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 and Pattern Recognition by Science and Engineering Research Support Society. This issue contains 24 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 “Numerical Study on Filtration of Microparticle from Non-point Source”, The impermeable area and the peak discharge volume have been consistently increasing due to widening of city development and renewal. Thus, distortion of water cycle has been serious problem compared to the past. When it comes to NPS pollution, lack of information on the load and characteristics of pollutants led to the insufficient reduction measures. Because the particles with size over 100 in road runoffs can go through gravitational sedimentation, they are controllable in grit chamber according to the structure of NPS pollution reduction facilities. In this section, using CFD model, the behavior of fluid and particle distribution according to structure characteristics of reduction facilities will be simulated and the optical condition for successful treatment in grit chamber will be calculated. As a result of study, numerical analysis about treatment of particulate pollutants with size greater than 100 for which gravitational sedimentation is possible showed that by controlling the inflow velocity the sedimentation efficiency could be improved and it is determined that maintenance will become facilitated through the installment of facilities such as baffles at grit chamber.

Paper “Proposing A new Design Approach for M-learning Applications” As Information and Communication Technologies (ICT) are developing frequently, new learning approaches have been introduced to facilitate teaching and learning processes. Mobile devices are growing in popularity and there has been an increasing interest in their potential as innovative tools for learning. Mobile learning or shortly (M-learning) is a new learning approach intending to use mobile devices such as laptops, smart phones and personal digital assistant (PDA) in learning process in any place and at any time. M-learning application needs to be designed in a way that considers the special features and constraints of mobile devices such as screen size, available storage, processor speed and battery life. This paper explores the existing design approaches for M-learning and highlights their main limitations. As a step forward in this direction, this paper also proposes a new design approach for M-learning applications focusing mainly on three main aspects: learner, learning content and technology. The approach consists of three phases: starting dimensions (SD) phase, M-learning Development (MLD) phase and Learning Content Design (LCD) phase. Finally, this paper provides a case study scenario to demonstrate the feasibility of the proposed approach.

The paper “Improving the Architecture of Communication Middleware for Social Networking Services”, The propose an improved version of our communication middleware for social networking services (CMSNS) designed to support the rapid development of a social networking service (SNS) application through simple application programming interfaces (APIs) and configuration options related to communication.
among users. With CMSNS, a developer can easily build the communication-related functions that are commonly required for SNS applications, including communication architecture management, user registration and authentication, event transmission, and SNS messages with friends. We improved the internal architecture of the proposed CMSNS to provide platform independence, save event size, use an event queue to efficiently process events, and adopt a model-view-controller (MVC) design pattern to separate the internal information from multiple event controller modules.

The research paper entitled “An Adaptive Variable Block for Median Filter” In this paper, we present a median filter which uses an adaptive variable block. The two dimension median filter is a nonlinear digital image filtering method, which generally used to remove unwanted impulse noise. The median filter is normally used in the step of pre-processing to improve the performance. To assess performance of the proposed method, we vary noise level and block size. Experimental results show that the proposed adaptive variable block-based method gives a satisfactory result.

The authors of the paper “A Survey of Software Development Process Models in Software Engineering” Software has been a significant part of modern society for a long time. In particular, this paper is concerned with various software development process models. Software process model is a description of the sequence of activities carried out in a software engineering project, and the relative order of these activities. It represents some of the development models namely, waterfall, v-shaped, incremental, RAD, iterative spiral and agile model. Therefore, the main objective of this paper is to represent different models of software development and different aspects of each model to help the developers to select specific model at specific situation depending on customer demand.

The paper “Dynamic M-ary QT Algorithm to Improve the Performance of RFID Tag Identification” In this paper, we proposed a dynamic M-ary QT protocol, which effectively reduces unnecessary query-response cycles by varying ‘m’-bit recognition method. By using Manchester code, we can detect the location of collided bits due to the characteristic of Manchester code. We proposed enhanced tag identification algorithm that utilize feature of Manchester coding to increase efficiency of Tag identification not only in RF-1D reader but also in RF-1D tags. From the simulation results, the proposed scheme significantly outperforms traditional M-ary QT schemes in terms of efficiency and communications overhead, identification time.

The paper entitled “Impact and Comparison of Programming Constructs on JAVA and C# Source Code Readability” Software readability is a property that manipulates how easily a given piece of code can be read and understood. Since readability can affect maintainability, quality, reusability, understandability etc. Programmers are very concerned about the readability of code. For the good decision of selecting languages, it is necessary to know about the readability of languages. Many software constructs may affect readability of code. In this paper we have selected some constructs that affect readability property and we calculated their readability in C# and java PL. At the end we have also compared results for both languages to make decision easy for programmers to choose best one from both. Short snippets are taken from c# and java and for their readability; five readability indexes are used to get results.

The paper “A Study on Imbalanced Data Stream Processing Using a Mass Function” In the IOT environment, sensor data stream consists of event data from heterogeneous multi-sensors. One type of sensor may have quite a different event frequency from those other kinds of sensors, which makes most sensor data sets imbalanced. To classify an imbalanced data effectively, it is necessary to preprocess it for converting into a balanced
data. This process may unify heterogeneous attributes in the imbalanced data and alleviate the difficulties for data mining on it. Mass function plays an important role in the fuzzy theory and Dempster-Shafer Theory. In this paper, using a mass function is suggested to process imbalanced data stream. A mass function is developed to compute mass values for imbalanced data sets, and an experiment is performed to investigate the validity to apply the mass function to the sensor data stream.

Authors of the paper “Construction of IoT-based Hybrid App for Patients’ Preventive Management in the Mobile Environment” This study investigated the development of hybrid application for patients’ prevention management and constructed IoT convergence technology capable of providing more customized service to each individual based on the sensing information opening, sharing, spreading and participation which were enabled by the connection between smart devices and the sensor network information that had been used individually in a closed manner. Also, data collection and establishment was performed on preventive care methods against aspects deeply related to cardio-cerebrovascular diseases such as smoking and drinking as well as healthcare application-related factors including health common sense, etc., to provide more suitable service. It is expected that, in the near future, according to the needs, IoT-related convergence technology will further develop and more research and development efforts will be made to commercialize integrative sensor kit applicable to diverse aspects of real life or individualized sensor products easily interlocked wirelessly.

Authors of the paper “Empirical Investigations to Find Illegal and its Equivalent Test Cases using RANDOM-DELPHI”, Software quality can be described as degree of conformance to functional, performance requirements, implicit and explicit characteristics and specified document development standards. To assure software quality testing and debugging both have to be accommodate. Testing is a sequence of steps that can be applied to achieve or uncover bugs, which can be rated as mild, moderate, serious, seriously disturbing, extreme, intolerable, and catastrophic. Sometimes low frequency bugs may not detected using normal testing, but causes huge disaster like Ariane 5, Patriot missile, Mars path finder. To uncover low frequency bugs Random Testing (RT) is a best alternative strategy. However random testing is useful technique for testing, the implications of random testing are not to choose random testing as their testing technique for the testers. In this paper we present the implications of random testing and to prove these implications with the FTP-Client Server application.

The purpose of the paper “Method of Calculating the Server Capacity for Cloud Computing for SaaS” Thanks to today’s computing environment, where it is like IT is cloud, and cloud is IT, the importance of calculating the system performance and capacity is gaining more and more weight. More importantly, since cloud computing requires a significant amount of server resources, it is most important to calculate the capacity of the hardware in a systematic and accurate manner. Also, the technology is advancing rapidly to its maturity. Particularly, many IT companies in Korea have entered into MOUs with companies that have already established their cloud infrastructure and provide SaaS. Therefore, the studies on calculation methods on hardware capacities for SaaS is the most essential part of the cloud service and forms the foundation for future expansions to various businesses within the cloud. For this reason, this study provides the methods and criteria for calculating the capacity of hardware based on SaaS. The results of this study may be used as guidelines for calculating the capacities for HW when establishing a cloud computing environment in the future.

The paper “Integrating Natural Language Processing and Software Engineering” This paper tries to put various ways in which Natural Language Processing (NLP) and
Software Engineering (SE) can be seen as inter-disciplinary research areas. We survey the current literature, with the aim of assessing use of Software Engineering and Natural Language Processing tools in the researches undertaken. An assessment of how various phases of SDLC can employ NLP techniques is presented. The paper also provides the justification of the use of text for automating or combining both these areas. A short research direction while undertaking multidisciplinary research is also provided.

The paper entitled “Cooperative Virtual Data Center: Sharing Data and Resources among Multiple Computing Entities” Existing data centers are each individually owned and operated by a single entity. This situation creates an excessive financial burden upon each entity through the need to over-provision for hardware. While this state of affairs enables a secure and an efficient maintenance scheme for the data center, the financial drawbacks are perhaps excessive. To address the concern, we propose the idea of a cooperative virtual data center among multiple entities that is founded on the principal of fair resource sharing amongst the entities.

This report “Charging Facility Monitoring Stream Analysis based on Hadoop for Smart Grids” Charging facilities, which are being constructed for the wide penetration of electric vehicles, keep generating a massive amount of real-time status readings. The analysis of those streams provides a useful guideline for power provisioning and facility management. This paper first develops a charging facility monitoring system mainly interfacing chargers and the total operation system. Then, it builds a Hadoop-based framework which converts the raw data stream into manageable forms, filters information fields of interest, and creates preliminary statistics for the next-step analysis. Upon the set of records stored in the Linux file system, Pig scripts are implemented to obtain the number of reports as well as the amount of energy supplied to vehicles for each charger, vehicle, day, and time-of-day. The experiment finds a significant difference between respective electric vehicle entities resulting from the personal ownership and vehicle locations, making it possible to systematically integrate and analyze the future complex charger streams.

Authors of the paper “Rapid Applications Development Techniques: A Critical Review” There are different product maintenance and support techniques. These previous techniques do not solve user/clients bugs, issues and enhancements effectively and efficiently. Scrum is being used now a day as a quick, flexible and holistic methodology to develop software. In Scrum projects there is the much customer involvement is included which help to develop a user oriented product. Users can change their requirements in Scrum. Many techniques have been proposed for product maintenance and support. However, in this paper, there have been a detailed literature review of existing product maintenance techniques and also presented a new proposed model and technique for the product maintenance by using Scrum methodology. This Scrum based model for maintenance is designed and based on the analysis of client request types and severity (priority). In our approach, The Session attendees (Scrum Master, Product Owner and Team) choose that bug, issue or enhancement first which has an urgent type or higher priority request and resolves it then select low priority request or non-urgent requests and facilitates the clients in timely manner. In this way this proposed model works effectively and defiantly to meet the customer’s demand. A comprehensive study on product maintenance and support has been carried out which adds to the current practices in the scrum. We found that maintenance phase of the scrum has been given less attention in the existing literature. In view of this, we have made an attempt to propose a novel model that focuses on the maintenance phase of scrum.
The paper entitles “A Study of HTC Job Performance over KVM Based Virtual Cluster Computing Environment” High Performance Computing (HPC) needs enormous amounts of computing power for short periods of time. While High Throughput Computing (HTC) is suitable for huge number of jobs with considerable execution time. Many academic as well as industry researchers use HTC based computing resource for scientific or computing applications to simulate and calculate their results. In order to reduce power consumption and increase the utilization of computing resources, virtualization is one of the options. While general performance on virtual environment is not better than physical machine environment because of hypervisor overhead. In this paper, we present the performance difference of several configurations of CPU and Job running time between physical based HTCondor cluster and Virtualized HTCondor cluster environment.

The author of the paper “Comparison of Non-stimuli, WordNet and Related Search Terms in Creative Concept Generation” This paper examines the effect of related search term stimuli during concept generation in the game graphic design process by comparing the creativity of three conditions: non-stimuli, WordNet, and related search terms. The results indicated Google-related search terms are most effective, producing creative results among the three conditions. Thus, intelligent results that are based on collective knowledge are more effective than no stimuli and WordNet, which is organized into synonym sets, each representing one underlying lexical concept.

The paper “A General Template to Configure Multi-Criteria Problems in Ubiquitous GDSS” The study of multi-criteria problems adapted to the context of Ubiquitous Group Decision Support Systems (UbiGDSS) is covered in the literature through very different perspectives and interests. There are scientific studies related to the multi-criteria problems that lie across argumentation-based negotiation, multi-agent systems, dialogues, etc. However, to perform most of these studies, a high amount of information is required. The usage of so much data or information that is difficult to collect or configure can bring good results in theoretical scenarios but can be impossible to use in the real world. In order to overcome these issues, we present in this paper a general template to configure multi-criteria problems adapted for the contexts of UbiGDSS that intends to be easy and fast to configure, appellative, intuitive, permits to collect a lot of data and helps the decision-maker transmitting his beliefs and opinions to the system. Our proposal includes three sections: Problem Data, Personal Configuration and Problem Configuration. We have developed a prototype with our template with the purpose to simulate the configuration of a multi-criteria problem. We invited real decision-makers to use our prototype in a simulated scenario and asked to them to fulfill a survey in the end in order to study our hypotheses. Our general template achieved good results and proved to be very perceptible and fast to configure.

Author of the paper “Efficient Processing of Nearest Surrounder Query for 3D Geospatial Data” The Nearest Surrounder (NS) query is to find a set of all the visible objects that are not obstructed by other objects around the query location. Formally, for a given query Q and dataset D, NS(Q) returns a set of tuples, \( \{O, S, v_\theta\} \) if and only if (i) \( O \) is visible to Q, and (ii) \( O, R \) \( \{O\} \), \( dist(Q, O) \) \( dist(Q, O) \) at angular range \( \{v_\theta\} \), where \( i \neq j \). Using the R-tree index, NS query processing algorithm is based on the not only distance bounding properties but also angle-based bounding properties. Although NS query has a wide spectrum of applications, such as surveillance and augmented reality services, the existing work is not able to effectively support the 3D geospatial environments. Motivated by the weaknesses, we suggests a solution, termed 3D Nearest Surrounder (3DNS) query, to maintain NS query result from a dataset of 3D geospatial objects. In this paper, we propose heuristics for 3DNS query based on R-tree spatial index without pre-computing the visible region.
Paper “Analysis on the Performance of CVMFS in KISTI-GSDC ALICE System” The CernVM File System (CVMFS) provides a scalable, reliable and low-maintenance software distribution service. It was developed to assist High Energy Physics (HEP) collaborations to deploy software on the worldwide-distributed computing infrastructure used to run data processing applications. CernVM-FS is a member of CernVM family. CernVM is a Virtual Software Appliance capable of running physics applications from the LHC experiments at CERN. CernVM-FS focuses specifically on the software use case. Software usually comprises many small files that are frequently opened and read as a whole. Furthermore, the software use case includes frequent look-ups for files in multiple directories when search paths are examined. The experiment software is delivered to the machine just in time by means of network file system specifically designed for efficient software distribution. CernVM-FS is actively used by small and large HEP collaborations. In many cases, it replaces package managers and shared software areas on cluster file systems as means to distribute the software used to process experiment data. In this paper, I briefly explained how to install the CVMFS and compare performance of CVMFS to performance of torrent method in KISTI-GSDC ALICE system.

The paper “Design of Mobile Collaboration Frameworks”, In this paper, we suggested a mobile collaboration framework based on distributed object group framework. This paper will aim to design and implement a framework used to create collaborative applications on mobile phones. The emergence of mobile phones with some kind of ad hoc network technology built-in creates opportunities for new forms of computerized collaboration. Mobile, computer supported, collaboration between people that are collocated is now possible.

The paper entitled “A Study of Privacy Level Management System Establishment for Health and Welfare Sector” With development of information technology, process of massive data has been possible, and so usage of personal information for service which copes with customers’ needs is increasing. In public institutions, personal information can accelerate civil petition service as administrative process can be more efficient and promote convenience. In private firms, personal information can maximize economic profits as target marketing which matches customers’ characteristics. Importance of personal information protection of health and welfare sector which process massive amounts of personal information for people’s health and welfare support is being magnified. This study has established personal information level management system for the health and welfare sector that can realize self-check system which continuously inspect and diagnose institution’s personal information protection level with objectivity and differentiation.

Paper “Measuring the Risk of Software Projects” The risk of software projects is measured in terms of cost that is needed to abate the risk. Traditional practice to measure the risk of software projects uses risk exposure; however, risk measure cannot quantify the risk beyond the expected value of cost. Software project managers are keen to quantify the risk based on a certain probability which is beyond the expected value of the cost. This research work presents a model to measure the risk based on certain probability beyond the expectation. A case-study validates that proposed model shows an improvement in the measurement of risk of software projects compared to the actual risk of software projects.

The paper about “Effects of Process-Based Writing Instruction using for Three Students with Writing Disabilities” It is of considerable concern that students do not develop the writing skills needed for school, occupation, or personal success. A number of
explanations for this is, schools do not provide a good solution for teaching this complex skill. Writing is one of the most complicated literate activities in which children with writing disabilities engage. This study presents the effects of process-based writing instruction using ALMind on writing skill of students with writing disabilities. For this study, 3 elementary students were involved. The study was titled multiple baselines across subjects. According to the result, writing skills categorized in expression of accuracy and contents were increased.

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