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## Editorial

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### Tai-hoon Kim

School of Computing and Information Science,  
University of Tasmania,  
Private Bag 87, Hobart, TAS 7001, Australia  
Email: taihoonn@daum.net

### Sabah Mohammed\*

Department of Computer Science,  
Lakehead University,  
Oliver Rd, Thunder Bay, ON P7B 5E1, Canada  
Email: mohammed@lakeheadu.ca  
\*Corresponding author

### Carlos Ramos

Institute of Engineering and GECAD,  
Polytechnic of Porto (ISEP/IPP),  
Rua Dr. António Bernardino de Almeida 431,  
4200-072 Porto, Portugal  
Email: csr@dei.isep.ipp.pt

### Wai-Chi Fang

Department of Electronics Engineering,  
National Chiao-Tung University,  
No. 1001, Daxué Road, Dong District,  
Hsinchu City 300, Taiwan  
Email: wfang@mail.nctu.edu.tw

### Oswaldo Gervasi

University of Perugia  
Piazza dell' Università 1,  
06123 Perugia, Italy  
Email: osvaldo@unipg.it

**Biographical notes:** Tai-hoon Kim received his MS and PhD in Electrics, Electronics and Computer Engineering from the Sungkyunkwan University, Korea. He got his second PhD in the School of Computing and Information Science, University of Tasmania, Australia. He is Professor of Sungshin W. University and a visiting senior lecturer of UTAS in Australia. He has written 17 books about software development and computer security, and has published about 200 papers. He is a member of IEEE, ACM, and SERSC.

Sabah Mohammed started his career in 1977 as a Multimedia Maintenance Engineer working for Canon and Sony following his hobby in electronics, although he completed his bachelor degree in Mathematics (HBSc 1977). In 1979 he started his graduate studies where he received his degrees in Computer Science from Glasgow University, UK (PgD 1980, MPhil 1981) and from Brunel University, UK (PhD 1986). Since late 2001, he has been a full Professor of Computer Science at Lakehead University, with research interest in web intelligence, big data and medical informatics.

Carlos Ramos graduated from the University of Porto, Portugal, in 1986 and obtained his PhD from the same university in 1993. He is Coordinator Professor of the Department of Informatics at the Institute of Engineering, Polytechnic of Porto (ISEP-IPP). His main interests are artificial intelligence and decision support systems, recently with more emphasis on ambient intelligence. He is Director of GECAD (Knowledge Engineering and Decision Support Research Centre), the largest R&D centre of the Polytechnic system in Portugal, and dedicated to AI topics. He

coordinates the Ambient Intelligence and Decision Support group of GECAD. He has about 50 publications in scientific journals and magazines and more than 200 publications in scientific conferences.

Wai-Chi Fang received his BSc from National Chiao-Tung University in 1978. He completed his MSc in 1982 from State University of New York at Stony Brook and his PhD in 1992 at University of Southern California. He is currently the TSMC Chair Professor of National Chiao Tung University. From 1985 to 2007, he was with NASA's Jet Propulsion Laboratory (JPL), California Institute of Technology. His subjects of interest include VLSI bio-medical microsystems, neural networks and intelligent systems, multimedia signal processing, wireless communication, sensor networks, and space integrated avionic systems. He has published over a hundred papers, patents and books.

Oswaldo Gervasi is President of the Open Source Competence Center of Umbria Region, and a researcher at the University of Perugia. His research interests are focused on computational science, grid computing, cloud computing, virtual reality and web programming.

This issue contains 12 articles from various countries, among which we mention Canada, India, Algeria, Korea and China. 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.

In 'Prioritisation of software requirements using grey relational analysis', the authors propose a novel method for prioritising requirements in software projects based on a model of multi-attribute decision-making using grey numbers. Rooted in grey systems theory, this method relies on grey relational analysis to prioritise requirements using simple and quick computations.

In 'Empirical model for predicting high, medium and low severity faults using object oriented metrics in Mozilla Firefox', the authors describe how they calculated various object-oriented metrics of three versions of Mozilla Firefox, and also how they collected all the bugs along with their severity levels in these versions of Firefox using Bugzilla database and associated bugs with class.

In 'Towards an institution for Object-Z specifications', the authors define an institution for a 'subset' of Object-Z notation and prove that it has amalgamation. This property is useful for the behaviour of Object-Z specifications in-the-large and for their integration in the framework of a heterogeneous institution supporting a multi-modelling language based on UML and Object-Z.

In 'Towards formalising use case maps in Maude strategy language: application to multi-agent systems', the authors present a novel approach for formalising UCM notation as an executable formal specification described in the Maude language strategy, a recent extension of Maude. The main motivation of this work is essentially to provide a sound and rigorous description of complex systems described by UCM, which can help analysts, designers and developers to automate their verification and validation processes.

In 'A heuristic approach to locate candidate web service in legacy software', the authors propose an original approach that formulates the problem of locating services,

such as search problems, and they justify the adoption of functional cohesion measures and GA heuristic (i.e. genetic algorithms) to find a good enough solution, a set of modules (i.e. procedures or functions) contributing in the computation of searched service, given that deriving the optimal solution is shown to be NP.

In 'Object Petri nets marking using UML', the authors first propose an approach to mark the derived formalisms starting from any time of the system lifecycle. The marking was drawn from the object and sequence diagrams. Secondly, the authors exploit the association ends modelled on the object diagram to retrieve the first action of each object behaviour.

As the requirements are vague, uncertain and subjective in nature, in 'A fuzzy traceability vector model for requirements validation', the authors combine the theory of fuzzy sets with the traditional Vector Model (VM) approach in modelling the vagueness, haziness and non-specificity associated with the requirements and hence facilitate tracing the requirements up to a desired degree of relevance.

In 'Spatial indexing of static maps for navigation in online GIS: application for tourism web GIS', the authors present the different types of online GIS solutions, and they are interested in the 'static map' solution. They propose a dynamic variant of it with a new organisation of images based on the use of spatial indexes, for which they have made changes in the search algorithm. Finally, the authors have implemented this technique by developing an online GIS enhancing a region with significant potential for tourism.

In 'Image segmentation of noisy digital images using extended fuzzy C-means clustering algorithm', the authors presented an algorithm called Extended Fuzzy C means (EFCM), which pre-processes the image to reduce the noise effect and then applies FCM algorithm for image segmentation.

In 'Performance evaluation of incremental decision tree learning under noisy data streams', the authors present a new classification model with decision tree so-called incrementally Optimised Very Fast Decision Tree (iOVFDT), which embeds multi-objectives incremental

optimisation and functional tree leaf. In the performance evaluation, noisy values were added into synthetic data.

In ‘Extensions to ciphertext policy attribute-based encryption to support distributed environments’, the authors introduce extensions to Bethencourt et al.’s CP-ABE scheme for providing CP-ABE in a disturbed environment, in which multiple authorities are granted a set of constant and variable attributes that they may further delegate to their users.

Finally, in ‘Validation environment of UML2 IOD based on hierarchical coloured Petri nets’, the authors introduce a variant of UML activity diagrams where the nodes may be sequence diagrams. This combination provides benefits related to both specific and generic behaviours. The

validation is made by model checking using the hierarchical Petri nets derived from the IOD diagrams.

We would like to thank the authors and reviewers of all of the manuscripts that were submitted. Last but not least, we would like to thank Professor Prof. Quan Min Zhu, Editor-in-Chief, for his stimulating encouragements and Richard Sharp, Journal Manager, for his efforts in language editing, prompt assistance and excellent organisation skills in helping us meet the deadline and provide our association with this invaluable opportunity to show and disseminate the research activities.

We hope that the readers of the *International Journal of Computer Applications in Technology* will find this special issue interesting and useful.