Foreword and Editorial

International Journal of Software Engineering and Its Applications

We are very happy to publish this issue of an International Journal of Software Engineering and Its Applications by Science and Engineering Research Support Society.

This issue contains 25 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 “Automatic Software Test Case Generation: An Analytical Classification Framework” introduce an all-around classification framework for automatic test case generation approaches in terms of test type and Algorithm, and represent some test case evaluation approaches. A challenging part of software testing entails the generation of test cases. A good test case should have the quality to cover more features of test objective. The techniques for automatic generation of test cases try to efficiently find a small set of cases that allow an adequacy criterion to be fulfilled, thus reducing the cost of software testing and resulting in more efficient testing of software products. A comparison between different existing techniques was illustrated.

Paper “A Hybrid Regression Test Selection Technique for Object-Oriented Programs” propose a regression test selection technique that is based on analysis of both the source code of an object-oriented program as well as the UML state machine models of the affected classes. First, a dependency graph model of the original program from the source code is constructed. When the program is suitably modified, the constructed model is updated to reflect the changes. The model in addition to capturing control and data dependencies represents the dependencies arising from object-relations. To find the model elements affected due to a program change, a forward slice of the constructed graph model, where each changed model element is used as a slicing criterion was constructed. Subsequently, the affected methods from an analysis of the state machine models based on the changed statements were determined. The test cases that exercise the affected model elements in the program model as well as the transitions caused by the affected methods in state machine models are selected for regression testing.

The paper “Simulated Annealing Neural Network for Software Failure Prediction” presented various models for software reliability prediction that were proposed by many researchers. In this work a hybrid approach based on the Neural Networks and Simulated Annealing was presented. An adaptive simulated Annealing algorithm is used to optimize the mean square of the error produced by training the Neural Network, predicting software cumulative failure. To evaluate the predictive capability of the proposed approach various projects were used. A comparison between this approach and others is presented.

The paper “Cost Benefits maximization using Discount Cost Function for Embedded System Architecture Optimization” proposed a novel intelligent-based approach for software architecture optimization. The proposed approach is able to deal with RAP Problems,
furthermore it considers prices discount that may offered by component’s vendors or purchasing components from different vendors. This approach supports architects to take right design decision. Authors demonstrate how they can easily identify the level of redundant components under the specified constraints, so they can obtain an optimal architecture that satisfies quality requirements. PSO, as a promise metaheuristic search algorithm, has been employed for design space exploration, it has been used to: search design space; generate new candidates; evaluate candidates against the quality criteria; and finally provides a solution or set of solutions based on an objective function (cost) under specified constraints (reliability).

The Authors of “Probabilistic Credit Card Fraud Detection System in Online Transactions” discussed the past works on fraud detection system and highlights their deficiencies. A probabilistic based model was proposed to serve as a basis for mathematical derivation for adaptive threshold algorithm for detecting anomaly transactions. The model was optimized with Baum-Welsh and hybrid posterior-Viterbi algorithms. A credit card transactional data was simulated, trained and predicted for fraud. And finally, the proposed model was evaluated with different metric. The results showed that with the optimization of parameters, posterior-Viterbi cum new detection model performed better than Viterbi cum old detection model.

Paper “Block-based Atomicity in Message-passing Distributed Programs” presents a study of the notion of atomicity in message-passing distributed programs. The difference between the notion of atomicity in shared memory programs and message-passing programs has been discussed in detail. Due to the nature of communication in message-passing programs, the atomicity requirement in shared memory programs (serializability) does not guarantee the same level of atomicity in message-passing programs. Authors have referred to the atomicity level guaranteed by the serializability requirement in message-passing programs as the weak atomicity. The requirements that guarantee a level of atomicity in message-passing programs similar to that in shared memory programs have been defined.

In the paper “A Survey on Testing SOA Built using Web Services”, Authors presented an inspection of recent research achievements related to SOA testing. Testing challenges from the viewpoint of different stakeholders along with different levels of testing, including unit, integration, end to end and regression testing are analyzed. Further the ways to improve functional testing of SOA applications created using Web Services is explored.

The paper “Implementation of a New Chauffeur Service System” discusses the chauffeur service system in a city which is one of the most popular services, especially at night. This system provides a substitutive driver for people who can’t drive their car when they drink generally. But traditional chauffer system did not provide any driver’s information for service requester (user) whether the driver committed traffic accident, crimes or have car insurance. Thus the traditional system may not be user-centric one but service provider. The proposed system provides this information including driver’s position on user’s mobile device such as smart phones and tablet PCs. Then, user can select a driver of some drivers who are displaying including this information and their position on mobile device. Thus the proposed system is what we call user-centric one. This paper implements a new chauffeur service system with the Google map API.

The paper “A Dynamic Hedging Strategy for Option Transaction Using Artificial Neural Networks” presents a methodology for dynamic option hedging strategy using artificial neural
network (ANN) to enhance hedging performance and shows the superiority of the proposed method through computational experiments. In order to avoid the risk caused by continuously changing option value, option issuers generally utilize the traditional Dynamic Delta Hedging (DDH) method. DDH tries to maintain risk-neutral position by adjusting hedge position according to the delta by Black-Scholes (BS) model. DDH, however, is not able to guarantee optimal hedging performance due to some impractical assumptions inherent in BS model.

The Authors of “A New CMM-Quality Education (CMM-QE) Framework using SEI-CMM Approach and Calibrating for its Process Quality and Maturity using Structural Equation Modeling – PLS Approach” presents a new quality educational capability maturity model for evaluating the maturity of multi-dimension factors and attributes of an Educational System. Assessment questionnaires and a rating methodology comprise the framework of this Capability maturity model for quality Education (CMM-QE). The objective and design of the questionnaires are to collect information about the Education system engineering process from the multi perspectives of academic, infrastructure, administration, facilities etc. This model is validated using PLS-Graph tool, and the organizational maturity is validated by classifying the educational institutions into different levels by applying k-means Cluster analysis using SPSS and finally it is ranked for its maturity level accordingly.

Paper “Design of Index Schema based on Bit-Streams for XML Documents” discusses the structural information between tree nodes of XML documents is represented without any structural changes of the tree by converting that number information added to the tree into bit streams. It is also shown that other structural information can be retrieved and added to index schema in the process. In this process, the response time can be minimized by conducting a bit operation between the bit streams with index schema in use, and accurate results can be reached by searching only with information of record sets by nodes in index files were confirmed.

The paper “Transition Method into Alternate Symbols of Korean Option Market by Expiration Date” proposes a method for effectively implementing the pyramid strategy. The pyramid strategy is based on the short strangle strategy and adopts the multiple-entry approach. Risk management is an essential element of derivatives trading, and the pyramid strategy is very efficient because it combines mutual and dynamic hedging. However, in operating the pyramid strategy, choosing a specific exercise price results in significant differences in terms of profitability and stability. This paper analyzes theta—measurement of decreasing time-value of an option—to propose a method for achieving profitability and stability simultaneously. The proposed approach involves adding stability by selecting deep out-of-the-money (OTM) options in early monthly contracts, and moving to near OTM options with high theta values in late monthly contracts to pursue profitability.

Paper “Metaheuristic Search Approach Based on In-house/Out-sourced Strategy to Solve Redundancy Allocation Problem in Component-Based Software Systems” proposes an architecture optimization approach based on Metaheuristic Swarm Intelligent algorithm in order to answer the question: What type of components to be selected and how many components are appropriate for each subsystem in order to obtain optimal software architecture. The objective is to minimize cost under reliability constraints by combining components from different sources in order to compose system that satisfies the requirements. Sensitivity analysis applied on a numerical simple case study showed the potentiality of the approach.
In the paper “An Enhanced Packet Buffering Transmission (EPBT) Architecture Design for Performance Enhancing Proxies (PEPs)”, Authors provided a discussion of the overview of Performance Enhancing Proxies together with the problems and drawbacks of such technologies to improve the degraded performance of TCPs. Based on the identified limitations of the currently developed and designed PEPs, some mechanism for the improvement of the handover latency were integrated, thus enhancing its performance. Some steps with the handover procedure have been modified applying the benefits splitting and spoofing techniques resulting with a better performance and shorter handover latency. An enhanced packet buffering transmission module was introduced to boost the packet transmission performance in terms of efficiency.

The paper “The Practical Application of Computer-Assisted Language Learning in English as a Foreign Language” presents a questionnaire study to help understand practices with computers in terms of learning English among Korean university students. Concerning IT usage of studying English, the results show that about a half of the participants have utilized IT, and VOD lectures are a major method at present, and vocabulary learning tools are also popular including electronic dictionaries. While learners began to use smart phone application, learning English with social network services is not common yet. Though technological aids are crucial, however, participants also pointed out that learners’ willingness or interest in learning English is the most important factor affecting English study. Emphasizing that both human/social and technological aspects should be understood simultaneously to build better systems, we hope that the results shed some light on the development of more realistic and practical CALL in English as a foreign language (EFL).

The Authors of “Next-Generation Library information service - ‘Smart Library’” presents a description of a library information system that utilizes collective intelligence and cloud computing. The information system developed for this study adopts the SaaS-based cloud computing service concept to cope with the shift in the mobile service paradigm in libraries and the explosion of electronic data. The strengths of such a conceptual model include the sharing of resources, support of multi-tenants, and the configuration and support of metadata. The user services are provided in the form of software on-demand.

Paper “Data Mining of High Accuracy for the Efficiency in the Task of Massive Printing” presents an efficient procedure that utilizes random forests to predict the cylinder bands in rotogravure printing. Random forests are known to be robust for missing and erroneous data as well as irrelevant features. Moreover, even though the forests have many trees, they can utilize the fast building property of decision trees, so they do not require much computing time. Even though several research results have been published already to find better prediction accuracy based on other methods, a new and very good result has been found with the suggested method having appropriate parameters of random forests.

In the paper “An Implementation of Network Management System Using Dynamic Routing in the IMS”, a management function of NMS, applying a dynamic routing algorithm for managing the CSCFs in the IMS was suggested. The algorithm by measuring the performance of PoC and presence service one of the prominent application services to be deployed in the IMS were then analyzed.
The paper “A Study on Water-line Performance Improvement based on OFDM System for Underwater Communication” presents a study of the efficient method to minimize signal interference by water-line signal so that we applied convolution error correction code on water-line to minimize signal level. To overcome the poor communication environment between the underwater acoustic signal transmitter and receiver, previous research applied underwater acoustic OFDM communication system which had efficient bandwidth capacity and could mitigate multi-path delay spread effect via guard interval. Concurrently with this OFDM signal, additional data could be transmitted through spread spreading technique, which was called water-line technique. However, this decreased the performance of the OFDM modulation because the water-line signal degraded OFDM signal.

The paper “Design andImplementation of a Problem-based Digital Textbook” proposes a problem-based digital textbook (DT) by defining an instructional model of problem-based learning (PBL) for DTs. The objective was to develop a DT that stimulates self-directed learning through the support of a wide range of student-centered learning activities to enhance the overall learning experience and effectiveness. As an application, a problem-based DT that performs PBL according to the proposed instructional model was developed for the subject of general computing used by high schools in South Korea. For the experiment, the DT was applied to practical classes for one semester at a commercial high school and there were generally very positive responses and enhanced problem-solving achievement.

The Authors of “Improvement of an Integrated Management System for Smart Libraries Based on SaaS” presented a study that developed the key elements that can be deployed in the SaaS-based digital library system supporting the multi-tenant environment (SaaS maturity level 3 or higher). The system was deployed with the SaaS-based software on-demand type service model, which requires little initial investment, is simple and easy to use, and delivers the IT service at a low cost. The system proposed features multi-tenant-oriented application resource sharing and optimization, multi-tenant-oriented data space sharing and isolation, multi-tenant-oriented back-end data management, and isolated multi-tenant-oriented hosting in order to solve many problems of the existing problems.

In the paper “A Comparative Study on Seven Static Mapping Heuristics for Grid Scheduling Problem”, discussions focus on grid computing which is a promising technology for future computing platforms and is expected to provide easier access to remote computational resources that are usually locally limited. Scheduling is one of the core steps to efficiently exploit the capabilities of grid computing (GC) systems. The problem of optimally mapping (defined as matching and scheduling) tasks onto the machines of a grid computing environment has been shown, in general, to be NP-complete, requiring the development of heuristic techniques. The efficient scheduling of independent tasks in a heterogeneous computing environment is an important problem in domains such as grid computing. Different criteria can be used for evaluating the efficiency of scheduling algorithms, the most important of which are makespan, resource utilization and matching proximity. 7 popular heuristics for statically mapping independent tasks onto grid computing systems have been compared.

The paper “An Efficient Application Virtualization Mechanism using Separated Software Execution System” propose a new application virtualization mechanism using separated software execution system. The proposed system does not execute 3D rendering commands or graphic commands of the 3D graphics application at the hosted server but delivers them to
client via the Internet and executes them using the client’s graphic device. This mechanism enhances the hosted server’s performance for desktop virtualization service of 3D rendering applications.

The paper “MCSC: Mobile Collaborative Service Cloud using Instant Adaptive Orchestration and Mashup” propose MCSC, a mobile collaborative service cloud for Android and iOS which requires less computing power while providing rich functionalities. While implementing an application using native language takes significant time and requires a specialized skill set, using the proposed service cloud, users can implement new mobile applications easily and quickly using instant adaptive orchestration and Mashup. MCSC facilitates the use of other devices’ resource and context information such as contact lists, location, etc.

The Authors of “The Research on Social Influence-based Cache Replacement Policy over Wireless Information-Centric Network” proposes a new cache replacement policy by social influence of user in SNS over ICN. The proposed algorithm is able to reduce network resource than existing ICN. Social influence in cache replacement policy over ICN was considered. The social influence makes a decision based on the Social Network Service (SNS) application.

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