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## Guest Editorial

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**Biographical notes:** Zhihan Lv is an Engineer and Researcher of Virtual/Augmented Reality and Multimedia major in Mathematics and Computer Science, having plenty of work experience on virtual reality and augmented reality projects, engaged in application of computer visualisation and computer vision. His research application fields widely range from everyday life to traditional research fields (i.e., geography, biology and medicine). During the past years, he has finished several projects successfully on PC, website, Smartphone and Smartglasses. In 2012, he was granted PhD in Computer Applied Technology from Ocean University of China (2006–2012). Before that, he has enjoyed 16 months full-time research experience at Centre national de la recherche scientifique (CNRS)-UPR9080 in Paris (2010–2011).

After then, he has fulfilled 2-year Postdoctoral research experience at Umea University and a short invited teaching experience at KTH Royal Institute of Technology in Sweden. Since 2012, he has held an Assistant Professor position at Chinese Academy of Science.

Jiachen Yang received the MS and PhD in Communication and Information Engineering from the Tianjin University, Tianjin, China, in 2005 and 2009, respectively. Currently, he is an Associate Professor at Tianjin University. In 2014, he was a Visiting Scholar in the Department of Computer Science, School of Science at Loughborough University, UK. His research interests include stereo camera, stereo vision research, pattern recognition, stereo image displaying and quality evaluation.

Jim Jingyan Wang has 10+ years of experiences of machine learning research, developing novel algorithms of non-negative matrix factorisation, learning-to-rank, feature selection, semi-supervised learning, bag-of-words, sparse coding, multi-kernel learning, transfer learning, and multivariate performance optimisation. He has 40+ publications of journal articles/conference proceedings of machine learning, 20+ indexed by SCI, cited for 500+ times, H-index 13, 7+ years of machine learning algorithm applications, proficient in predictive modelling, logistic regression, decision trees, support vector machine, neural networks, recommendation system, collaborative filtering, natural language processing, and information retrieval, 5+ years of experiences of big data, proficient in Hadoop, MapReduce, Hive, Pig and HBase, proficient in object-oriented programming, Python, Java and scripting language Matlab, familiar at statistical modelling and analysis, linear regression, hypothesis testing, time-series analysis and R, familiar at relational database, SQL, and MySQL.

Tengfei Yin is presently a PhD Researcher in School of Engineering and Informatics at University of Sussex, UK. His current research is in the area of advanced 3D Ultrawideband (UWB) imaging for early breast cancer detection and research articles have been published on IEEE Transactions on Biomedical Engineering and IEEE Antennas and Wireless Propagation Letters. Prior to joining University of Sussex, he received BE and ME in Communication Engineering from Qingdao Technological University and Ocean University of China in 2008 and 2011, respectively. His research interests cover microwave image reconstruction, image processing/machine vision, virtual reality and peer-to-peer (P2P) network.

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Nowadays, multimedia and pattern recognition-based medical technology is becoming a popular trend, which can explore and utilise multimedia information, including video streams, images, voice, heartbeat, blood pressure and scalar sensor data. Based on these kinds of technologies, medical device is able to percept, process in real-time, analyse and evaluate multi-source and multi-dimensional data, thus has been widely used in disease diagnosis, rehabilitation, health monitoring, assisted surgery and other medical areas. Many of these applications require the multimedia and pattern recognition paradigm using medical sensors. The notion of pattern recognition is becoming a reality with the development of variety of multimedia technologies. The intelligence functions of multimedia and pattern recognition technologies can be applied to smart hospital, smart clinic, smart rehabilitation at home and so on. Accordingly, the assessment and

evaluation methods need to be developed and involved into the iterative designing process.

For random clustering and one hop communication in LEACH, if there are too many nodes in a cluster, the cluster head will consume more energy and the network lifetime will be shortened. In order to balance energy consumption and avoid long-distance communication, a uniform clustering routing algorithm based on K-means and Dijkstra algorithm (KDUCR) is proposed in 'A routing protocol for wireless sensor networks using K-means and Dijkstra algorithm'. In the KDUCR algorithm, the sink node uses K-means clustering algorithm to divide sensor nodes into  $k$  uniform clusters and assigns the head of each cluster in the first round. Then, the sink node uses Dijkstra algorithm with heads' position to calculate the shortest paths from every head to the sink node. In the resident round of network operation, re-clustering will not run, only cluster heads updating and routing updating run. The simulation shows that the KDUCR algorithm could better balance the energy consumption of nodes and prolong lifetime of a WSN.

Coal and gas outburst is a very complex phenomenon of dynamic disaster in coal mine, where exists a complex non-linear mapping relationship that could not be described with functions between outburst risk and its influential factors. In 'Study on the improvement of the genetic algorithm for prediction of coal and gas outburst risk', from operator theory, the choice of initial parameters is optimised, and genetic algorithm is improved. Mathematical model of coal and gas outburst risk prediction is established, and the improved genetic algorithm was applied to the risk prediction model.

Having been raging the West African land for almost one year, Ebola virus causes a global panic because of its terrible high-speed infection and high mortality rate. Recently, WHO announced that its new drugs can prevent the virus and cure the patients of non-advanced Ebola. In order to meet the drug supply chain and transport chain requirements, three models are established to help reduce the increasing number of patients in 'Study on optimal mathematical model to eradicate Ebola'. In drug flow system, by applying the supply chain model to constrain the drug in different ways, the optimal allocation plan is achieved. In inter city transportation, by using the ant colony algorithm, the optimal path can be found in the same region.

Recognition and measurement of evidence conflict is the key problem that restricts the application of D-S Evidence Theory. Based on the evidence conflict definition and case analysis, the authors give the new measurement factor of conflicts, integrate the traditional conflict coefficient  $K$  and the Jousselme's information distance to represent the conflict between the evidence, use information entropy to represent the evidence information effectiveness in 'An identification method of D-S evidence conflict based on the measurement factors', which analyses the relationship among the three metrical components through constructing the coefficient  $K$  and difJ information matrix and verified the effectiveness and adaptability of the new conflict metric factor in recognition and measurement of the evidence conflict.

A novel volumetric data clustering work introduced in this paper aims to cluster the volume data and filter out its inherent noise via extracting the data structure and indicating the useless segments. Based on classic segmentation algorithms, 'Clustering-based volume segmentation design' focuses on exploring volume-based segmentation solutions and property-oriented display mechanisms to assist with the decision-making stage involved in associated volume data manipulation works. As the resulting outputs of this design, the occlusion relationships embedded into volumetric space can be precisely oriented in the manner of visualised partition feature(s). This data visualisation process

can be accomplished automatically based on the classified information. In addition, a novel manipulation operation can be built via extracting wireframe-based surfaces from the segmentation results.

In 'Investigating public health through urban form data mining with geographic information system and space syntax', the authors investigate the importance of urban form towards public health using GIS and space syntax methods. Hankou riverside area of China is selected as a case study. Urban fabric and street network are combined for a comprehensive image of urban form. First, five formal indicators are calculated based on GIS. Secondly, axial and visibility analysis of space syntax are joined for complement. The result indicates that the selected area has a good potential of richness and complexity of urban fabrics. Suitable urban form could stimulate activities and social interactions that are beneficial to people's physical condition and mental strength. It also reveals that its street network presents a multi-hierarchical structure and spatial wholeness from local scale to city scale. The paper proposes to maintain the vitality of urban form to increase diversity of urban life.

At present, with the development of the information technologies and the internet, evaluation and the recommendation of all kinds of information are increasingly concerned. According to the user behaviour information of a famous online bookstore, analysis of the factors affecting user ratings to establish user on the books of the scoring system model, and then the user recommended books. The original data are filtered first. The label, social friends, books browsing amount of three groups of data were analysed by bivariate correlation analysis, respectively, so that it can get the number of users on the books, scores and label users' good friends, the history of the book number of pageviews a positive correlation. As to the second question, 'Research about recommending books based on hierarchical analysis method and BP neural network' established the AHP model and BP neural network model to predict the scores. So the authors can obtain more accurate results by comparing the two kinds of models.

Olefin infrared spectrum is a comprehensive presentation of its feature data. If the structures are different, then it will certainly lead to feature differences between the spectrums. In 'Building SVM and PNN optimal classifiers based on GA-PLS algorithm and the application in infrared spectrum', with olefin cis/trans IR spectrums in OMNIC IR database as research objects, the authors have designed four types of classifiers based on SVM and PNN upon Fisher Ratios and GA-PLS, respectively, so as to select the optimal classifiers to apply into other databases. The results show that all the optimal classifiers based on SVM and PNN are designed with GA-PLS algorithm; and when the corresponding feature sets include the 70 features and 50 features, respectively, selected by GA-PLS, the classifiers are optimal. Upon case verification, it is found that SVM-GA-PLS classifier is more suitable for the prediction to olefin cis-structure and PNN-GA-PLS is more suitable for the prediction to olefin trans-structure.

Optimal feature extraction forms an integral component involved in the design of an efficient segmentation methodology. Among several methods reported in the literature in this regard, textural feature extraction techniques are increasingly used in brain MRI application to provide high diagnostic accuracy. In 'An efficient framework for segmentation and identification of tumours in brain MR images', two efficient textural feature extraction algorithms (TFEA-I and TFEA-II) are proposed for a class of brain MR imaging applications. TFEA-I employs higher-order statistical cumulant, namely, Kurtosis in order to generate a feature set based on the probability density function (PDF) of generalised Gaussian model that represents the wavelet coefficient energies of the sub-

bands of decomposed image. TFEA-II derives a feature set employing co-occurrence matrix model for second-order statistical characterisation of wavelet coefficients. For selected medical imaging applications involving indexing of images in the database, ROI-based medical image compression, it is often sufficient to compute a coarse tumour boundary that acts as a seed for computing smooth segmented boundaries of the tumour. Accordingly, in conjunction with TFEA-I and TFEA-II, the authors propose segmentation framework to compute coarse and smooth segmented boundaries for the tumour. When compared with the conventional TFEA methods reported in the literature, the use of proposed TFEA-I and TFEA-II results in two important advantages:

- considerable reduction in the feature set size
- elimination of the need for using specialised feature selection/reduction algorithms thereby making them highly attractive for a class of brain MR imaging application.

It is important to note that both TFEA-I and TFEA-II are simulated in Matlab using datasets of real and synthetic brain MR images. When compared with conventional method reported in literature for tumour detection, TFEA-I offers superior performance in terms of four quantitative measures employed, while TFEA-II offers sub-optimal performance in all four measures. Concerning the relative performance of TFEA-I and TFEA-II, the former appears to be superior for a class of MR imaging applications.

The feature identification method based on artificial intelligence can significantly improve accuracy and effectiveness of sensor fault diagnosis. An improved SVM-K-nearest neighbour (KNN) classification method that combines one-verse-rest (1-v-r) SVM and KNN was brought for sensor fault recognition. In 'Research on sensor fault identification based on improved 1-v-r SVM classification method', the method firstly constructs 1-v-r SVM training set by primary selection on training samples, and then classifies it using 1-v-r method. It re-classifies indivisible samples with KNN algorithm. Fault diagnosis experiment on photoelectric encoder sensor verifies that it can determine current fault belongs to which type of common sensor faults. The experiment also compared SVM-KNN with one-verse-one (1-v-1) SVM and bintree SVM. Results show that it has better classification accuracy and classification speed.

With the development of economy and society, traditional training model of higher education cannot meet the needs of modern society. Therefore, improving the entrepreneurial ability of college students and cultivating entrepreneurial talent meet the needs of social and economic development, alleviate employment pressures, the need to promote social harmony as well as important aspects of the reform of China's higher education. In this paper, the authors use the AHP method to calculate the individual elements of the entrepreneurial ability in the target weight ratio, and then the authors sort, in order to determine the importance of each element in the entrepreneurial ability of college students, 'The evaluation of college students' entrepreneurship ability based on AHP method' is to specify the direction of college students entrepreneurship training.

Alkalinity and MgO content is studied on the influence of liquid and the liquid distribution of magnesia fluxed pellet by using factsage software. Basicity and the content of MgO is analysed on the influence on liquid of magnesia fluxed pellet by melting point melting rate instrument, at the same time, the alkalinity and MgO content on shrinkage rule and factsage simulation of the amount of liquid phase is broadly in line with a trend of generation and the magnesian fluxed pellet roasting temperature should be controlled in about 1270°C, eventually based on the above the influence of alkalinity and

the content of MgO on the compressive strength of the magnesian fluxed pellet is studied in 'Liquid phase formation behaviour of magnesia fluxed pellet and impacting on the strength of pellets'.

At rapid development of information technology, computer is applied to all trades and professions making the whole society to improve. Virtual tour is a product at this period. Based on neural network, evaluation of virtual travel simulation and experiential system was conducted in 'Application of computer virtual reality technology in virtual tour'. Through a lot of questionnaires and collecting the relevant data, the evaluation model of virtual tour was established. Huangshan, Taishan, the Forbidden City and Wuzhen, as an object of study, validated the model. The results showed that virtual tour system of Huangshan and the Forbidden City is superior. Virtual tour system of Taishan and Wuzhen is relatively poor. This conclusion was consistent with the actual situation, indicating that the model is reasonable.

With the rapid development of information technology and internet, people from an era of scarcity gradually entered the era of information overload. For information-consumers, finding themselves interested in information from a large amount of information is a very difficult task. As regard to information producers, letting the production information stand out and getting the attention of the masses of users is also a very difficult task. In order to solve this contradiction, in 'Collaborative filtering model of book recommendation system', first, the authors establish a decorrelation principal component analysis model based on the correlation of the theory to obtain the main factors affecting the user evaluation of books. Secondly, the authors establish a predictive scoring system based on linear regression theory, which can predict book ratings. Finally, the authors establish a collaborative filtering model of book recommendation.