Publ. Switzerland, 84, 2021, pp. 429-440. (Studies in Big Data; Book 84). e-book: ISBN 978-3-030-65722-2; print ISBN 978-3-030-65721-5

Abstract

In this article, we address the importance of classification and social media mining of human emotions. We compared different theories about basic emotions and the application of emotion theory in practice. Based on Plutchik's classification, we suggest creating a specialized lexicon with terms and phrases to identify emotions for research of general attitudes towards mobile learning in social media. The approach can also be applied to other areas of scientific knowledge that aim to explore the emotional attitudes of users in social media. It is based on the Natural Language Processing and more specifically uses text mining classification algorithms. For test purposes, we've retrieved a number of tweets on users' attitudes towards mobile learning.

IV. Scientific papers

№19. Sulova, S. 2012. Main Trends in The Development of E-Commerce Systems// Trends and challenges in the development of the economy: Proceedings of an International Scientific Conference: Vol. 3. Varna, Publishing house "Science and Economy", pp. 127-132. ISBN 978-954-21-0602-9

Abstract

In order to be competitive in the new economic conditions, e-commerce companies should have functional and reliable software systems for its implementation. The paper highlights and analyzes the following important trends in the development of online trading systems: improving their functionality; increasing their customer orientation; increasing the number of marketing tools and their connections to social networks; providing opportunities for e-commerce through mobile devices; improved content management; integration with business management systems; usage of cloud technologies.

№20. Sulova, S. 2013. Evaluation of E-Commerce Systems Usage. Proceedings of the International Scientific Conference "Modern Methods and Technologies in Scientific Research", Varna, Publishing house "Science and Economy", pp. 166-171. ISBN 978-954-21-0630-2

Abstract

The analyses based on the data on the usability of e-commerce systems are of significant importance, as they help improve the business, customer relationships and the e-commerce systems. The purpose of this report is to highlight the main tools for analysis and the indicators which can be used to evaluate the usability of e-commerce systems. The emphasis is on the need for the integrated use of the data from the modules for collecting statistical information from online stores' content management

systems and additional, external analysis tools and tools for extracting knowledge from internet sources.

№21. Сълова, С. 2013. Some Aspects of The Use of Cloud Services in E-Commerce. Proceedings of the International Scientific Conference Regional and Global Dimensions of Trade, Varna, Publishing house „Science and Economy" pp. 557-564. ISBN 978-954-21-0667-8

Abstract

The need for the application of cloud technologies is increasing with each passing day due to the rapid development of technology. Retail companies are looking for ways to reduce their IT costs and stay competitive by using technological solutions based on cloud computing. The report analyzes the opportunities for the application of cloud services – infrastructure as a service (IaaS), Platform as a Service (PaaS) and Software as a service (SaaS) in e-commerce. The main advantages and disadvantages of using cloud computing in e-commerce are highlighted.

№22. Sulova, S. 2014. Web Mining for E-commerce Intelligence. Proceedings of the International Scientific Conference "Current Problems and Ways of Ensuring Socio-Economic Development of Country and Regions", Dnipropetrovsk, Ukraine: Dnipropetrovsk State Financial Academy, pp. 325-327. ISBN 978-966-8866-92-0

Abstract

The essences of the following concepts are defined in the paper: Web Mining and its three main types – Web Content Mining (WCM), Web Structure Mining (WCM) and Web Usage Mining (WUM). The paper emphasizes the importance of the extraction of knowledge from the web for e-commerce and shows how this new knowledge can improve online traders' business.

№23. Сълова, С. 2014. Analysis of Similarity in Data from Internet Sources. Proceedings of the International Scientific Conference "Information technologies in business and education", Varna, Publishing house "Science and Economy", pp. 387-394. ISBN 978-954-21-0780

Abstract

The accumulation of more and more information in the web space makes the Internet an appropriate source of new knowledge. The report shows how Web content mining – WCM can be applied to carry out an analysis of the similarities between websites. The CosineSimilarity measure is used to find the similarity between text documents. The experiment proves that extracting textual content from web pages and finding the similarities between them can be used to categorize web documents and based on that achieve various marketing goals, such as grouping users and researching their interests.

№24. Сълова, С. 2015. Basic aspects of choosing e-commerce software. Proceedings of the International Scientific Conference "The economy in the changing world: national, regional and global dimensions", Varna, Publishing house "Science and Economy", pp. 162-166. ISBN 987-954-21-0835-1 (Vol. 3)

Abstract

The success of e-commerce depends to a large extent on the software apps with which this activity is carried out. The report presents and analyses the following main aspects which have to be taken into consideration when choosing a software solution for e-commerce: choosing an approach for the implementation of the e-commerce system; determining the functionalities necessary for the company and based on them choosing an appropriate solution; ensuring the smooth integration of the chosen software with the existing company systems and business partners' systems; providing opportunities for an easy and flexible inclusion of specific additions and creating an

expandable and scalable e-commerce system; providing a reliable and secure software solution for online sales.

№25. Sulova, S. 2016. Methods for opinion mining and sentiment analysis. Proceedings of the Jubilee International Scientific Conference "Challenges to information technology in the context of Horizon 2020", Svishtov, Academic publishing house "D.A. Tsenov", pp. 146-152. ISBN 978-954-23-1188-1

Abstract

The accumulation of user opinions in the web space is a prerequisite for finding and applying appropriate tools for their computer processing and extracting useful knowledge from them. The report provides a literature review of the existing methods for opinion mining and sentiment analysis. The steps for carrying out the process are defined. The main tasks and existing methods for Sentiment analysis are analyzed and classified. The importance of understanding existing approaches in the non-traditional process of extracting knowledge from unstructured textual data is highlighted.

№26. Sulova, S., Todoranova, L., Penchev, B., Nacheva, R. 2017. Using text mining to classify research papers. 17th International Multidisciplinary Scientific Geoconference SGEM 2017, Albena, Vol. 17, Issue 21, pp. 647-654. ISBN 978-619-7408-01-0 ISSN 1314-2704

Abstract

Recently, the volume of scientific literature has grown rapidly raising an imminent question about its storage and organization. Many research papers are often available only through the websites of the relevant scientific journals. It is an essential problem when different classification codes are used in order to organize these papers or when specific categorization in a certain scientific field is missing. This leads to unnecessary complications in the researchers' aims who want to quickly and easily find

literature on a specific topic among the large amount of scientific publications. Simultaneously, the research interest related to the mechanisms of natural language processing is growing because much of the information they work with is unstructured and in the form of plain text. In order to improve and automate the process of organizing and classifying scientific papers we propose an approach based on the technology for natural language processing. This applies the methods of supervised machine learning and two specific algorithms for text categorization – Support Vector Machines (SVM) and Naive Bayes (NB). The proposed approach classifies the scientific literature according to its contents. To successfully execute our scientific research, we used over 200 papers, published in the last four years in the journal "Izvestiya", which is issued by the University of Economics – Varna. The articles explore different topic areas and are written in English. The experiments were conducted with the software product RapidMiner.

№27. Sulova, S. 2018. Integration of structured and unstructured data in the analysis of e-commerce customers. SGEM 2018: 18 international multidisciplinary scientific geoconference, Albena: STEF93 Technology Ltd., 18, pp. 499-506. ISBN 978-619-7408-39-3 ISSN 1314-2704

Abstract

The main reason for the rapid development of e-commerce is the possibility of personalization and individual customer service. Modern e-commerce systems have diverse and well-developed capabilities to analyse and manage customer relationships. In most cases, however, these analytical systems are based on processing and analysis of structured customer data, those that are collected at registration and stored in the database. It is important to note that many of the customers when completing registration forms do not always fill in their data properly because of the lack of sufficient motivation or for security reasons. In addition, it is sometimes difficult to

derive sufficiently detailed information about customer behavior from this data alone. What's more – in this case one of the major challenges to the development of e-commerce is the search for and use of additional data sources for customers. That is why we propose for business analyses in the field of electronic commerce the integrated use of the data accumulated in the databases and the data obtained from the processing of unstructured information, deriving mainly from additional surveys and from different Internet sources. Data Mining Methods were used to analyze the resulting integrated data, and the approbation was done with a RapidMiner software product.

Abstract

E-commerce involves the processes of selling and buying goods and services through the use of modern communication technologies and the Internet. The success of this form of commerce largely depends on the website through which the sales are carried out. Modern online e-commerce platforms are sophisticated applications that perform multiple functions. They are both a marketing tool that attracts customers, dynamic systems that allow interaction with the users, and the realization of transactions and a portal with useful information about the sold goods and services. For online retailers as well as for software developers, it's important to understand how effective the website, through which the online sales are done, is. This paper proposes a methodology for evaluating e-commerce websites. In order to understand the strengths and weaknesses of an e-shop, as a basic tool for doing business, we believe

it is good to make a comprehensive assessment by means of a system of indicators grouped in the following sets: evaluation of the website's visitability; evaluation by specific e-commerce indicators; evaluation of the e-commerce website's functionality; evaluation of the e-commerce website as a marketing tool. Some of the metrics are obtained as a result of expert judgment, while others are obtained from the data of the e-shop's database, data from analytical systems and data extracted from Internet resources. The proposed metrics system for evaluation e-shops is of importance to improving business processes, customer relationships, marketing, and management.

№29. Sulova, S. 2019. Models for Web Applications Data Analysis. CompSysTech '19: 20-th International Conference on Computer Systems and Technologies, 21 - 22 June 2019, University of Ruse, Bulgaria: Proceeding, New York: ACM pp. 246-250. ISBN 978-1-4503-7149-0

Abstract

Data analysis is a data inspecting and transforming process for the purpose of making conclusions and obtaining useful information to help make a decision about disclosed forecasts. There are numerous technologies and methods for analyzing data that are mainly determined by the type of data. The paper presents models for organizing web applications' data based on the integrated use of structured data from databases of web applications and unstructured data derived from web pages and server log files. Bu studying the many existing approaches to data analysis from web applications, a summary of the process of data analysis from web applications has been made. An example of using this approach in e-commerce applications is given. The software tools that can be used to perform analyses have been pointed out.

№30. Sulova, S. 2019. The Usage of Data Lake for Business Intelligence Data Analysis. 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. 135-144. ISBN 978-954-21-1004-0

Abstract

Data analysis is now becoming increasingly more important for business. The accumulation of large amounts of different types of data in organizations is a prerequisite for seeking new ways of storing, processing and analyzing them. The following paper presents the nature of the data lake concept and examines its capabilities to organize all the data, both those generated by the organization and those extracted from Internet sources. Storing large amounts of data, regardless of its type, structure, or format, allows for the integrated use of structured and unstructured data and the application of a variety of techniques for intelligent business analysis.

№31. Sulova, S. 2019. Digitalization in the Construction Industry and the Need of Innovative Database Models. Proceedings of the 34th International Scientific and Practical Conference "Construction Entrepreneurship and Real Property", Varna, Publishing house "Science and Economy", pp. 78-85. ISSN 2683-0280

Abstract

The digital transformation is changing the modern economy fundamentally. Although at a slower pace, the use of sophisticated software applications based on new IT technologies is also entering the construction industry. The transformation process, in turn, increases the scope and volume of the data which is collected and stored. Regarding that this report takes a look at the changes that have taken place as a result of digitalization in construction industry and the need to implement new models for data storage and management.

№32. Sulova, S. 2020. Data Management Challenges in the Context of the Digital Transformation of Business. Jubilee International Scientific Conference "Economic Science, Education and the Real Economy: Development and Interactions in the Digital Age" Vol. 1, Varna, Publishing house "Science and Economy", pp. 599-609. ISBN 978-954-21-1037-8

Abstract

In recent years, digital technologies have been implemented even more into business and society. In the conditions of this innovative and digital work environment firms often face difficulties connected to managing their data. The main reason for that is that there is a tendency to constantly increase the volume of the stored data and to use more data from a variety of new sources. The process of digitization creates prerequisites for changing the current strategies for collecting and storing data so that afterwards they can easily be used as a source of useful knowledge. Understanding the changes that have happened and the correct use of the data is the base of quality business analyses and ensures productivity and efficiency across all economic sectors. In this regard, the main goal of the report is to highlight the changes in the data management models and to point out the guidelines for dealing with data in the conditions of digital transformation of the economy.

№33. Nacheva, R., Sulova, S. 2020. Internationalization in Context of Education 4.0: AHP Ranking of Bulgarian Universities. CompSysTech'20: Proceedings of the 21st International Conference on Computer Systems and Technologies '20, Association for Computing Machinery, pp. 278-284. ISBN 978-1-4503-7768-3

Abstract

The Fourth Industrial Revolution has brought about major economic, political and social changes. The world around us is moving at a rapid pace, and artificial intelligence, big data, the Internet of Things and robotics are imposing new rules on the labor market. Many

job requirements have changed – employees must have digital competencies to handle workplace responsibilities. Educational institutions also seek to meet the demands of business by changing the curriculum and teaching methods, i.e. gradually progressing towards the concept of Education 4.0. On the other hand, the pressure exerted by the globalization process on universities inevitably leads to the internationalization of education.

The report proposes a system for evaluating universities in the conditions of internationalization. The ranking is based only on publicly available information, visible on their websites. The criteria are developed in the context of Education 4.0 and are applied in accordance with the Analytical Hierarchical Process method (AHP). The proposed ranking system can be applied in other professional fields as well.

№34. Petrova, R., Sulova, S. 2020. AI Governor for the Quality and the Strength of Bridges. CompSysTech '20: Proceedings of the 21st International Conference on Computer Systems and Technologies '20 , Association for Computing Machinery, pp. 78-85. 978-1-4503-7768-3

Abstract

The designing and construction of bridges is very difficult to standardize and there is a need for quality control through modern information and communication technologies. The report examines the scientific literature on the topic. It concludes that Internet connectivity and the inclusion of electronic components, software and AI methods allow the collection and exchange of data for the monitoring and control of bridges. The report proposes a system model, which performs real-time analyses, self-learns, adapts to changes in the environment and aims to identify and warn of potential problems.

№35. Sulova, S. 2021. Text Mining Approach for Identifying Research Trends. CompSysTech '21, Proceedings of the 21st International Conference on Computer

Systems and Technologies '21, Association for Computing Machinery, pp. 93–98. ISBN 978-1-4503-8982-2

Abstract

With the increase of unstructured data, the issues connected with automatic text processing, the categorization of documents and the discovery of topics have become objects of growing interest. In order to improve the process of grouping and processing research publications, we would like to propose a method based upon natural language processing. It is based on text mining technologies which aim to identify key tendencies in documents. It processes the content of publications by clustering and identifies the topics of each Identified group. This analysis helps by identifying key tendencies as well as discovering emerging new areas of research. Publications from the research literature database, Scopus, were used to test the approach. The topic of the publications is "the application of digital technologies in the logistics business". The experiments were completed using the RapidMiner Studio software.

№36. Marinova, O., Sulova, S. 2021. Challenges and Key Requirements for Data Scientists. International Scientific-Practical Conference "Human Resource Management". Varna, Publishing house "Science and Economy", pp. 44-51. ISBN 978-954-21-1092-7

Abstract

Currently, the digital transformation of business and the increased volumes of data require new and specific ways of organizing, managing and analysing data. Working with big data poses several challenges to analysts. Regarding this matter, the aim of the paper is to highlight the key skills needed for data science professionals, which this new and constantly evolving field requires. Technical skills are not the only important ones here, abilities such as analytical thinking and application of creativity, innovation, and inquisitiveness to the execution of work tasks are even more significant. The paper shows the main challenges data science experts face and how their skills are important for the transformation of business problems into working solutions with business value.

V. Textbook

№37. Sulova, V., Iliev, P., Kancheva, A., Atanasova, T., Filipova, N., Parusheva, S., Sulova, S., Todoranova, L. 2013. Informatics. Varna, Publishing house "Science and Economy". ISBN 978-954-21-0664-7

Abstract

The textbook "Informatics" is suitable for all students in the professional fields "Management and Administration", "Economics" and "Tourism" in the bachelor's degrees of University of Economics – Varna. The course material is in accordance with the curriculum approved by the "Informatics" Department and includes topics related to computer hardware and software, the Windows 7 operating system, the Microsoft Office 2010 office package, computer networks and security.

The parts written by Assoc. Prof. Snezhana Sulova are the points about data exchange between Microsoft Access and other applications and database security from chapter 7. Microsoft Access; Chapter 8 – Microsoft PowerPoint and from chapter 9 - point 9.2.4, which is about e-mail.

№38. Atanasova, T., Sulova, S. 2013. Business intelligence of the company. Electronic textbook, Varna, Publishing house "Science and Economy". ISBN 978-954-21-0680-7

Abstract

The textbook aims to give students knowledge about the nature of business intelligence and business intelligence systems (BIS) and their application in company management. It covers the architectural components and functions of the business intelligent system. Students gain theoretical knowledge about the possibilities for extracting knowledge from structured and unstructured information, as well as practical skills for conducting business analyses.

The topics developed by Assoc. Prof. Snezhana Sulova address the following topics: the types of software tools for creating business intelligent systems; the use of BIS in Bulgaria and other European countries, cloud technologies and business intelligent systems and the extraction of knowledge from Internet sources.

№39. Iliev, P., Kasheva, M., Sulova, S. 2013. E-business 1 part. Electronic textbook, Varna, Publishing house "Science and Economy", ISBN 978-954-21-0678-4

Abstract

The textbook provides knowledge and skills about the methodology, organization and technology of e-commerce and e-marketing in the global network that is the Internet. It consists of 3 parts: e-commerce, e-commerce software systems and e-marketing. Assoc. Prof. Snezhana Sulova is the author of the topics from the second part about the software and technical support of e-commerce.

№40. Iliev, P., Atanasova, T., Filipova, N., Sulova, S., Kasheva, M., Peneva, P., Radev, M. 2014. Study materials in the specialty "Informatics" for the master's degree I part. Publishing house "Science and Economy". ISBN 978-954-21-0804-7

Abstract

An electronic textbook in Russian, containing materials needed for studying the disciplines "Electronic Business Part 1", "Business Modelling", "Analysis and Construction of BIS", "Intelligent Agents and Multi-Agent Systems", "Corporate Networks". Assoc. Prof. Snezhana Sulova is the author of the topics related to e-business software. The textbook covers and characterises the software tools for creating an e-shop.

№41. Sulova, S., Kasheva, M., Filipova, N., Peneva, P., Aleksandrova, Y. 2015. Electronic Business 1st Part Business Modeling Analysis and Development of Business Information Systems. Publishing house "Science and Economy". ISBN 978-954-21-0865-8

Abstract

An electronic textbook in English, containing materials needed for studying the disciplines "Electronic Business Part 1", "Business Modelling", "Analysis and Construction of BIS". Assoc. Prof. Snezhana Sulova is the author of topic 1 which is about the nature and benefits of e-business and topic 2 – about software tools for e-business.

№42. Sulova, V., Atanasova, T., Kancheva, A., Filipova, N., Parusheva, S., Sulova, S., Todoranova, L., Marinova, O. 2017. Informatics. Varna, Publishing house "Science and Economy", ISBN 978-954-21-0905-1

Abstract

The textbook "Informatics" is suitable for all students in the professional fields "Management and Administration", "Economics" and "Tourism" in the bachelor's degrees of University of Economics – Varna. The course material is in accordance with the curriculum approved by the "Informatics" Department and includes topics related to computer hardware and software, the Windows 10 operating system, the Microsoft Office 2016 office package, computer networks and security.

The parts written by Assoc. Prof. Snezhana Sulova are the points about data exchange between Microsoft Access and other applications and database security from chapter 7. Microsoft Access; Chapter 8 – Microsoft PowerPoint and from chapter 9 - point 9.2.4, which is about e-mail.

№43. Sulova, S., Todoranova, L., Lazarova, N., Bankov, B. 2018. Internet technologies. Varna, Publishing house "Science and Economy". ISBN 978-954-21-0952-5

Abstract

The concepts covered in the textbook are some fundamental and easily applicable in business, network and internet technologies and communication services, as well as blogs and websites as an effective marketing tool used to promote and support business activities. Its main purpose is for students doing bachelor's degrees in all specialties in the professional fields: "Management and Administration", "Economics" and "Tourism". The textbook is also useful for anyone who wants to learn to apply Internet technologies more effectively in business. It covers software email clients, Google cloud applications, and platforms for creating blogs and websites. Special attention is paid to the design, construction, maintenance, development, and promotion of websites.

Developed by Assoc. Prof. Snezhana Sulova are the introduction, Chapter 1 – "Network and Internet technologies. Internet Communications and Email Clients" and Chapter 3 – "Websites – Planning, Design and Creation Technologies".

№44. Sulova, S., Todoranova, L., Penchev, B., Aleksandrova, Y., Начева, P. 2018. Guide for preparation for a national computer science competition. Varna, Publishing house "Science and Economy". ISBN 978-954-21-0979-2

Abstract

The practical textbook is intended for all high school students who seek creative expression in the Informatics field. It is a good helper when preparing for student competitions in informatics and information technologies. The tasks in it are divided into 3 groups: "Programming", "Microsoft Excel" and "Web design".

The practical textbook can be useful to anyone who wishes to improve or test their knowledge in the field of Information technologies.

№45. Sulov, V., Atanasova, T., Filipova, N., Parusheva, S., Petrov, P., Sulova, S., Todoranova, L., Marinova, O. 2019. Informatics. Varna, Publishing house "Science and Economy". ISBN 978-954-21-1003-3

Abstract

The textbook "Informatics" is suitable for all students in the professional fields "Management and Administration", "Economics" and "Tourism" in the bachelor's degrees of University of Economics – Varna. The course material is in accordance with the curriculum approved by the "Informatics" Department and includes topics related to computer hardware and software, the Windows 10 operating system, the Microsoft Office 2019 office package, computer networks and security.

The parts written by Assoc. Prof. Snezhana Sulova are: the points about data exchange between Microsoft Access and other applications and database security from chapter 7. Microsoft Access; Chapter 8 – Microsoft PowerPoint and from chapter 9 – point 9.2.4, which is about e-mail.