NATURE PHENOMENA AND INNOVATIVE ENGINEERING

Effect of texture on mechanical and magnetic properties of steel from the petroleum distillation column

Elena Dragomeretskaya

Computer Modelling & New Technologies 2017 ***21****(2) 7-10*

Texture, mechanical properties and coercive force of steel 09G2S from the column fragment of petroleum distillation after prolonged use studied. Anisotropy of mechanical properties and coercive force take place. Significant pair wise linear correlations and appropriate regression equations with coefficients reliability of approximation not less than 0.90 were found between magnitudes of the coercive force, tensile strength, yield strength, elongation and texture characteristics. Found correlations may be used for nondestructive mechanical properties control of investigated steel by means of monitoring of coercive force.

Keywords: texture, anisotropy, mechanical properties, coercive force, correlation

Decision support system on the base of genetic algorithm for optimal design of a specialized maritime platform

Andrejs Zvaigzne, Oleksandr Bondarenko, Anzhela Boiko

Computer Modelling & New Technologies 2017 ***21****(2) 11-18*

The analysis of possibilities of application of the small waterplane area twin hull ships (SWATH) as a specialty (universal) platform is performed. It is shown that the design of the specialized platform with a small waterplane area twin hull is characterized by a large number of parameters to be determined. The optimum relation selection between SWATH dimensions, seaworthiness, cost and efficiency is proposed by solving a multidimensional optimization problem with the use of special methods of searching solutions. The optimization problem of designing a universal platform is formulated. The constraints accounting on SWATH technical characteristics is produced by using the method of penalty functions. To solve the optimization problem, one of modern search methods – genetic algorithm is used. An example of solving the problem of selection the main dimensions of 25 m platform using a genetic algorithm is presented.

Keywords: SWATH, specialized platform, genetic algorithm, optimization, Mission Module

MATHEMATICAL AND COMPUTER MODELLING

Cyber intelligence systems based on adaptive regression splines and logical procedures of attack recognition

G Beketova, B Akhmetov, A Korchenko, V Lakhno, A Tereshuk

Computer Modelling & New Technologies 2017 ***21****(2) 19-28*

The article presents the results of research devoted to the further development of methods, models and algorithms for recognizing cyber threats, as well as the most common classes of cyber attacks and anomalies in critical computer systems (CCS). It is shown that the cyber security process for CCS controlled and analyzed by the values of several parameters of anomalies or signs of cyber attacks. This, in turn, makes it possible to carry out a preliminary assessment of information security with the help of two-stage recognition procedure in which initially used the methodology of adaptive regression splines for the processing of statistical data on the anomalies and cyber incidents in CCS, and then in the second stage are used designed logical recognition procedures based on the signs of matrix surfaces. This minimizes the number of training samples for the detection of objects in the framework, the relevant classes of cyber threats, attacks and anomalies.

The research on minimizing the amount of training samples of recognizing signs were performed. It is shown that for the recognition of objects within the known class of cyber threats, attacks and anomalies in the use of training facilities matrices used for training a representative set of long 3-5 attributes will allow to achieve maximum efficiency of the algorithm, reaching up to 98%.

Using the proposed method and models has allowed to reduce the amount of required object recognition rules within the class of 2.5-10 times, compared to the widely used in anomaly detection systems and methods of cyber attacks sequential sorting features and statistical algorithms states.

Keywords: intelligent recognition system, cyber threats, anomalies, signs of cyber attacks, adaptive regression splines, logical procedures, elementary classifier

Metrics for consistency checking in object oriented model transformations

G Ramesh, T V Rajini Kanth, A Ananda Rao

Computer Modelling & New Technologies 2017 ***21****(2) 29-36*

Model transformation is the cornerstone of Model-Driven Engineering (MDE) as it is crucial in Computer Aided Software Engineering (CASE) towards Object Oriented Analysis and Design (OOAD) and Object Oriented Programming (OOP). It also plays vital role in entity relationship model. Therefore it is indispensable to be treated as traditional software artefacts and assess quality of model transformations. Model-to-model transformations are from Platform Independent Model (PIM I) to Platform Independent Model (PIM II) and from PIM to Platform Specific Model (PSM). The goal of our research in this paper is to make these model transformations measurable. However, it is confined to proposing a set of metrics pertaining to consistency checking. The quality of transformations is measured in terms of consistency. The metrics proposed in this paper are general and can be reused. We evaluate the metrics using our framework named Extensible Real Time Software Design Inconsistency Checker (XRTSDIC) which supports end-to-end transformations of object oriented models. Our empirical study revealed that the proposed metrics add value to our model consistency checker as they quality in model transformations.

Keywords: Model Driven Engineering (MDE), XRTSDIC, model transformations, consistency checking, quality measures

Border node detection: a new experimental approach

Saher Manaseer, Dua Alsoudi, Asmaa Aljawawdeh

Computer Modelling & New Technologies 2017 ***21****(2) 37-40*

This paper aims at sensing the network, and detects the border nodes, the researcher use NS2, in order to represent, simulate and calculate the delivery ratios of the distributed packets which accordingly will help to detect the border nodes. The importance of this research comes from detecting the border nodes without depending on other resources, since Ad hoc networks coordinates are virtual. The researchers analysed the results of the trace file that came as an output of carrying out simulations in Network simulator (NS2) for the evaluation of the ratios. The methodology of this experiment depends on using the IEEE 802.11 MAC protocol. Flooding technique was used to send data packets through three scenarios: First, 5% of the nodes are randomly chosen to send their data packets per minute. In the second and third scenarios, the percentages of nodes that flood their data are 25% and 50% respectively.

Keywords: MANETs, Broadcast, NS2, IEEE 802.11, MAC, Flooding

Tri-Partite graph: a novel security scheme for cloud data

P Dileep Kumar Reddy, C Shoba Bindu, R Praveen Sam

Computer Modelling & New Technologies 2017 ***21****(2) 41-47*

Cloud data security is the most concentrated feature of the cloud computing technology. Many cloud computing techniques like cloud data partitioning emerged reflecting new heights of providing data security by defining data priorities. The proposed method presents a novel scheme of maintaining owners prioritized data, while equally ensuring the security for whole portion of the data. The proposed method uses a tripartite graph for securely managing the prioritized data at various levels.

Keywords: Encryption, Authentication, tripartite graph, Hash, MAC

Virtualization safety

Zh E Aytkhozhaeva, A A Ziro, A Zh Zhaibergenova

Computer Modelling & New Technologies 2017 ***21****(2) 48-53*

Article considered virtualization technologies, their types, advantages and disadvantages. Attention to specific risks and information security threats in case of virtualization platforms is paid. The main risks of virtualization platforms are defined. Potential internal vulnerabilities of virtualization platforms can be revealed only by testing for penetration which user-friendly and available instrument for implementation is specialized by Kali Linux OS. The attacks to the virtual machines with use of the Kali Linux tools were organized. As a result of experiments is Kali Linux allows revealing and analysing vulnerabilities at the channel, network and transport levels. For detection of problems at the level of applications that is urgent for virtualization of platforms, it is necessary to use commercial products of ethic hacking in addition.

Keywords: virtualization platforms, risks, penetration testing

Improvement of learning efficiency of the neural networks, intended for recognition of graphic images in systems of biometric authentication

L Tereykovskaya, I Tereykovskiy, E Aytkhozhaeva, S Tynymbayev, A Imanbayev

Computer Modelling & New Technologies 2017 ***21****(2) 54-57*

Article is devoted to a problem of use of neural network technologies in the field of biometric authentication of users. It is shown that one of important the shortcomings of application of neural networks technology on the basis of a multi-layer perceptron for recognition graphic images in systems of biometric authentication of users is insufficient quality of processing of statistical data which are used when forming parameters of educational examples. It is offered to increase quality of educational examples due to use of the procedure of neural network coding of value of the expected output signal of educational examples which allows consider closeness of standards of the recognized classes in this signal. The coding procedure of the expected output signal providing use of a probable neural network is developed. The appropriate mathematical devices are created. As a result of numerical experiments it is shown that application of the developed procedure allows reduce the number of the computing iterations necessary for achievement of the given error of training by 30-50%. It specifies prospects of use of the proposed solutions for improvement of learning efficiency of the neural networks, intended for recognition of graphic images in systems of biometric authentication.

Keywords: neural network, information security, learning, biometric authentication

Word sense disambiguation in Hindi applied to Hindi-English machine translation

S Mall, U C Jaiswal

Computer Modelling & New Technologies 2017 ***21****(2) 58-68*

The Word Sense Disambiguation for Hindi Language is one of the biggest challenges faced by Natural Language Processing. In this paper we discuss issues in reducing ambiguity in Word Sense Disambiguation for Hindi Language. The concepts are induced in two modules Parsing and Word Sense Disambiguation for Hindi Language. Parsing is an extension of our previous work on shallow parser method that creates groups word which are essential for Machine Translation. Monolingual Hindi and English corpora are used. Following this we used machine learning technique such as supervised approach, unsupervised approach and domain specific sense with the help of Knowledge based methods. Knowledge based method uses Hindi and English WordNet tools. Supervised method is used to disambiguate the multiple tags in the context label with the correct tag. Unsupervised method is used to update the sentence with the correct sense and parts of speech tag. There are various websites which provide the facility of translation of Hindi language to English language such as Google Translator and Babefish Translator but these translators fail to resolve polysemy words in Hindi sentences the result is discussed in this paper. The accuracy result of part of speech tagging generated by our system is

92.09%. The accuracy results generated by our system for Chunk are window-3, window 2 and window1 are: 94.45%, 81.23%, and 81.11% respectively. We modify and develop Lesk algorithm which uses WordNet tools for Word Sense Disambiguation. We compare the system's performance with the website Google Translator. We also examine errors made by Google Translator for given input Hindi sentence. Our system generates correct translation with Word Sense Disambiguation for given input Hindi sentence as shown in the Figure 12.

Keywords: Domain specific sense, Word Sense Disambiguation, Morphological analysis, Part of speech tagging and Parsing

Ant colony optimization algorithm: advantages, applications and challenges

Kavita Tewani

*Computer Modelling & New Technologies 2017 **21**(2) 69-70*

Ant Colony optimization is a technique for optimization that was introduced in early 1990's. ACO algorithm models the behaviour of real ant colonies in establishing the shortest path between food sources and nests and this technique is applied on number of combinatorial optimization problem, communication networks and robotics. This paper introduces the advantages of using the ACO algorithms with the help of some problem examples and the challenges faced for solving the problems. Initially, the paper discusses about the biological inspiration and behaviour of ant colony and then relates with the real life problems.

Keywords: Ant colony optimization (ACO), pheromone, Travelling Salesman Problem (TSP)

Business process re-engineering capability based on ECMM: Efficient Configuration Model and Management

K Sekar, M Padmavathamma

*Computer Modelling & New Technologies 2017 **21**(2) 71-79*

Most business process Companies are interested for new solutions and techniques in organisations. Relating to the big data to achieve that business process must be reengineered. Reengineering of business process can be done based on six sigma activities like Define, Measure, Analyze, Improve, Control and Report. In Business Process Reengineering, the two constants of any organisation are people and process If individuals are motivated and working hard, here the business process are compressive and organisational process will be poor and posses high failure rate. In order to overcome these effects Business Process Reengineering must have some assessing capabilities which is referred as Desired Organizational Capabilities (DOC) and total quality management (TQM) to increasing the efficiency of reengineering and makes the manufacturing of logistical systems more scientific.

Keywords: Six Sigma activities, DOC, Business Process Reengineering, TQM

Handwritten digit recognition using combined feature extraction technique and neural network

Ankita Mishra, Dayashankar Singh

*Computer Modelling & New Technologies 2017 **21**(2) 80-88*

Handwritten digit recognition is established and emerging problem in pattern recognition and computer vision. A very few volume of work related to research has been done in this field till now. Handwritten digit recognition is very useful in cheque processing in bank, form processing systems and many more. In this paper, a robust and novel technique has been introduced for handwritten digit recognition which is tested on well-established MNIST dataset. Histogram of oriented gradient technique and wavelet transform technique is used for feature extraction. Radial basis function neural network and back-propagation neural network have been used as classifier. Experimental analysis has been carried out and result shows that RBF yields good recognition accuracy as compared to back-propagation neural network.

Keywords: Handwritten digit recognition (HDR), Back propagation Neural Network, Radial Basis Function, Histogram of Oriented Gradient (HOG)

Fuzzy comprehensive evaluation model for mobility model

Yao Minghui, Zhang Sheng

*Computer Modelling & New Technologies 2017 **21**(2) 89-92*

Evaluation of mobility model is an important means to ensure the quality and design level. At present, many mobility models are proposed for opportunistic networks. But, there is no practical quantitative evaluation system to evaluate the mobility models. Firstly, this paper put forward a comprehensive evaluation index system of mobility model based on the analysis of the main factors affecting the quality of mobility model and the relationship between them. Secondly, based on the theory of fuzzy comprehensive evaluation, this paper put forward a fuzzy comprehensive evaluation model for mobility model (FCEM). In this model, the membership function of fuzzy mathematics is used to deal with the fuzzy evaluation of each index of the mobility model. The model realizes the quantitative evaluation of mobility model. This model not only provides new ideas and methods for mobility model evaluation, but also provides help and guarantee for mobile node modelling. Finally, the application of the model is demonstrated through the evaluation of the random waypoint (RWP) model.

Keywords: mobility model, evaluating indicator, membership function, fuzzy comprehensive evaluation

Enhance detecting and preventing scheme for ARP Poisoning using DHCP

Vidya Srivastava, Dayashankar Singh

*Computer Modelling & New Technologies 2017 **21**(2) 93-99*

The client which is using LAN for mapping network address connected to its corresponding MAC address is done by Address Resolution Protocol, which is a primary protocol. It is well known that ARP is determined and works properly in case there is no malignant client in the network but in practical scenario it is not possible. The primary motive of an attacker is always tried to find a

strategy which is further accomplished to launch various attacks. ARP gives this accountability – the unsubstantiated and stateless characteristics of the protocol which accredit the attacker to conduct biggest level attacks. In this paper, an attempt is made to resolve out or minimize the attempt of attacker by providing a validation using DHCP server. By the introduction of DHCP (Dynamic host control protocol) such that if an attacker applies the IP of host not in network can be prohibited. The simulation result has been shown in the dissertation report. By the response of DHCP correct matching of IP and MAC could only respond and thus poisoning can be detected and protected successfully.

Keywords: Address Resolution Protocol, Network security, MiTm

