Foreword and Editorial

International Journal of Multimedia and Ubiquitous Engineering

We are very happy to publish this issue of an International Journal of Multimedia and Ubiquitous Engineering by Science and Engineering Research Support society.

This issue contains 39 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

The paper “Development of Lesson Plans Utilizing VR Experiencing Classroom in a Smart Elementary School” aims to develop lesson plans using mixed reality contents in VR experiencing classroom. For the purpose of this study, Authors analyzed 10 mixed reality contents, VR experiencing classroom environment, and curriculum in C smart model school in KOREA. Moreover, they derived three teaching-learning models and applied them to experience learning activity design using mixed reality contents. Three models included role play model, group investigation model, and task based language teaching model. As the result of this study, we developed specific lesson plans based on three models.

Paper “A Systemic Smartphone Usage Pattern Analysis: Focusing on Smartphone Addiction Issue” states that despite the recent massive popularity of smartphones and their impact on our lifestyles, only few objective studies have been conducted on smartphone usage patterns. In this paper, using a comprehensive smartphone usage logging system (a client app and a server), various statistical analysis results from more than 800 man-days usage logs are presented. The analysis shows 1) significant difference in usage frequency and time statistics among the applications, 2) different application category preferences between addicts and non-addicts, and 3) little usage variation between weekdays and weekends, but higher usage in night time for addicts.

The paper “The Analytical Method of Web Services Composition Based on Action Patterns” presents that in the word of service-oriented architecture and collaboration, it is important to deal with sub-services of cooperating components. In existing research, functions to meet and behavior predictability are two major aspects of Web services composition, but there are some limitations to treatment of behavioral constraints. In this paper, Authors model a component by an open Petri net, and investigate action patterns as a means to depict and analysis of behavior constraint under the condition that subnets composition are satisfied. This approach can effectively describe the constraint of behaviors, achieve behavior interaction between services and model a component that meets specific behavioral relations.

In the paper “Mobile Colored Overlays for People with Visual Stress”, a colored overlay has been used as an assistive device for people with visual stress. Recently, a kind of mobile colored overlays has been developed; however, it can’t be applied to all contents of its environment. In this paper, Author implemented a mobile overlay application based on the
Android operating system and it can be applied to not only all contents in the system but also external contents such as book using camera mode.

The Authors of “Research on User-personalized Image Retrieval Method” states that with the rapid expansion of information resources, the amount of image data in the network shows an explosive growth trend. The traditional search engines have not considered users’ different interests; therefore image retrieval efficiency is reduced. To solve the problem, this paper puts forward a research on user-based personalized image retrieval technologies. Firstly, this paper studies the user interest model, and provides its definitions and application strategies; secondly, it studies collaborative filtering algorithm based on K-means clustering, and solves the problem of sparse resources effectively; Finally, explicit tracking, implicit tracking and relevance feedback methods are adopted to learn and update user interest model constantly to meet the users’ needs and improve retrieval accuracy and efficiency. Based on the above studies, this paper presents a kind of user-based personalized recommendation technology, and completes an image retrieval system based on user personalization, proving that this recommendation technology is able to provide users with better personalized recommendation service.

Paper “Modeling and Verifying of CPS Component Services Based on Hybrid Automata” presents that in recent years, the modeling and verifying of Cyber-Physical System (CPS) is now an important aspect of CPS researches. Because of the CPS’ complex architecture, it may suffer from the state-space explosion problem when we verify CPS models by model checking methods. Therefore, Authors offer a method which models CPS with Component Services. The method treats the CPS components as a service provider, and models component services to further simplify the system’s state-space.

The paper “Study of High Performance Computing Activation Strategy” states that High Performance Computer (also called "supercomputer") is a computer which can process the complex and large-scale operation in computational science. In general, High Performance Computer represents the top 500 computers which is based on the computer performance in the world. After the successful commercialization of CDC6600 which has the 9MFLOPS performance in 1964, TFLOPS and PFLOPS High Performance Computer have been developed. High Performance Computer is the public resource which can be developed and provided by government. For the efficient application of High Performance Computer, government has to support the related activities such as research, resource allocation, and professional manpower training. To build a basis of the development of High Performance Computing can improve the quality of life and develop the national economy.

The paper “Application of an Optimized SVR Model of Machine Learning” states that machine learning is the core of artificial intelligence. It is a fundamental way to the computer intelligence. Support vector machine is one of the important methods in the field of machine learning. It has the advantages of global optimization and strong generalization ability. It has been successfully applied to face recognition, fault diagnosis, financial forecasting and other fields. In this paper, a novel SVR model is proposed to forecast GDP. In the model, the neighborhood rough set (NRS) is used to reduce the index set and the chaotic genetic algorithm (CGA) is adapted to parameters searching in SVR model. Then the novel model NRS-CGA-SVR is established to predict GDP of Anhui province.
The paper “Ordinal Pattern Analysis Method Applied in a P300-based Brain Computer Interface” discusses that Ordinal Pattern analysis has been used recently for extracting qualitative information from non-linear time series and it has been applied to usefully track brain dynamics. In this paper, Authors proposed a novel P300-based BCI system which depends on ordinal time series analysis as a feature extraction method.

The Authors of “An Enhanced Progressive Scanning Algorithm for Improving Tag Identification Performance” presented that the PS algorithm divides the tags within the reader’s identification range into smaller groups by increasing the transmission power incrementally and identifies them. This algorithm uses the fixed frame size at every scan. Therefore, it has problems that the performance can be variously shown according to the number of tags, frame size, and power level increase. In this paper, Authors propose an EPS algorithm that allocates the optimal frame size by estimating the number of tags at each scan.

In the paper “A Hybrid Method of Vehicle Detection based on Computer Vision for Intelligent Transportation System”, a two-step approach for vehicles detection is proposed. The first step of approach is to approximate vehicles’ potential locations through searching for shadow area of vehicle low-part. In order to find these shadows, Haar-like feature with Adaboost was used to train a Haar detector offline and the relearning process with hard training samples is applied to increase detection rate.

The paper “Design of Smart Learning System based on AR-APM” deals with the new learning method and the need for e-learning technology of the constructivist paradigm which consist the individual experience-centered learning experience, knowledge increased by escaping from the videos and flash-based simple one-side education contents. In this paper, the augmented reality English learning contents for the students to learn through the role and mission in the virtual space as the contents of new forms for the experiential learning through the augmented reality and TOLED (Transparent, Organic Light Emitting Diodes) system by using the vibrating Bluetooth maker cube for themulti maker configuration was designed and the system was designed to service it.

Paper “A Priority based Adaptive Data Replication Strategy for Hierarchical Cluster Grids” propose the priority based adaptive data replication strategy for the reduction of the processing time in hierarchical cluster grids. Because the proposed replication strategy reflects data access patterns of users in real-time, job execution time increment due to changes in the access pattern can be reduced. Authors assign a Priority Value (PV) to all replicas for implementation of the replication strategy and use it for criteria of replica generation/deletion. The PV reflects the access pattern because it is calculated from an access count and capacity of the replica. And the PV is re-calculated in real-time whenever data is requested by users. Therefore the proposed replication strategy can be reduced job execution time in data grids to recover low data availability due to changes in the access pattern.

The paper “SRSH: A Social Recommender System based on Hadoop” states that Online Social Networks (OSNs) accumulate a large amount of user-generated data and Social Recommender Systems (SRSs) can help users discover information they are interested. However, most of the existing SRSs do not have good scalabilities to process huge volumes of data. Aiming to this problem we design a social recommender system named SRSH, which is based on Hadoop parallel computing platform. SRSH provides second-degree friends, similar users, user community and content recommendation modules, which can meet user
needs of finding potential friends and attractive content. Especially, every core methods existing in these modules above can be implemented using MapReduce parallel programming framework and run in Hadoop cluster.

Paper “Matrix-based Data Center Selection Algorithm for a Federated Cloud” discusses that Cloud Computing is a paradigm to provide the services like Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Virtualization technology plays an important role to provide these services. Due to lack of finance as well as requirement, data center providers are unable to establish data centers all over the world. To provide better Quality of Service (QoS) and maintain Service Level Agreement (SLA), data center providers collaborate with other data center which is named as a Federated Cloud. Load balancing process distributes the load or service request among the data centers by implementing distribution policies. Depending on the policies, the central manager chooses the location to deploy the virtual machine. This paper proposes the data center selection algorithm in a federated cloud to optimize the cost as well to improve the performance.

Paper “Exception Handling Education Approach Incorporating Role-Changing Brainstorming Technique in HCI Design Process” presents that Human Computer Interaction (HCI) is a discipline dealing with the study, planning, and design of interactions between humans and computers. The prevalent use of digital devices is increasing the need for research and education on HCI. Paying a close attention to HCI is important as poorly designed user interfaces can lead to unexpected problems. This work is focused on a new education method geared towards reducing errors and exceptions while developing a program, incorporating role-changing brainstorming techniques during HCI design process.

In the paper “MultiGranular: An effective Service Composition Infrastructure for Multi-tenant Service Composition”, as a common delivery model in cloud computing, SaaS applications are becoming increasingly popular. Multi-tenancy is a key characteristics of SaaS applications. Service composition plays a main role in SaaS applications because of frequent composability and reusability of software services. With the development of cloud computing, one side, there are an increasing number of available services, other side, tenant’ individual and diverse requirement become more intense, which makes service composition tend to be more complex. This paper proposes an effective infrastructure for service composition, MultiGranular, which provides a semantic basis for multi-tenant service composition. The MultiGranular supports the characteristic of hierarchy, uncertain correlation, inheritance and versioning, effectively responding to the requirements of complexity of service composition for cloud computing SaaS applications. The computing process of MultiGranular includes three steps: basic service clustering, correlation mining and hierarchy building. MultiGranular makes it possible to change disorder services into the hierarchy and ordered clustering services, and makes it easy to develop multi-tenant SaaS applications.

The paper “A Novel Trajectory Similarity Evaluation Method in VANETs” states that with the increasing number of vehicles equipped with GPS enabled wireless communication devices, locations and trajectories of vehicles can be collected every time. Finding similar trajectories in massive trajectory data can benefit emerging novel mobile applications, such as carpooling, friend recommendation and traffic analysis. This paper proposes a novel spatio-temporal based trajectory similarity evaluation method. In this method, the significance of each point on the query trajectory can be assigned according to personal preference.
In the paper “A Coherent Line-based Image Search using User Sketch”, an improved sketch-based image search framework through which users can search their target images from the images in database is presented. The basic approach is to search the database by comparing the user-created sketch with the graph extracted from the images in the database and estimating the similarity. The images of high similarities are suggested as the candidates that match the target image.

The paper “A Study on Relationship between Power of Adapter and Total Harmonic Distortion of Earphone’s leaking Sound” researched relationship between Power of adapter and total harmonic distortion of the open-type earphone. In the power of adapter, even harmonic component is extremely less and only the odd harmonics component is found.

The Authors of “English Semantic Feature Processing and Sentence Structure Analysis Based on Hierarchical Network of Concepts” states that current English-Chinese translation machine can’t understand the source sentence fully. The theory of hierarchical network of concepts is proposed for resolving the problem through methods including function, translator, effect, relation and state. English semantic feature plays an important role in analysis of sentence comprehension. In this study, Authors discuss the core structure of English semantic respectively and put forward the corresponding of source sentence compared with online machine translation machines.

The paper “Biological Virus Model Based Reversible Video Watermarking” states that infectious video watermarking (IVW) is to embed the first watermark in encoder/decoder for the protection of video contents and to infect the watermark in different codecs whenever video contents are copied or edited. This paper presents an infectious reversible video watermarking for fast infection in the infectious watermarking model (IWM). The method is designed by following main features. The first is that the watermark for the available period of video contents is combined with the control code for content-based video watermarking. This makes the video quality and strength be adaptively controlled in the infectious process. The second is the low complexity for fast infection. The third is to embed the infectious watermark as a unit of macro block (MB) for avoiding the delay time for extracting and recovering.

The paper “Study on an Innovation Design Model based on Creative Design Methods and DFSS” states that in order to solve the problems of product innovation design, an innovation model is developed. The five layers innovation design model integrates the creative methods (cluster analysis, brainstorm, TRIZ, QFD and reliable testing) and the process management method (design for the six sigma). The model take the step as following: taking advantage of the S curve of TRIZ evolution theory and design study to identify the lifecycle stage, using the cluster analysis to study the customers' requirements, using brainstorm to define the most important requirement and the possible solution, utilizing the TRIZ to further explore the creative solutions, utilizing reliable testing to verify the reliable of the final solutions.

The paper “Using PhysX Simulation Fire Model of Backdraft in Unity 3D Game Engine” states that smoke simulation is an interesting topic in simulation fluid dynamics and graphics area. The paper main goal is focus on simulation naturally fire model of backdraft.

In the paper “Context-Aware User Interface Framework for Mobile GIS”, although mobile phones currently are taking Geographic Information Systems (GIS) out of the office and into
the field, human-computer interaction (HCI) as a field is not yet theoretically equipped to match this reality. Consequently, human-GIS interface provided by mobile phones makes the growing influence on residents, they obtain related services through submit their request like search routes. However, the information offered by users is limited. To get more hidden information can make the command of users accurately; therefore, context-aware is advocated. In this article, Authors proposed a method which considering the existing context to concern users' ability and combining with the user feedback to provide a more effective way of human-GIS interface on mobile phones. Through a design case, they develop the methodological approach and illustrate how the model can be applied to analyze the context of users.

The paper “Web-based Implementation for Marine Casualty Information on Google Map” deals with safety navigation of vessels which is always the most important issue in maritime field. Recently, according to increasing the use of electronic equipment onboard, the requests for safety related information services have been growing up. To support this, International Hydrographic Organization suggests the concept of common maritime data structure. Since 2010, S-100 standard and relative product specifications have been defined as a part of that concept, covering the electronic navigational chart data and safe navigation related data. This paper introduced an empirical application of S-100 standard, applied to marine casualty information.

The paper “Main Factors Affecting the Performance of the B2C e-commerce Companies in Retail Market in China” states that as the development of the internet, there are increasingly online shoppers in the world engaging in e-commerce activities. As the biggest developing country, China has the highest online population growth rates in terms of online shopping. For companies to take full advantage of the potential offered by the Web, it is essential that their electronic commerce (e-commerce) websites be prepared and organized in highly usable manner. This paper is an attempt to investigate the main factors affecting the performance of the top 10 B2C e-commerce companied in retail market in China. GRA (Grey Relational Analysis) and Fisher’s exact test is applied to identify the main affecting factors of online performance of the selected e-commerce companied.

Paper “Diffusion-based Time Synchronization in Large-Scale Distributed Sensor Networks” states that the works on time synchronization in wireless sensor networks are investigated step by step. In particular, the diffusion-based algorithms for global synchronization in large-scale distributed sensor network are intensively focused. Authors propose a fast-converged asynchronous diffusion synchronization scheme in order to improve the performance of the asynchronous averaging diffusion method, and then prove its convergence mathematically.

Paper “Research on Different Pricing Strategy in Dual Channel under the Circumstance of Electronic Commerce” discusses that the rapid development of computer network technology and electronic commerce bring a series of convenience to the people but also brings a lot of problems. At the same time, these new computer technologies have forced many enterprises to reconstruct their distribution channels by adding the electronic channel. In the real life, the conflict between the network channel and traditional channel is an important problem. Supply chain has formed a network in real life and cyber work. This paper considers the problem of optimal decision of supply chain and discusses the pricing strategy of manufacturers in the Stackelberg leader follower strategy and the Bertrand strategy respectively.
In the paper “Research on the Model of Agricultural Products Distribution Optimization under Electronic Commerce”, recently, people pay more and more attention to the healthy lifestyles. And there is an increasing demand for the green agricultural products in real life. With the rapid development of the computer network technology and the electronic commerce, the emergence of e-business provides a new idea to promote the service of agricultural products. A huge supply chain network is established by the new idea and the technology. More and more agricultural products firms establish the electronic sale channel and get great profits. Firstly, Authors analyze the status of the agricultural products logistics distribution in both traditional sale channel and electronic sale channel in this paper. Then, they summarize the problems appeared in e-commerce channel. To solve these problems, they build an optimization model of the agricultural products distribution in e-commerce channel.

The paper “A Research on Utilization Plan Applying the Characteristics of the Silver Generation on Smartphone Acceptance Factors” discusses that the worldwide trend of aging is highlighting the importance of the silver generation as a major consumer group for various industries. In particular, the necessity of mobile services for the silver generation in the IT industry is increasing. The purpose of this research is to develop a smart phone utilization plan by analyzing the needs of developing mobile services applying the characteristics of the silver generation on smart phones and by studying the smart phone acceptance factors.

The paper “Research on Optimizing Model for Logistics Location under Electronic Commerce based on Heuristic Algorithm” states that with the development of the computer network technology and the electronic commerce, more and more firms establish the electronic sale channel and get great profits. The huge supply chain network is established through the new idea and technology. The node location selection is a planning process that chooses a location to set up a logistics node in an economy zone with multi demands. Hence, its location selection is a key link in the logistics system planning. This paper considers the specific particularity of the e-commerce. Then, the Authors constraints cost and delivery time of the logistics model. At last, they apply the heuristic algorithm to the location model.

The Authors of “SSiCP: a new SVM based Recursive Feature Elimination Algorithm for Multiclass Cancer Classification” states that an extremely crucial step in the diagnosis of cancers is to select a small number of informative genes for accurate classification. This issue has become a hot focus in the data mining of gene expression profiles. Especially for data with a large number of cancer types, many conventional classification methods show very poor performance. Here, Authors proposed a new approach for gene selection and multi-cancer classification based on step-by-step improvement of classification performance (SSiCP).

The paper “An Expedited WiFi Connection Establishment Scheme for Railroad Wireless Communications” states that always on Internet service has become norm and people are able to enjoy anytime, anywhere broadband wireless communication services. With the emergence of smart phone and tablet, wireless network traffic has increased exponentially. Wireless network traffic is expected to continuously increase dramatically as more and more communication capable multimedia devices are expected to be connected to wireless network. In order to offload heavy traffic of cellular network, WiFi has chosen since WiFi normally operates in license exempt bands. 3rd Generation Partnership Program (3GPP) has started study item on 3GPP-WiFi interworking in order to alleviate heavy traffic problem. Since
WiFi is independent and different wireless technology, 3GPP needs to be specially designed to provide seamless and high quality interworking with WiFi. Long Term Evolution (LTE)-WiFi interworking has a technical challenge of WiFi network detection. A good solution should provide not only fast WiFi network detection but also battery power saving of mobile phones. In this paper, Authors propose LTE and WiFi interworking scheme for railroad wireless communication. The solution is able to provide both expedited WiFi connection establishment and battery power saving by exploiting unique characteristics of railroad communication.

Paper “New Class Cohesion Metric: An Empirical View” deals with Cohesion which is an Object-Oriented (OO) software design property that helps for the measuring of degree of interdependency or connectivity within subsystems of a system. Numerous class cohesion metrics can be found in the literature. Which metric is best suited for a given situation is always a critical question. Few metrics are validated empirically against open source software projects. The purpose of this paper is to validate empirically of the proposed new class cohesion metric (CC) using some open source software projects and find the effected quality factors.

The paper “MIPv6 Based Framework for RF-GSM Enabled Mobile Wireless Sensor Nodes” states that the terms “ubiquity” can be achieved by the mobility of wireless sensor networks that denotes networks of intelligent sensor nodes that monitors physical and environmental conditions and can be deployed anywhere and anytime. The emergence of mobility that allows sensor nodes in WSNs to move spontaneously and actively is considered for a more sophisticated control and monitoring capabilities of applications based on a WSN. In this paper, a structure of a Mobile Wireless Sensor Network system has been presented. An introduction for the design of a mobile controller that can act as the moving device and interface for a sensor node or a group of nodes to the base station. The proposed scheme provides a communication link for the sensor nodes and the Base Station. The design makes use of the radio frequency (RF) signaling incorporated with short messaging system of GSM (Global System for Mobile Communication) to activate the communication between the Central Server and the sensor nodes.

In the paper “Video Steganography for Hiding Image with Wavelet Coefficients”, Authors study the video steganography method in which the image is hidden in a video file. The method is based on the discrete wavelet transform. The video frames are transformed and then the proper positions of the coefficients are selected to hide the secret image pixels. The heuristic considers the coefficients that have the similar values to that of secret images. The similar values mean the same or the values that are closed to the cover media pixels.

The paper “A Study about Honey Bee Dance Serious Game for Kids Using Hand Gesture” deals with hand gesture which is a form of non-verbal communication or non-vocal communication in which visible bodily actions communicate particular messages, either in place of, or in conjunction with, speech. This paper developed serious game for kids using ‘Leap Motion’ based on honey bee dance. There are many gesture recognition ways as Kinect, Leap Motion or Wii Remote. These devices are easy interaction device also game controller.

The paper “Analysis and Mimicking on Superhydrophobic Structure of Several Plant Leaves” discussed the contact angle of several plant leaves such as lotus, canna, reed and bluegrass were 152.6°, 150.3°, 151.4° and 150.6° respectively, their microstructure were
observed by scanning electron microscopy, it found that they are composite structure of micro and nanometer.

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