Preface

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Biographical notes: Makoto Ikeda is an Associate Professor at the Department of Information and Communication Engineering, Faculty of Information Engineering, Fukuoka Institute of Technology (FIT), Japan. He received his BE, MS and PhD from FIT, in 2005, 2007 and 2010, respectively. He was a Research Fellow of Japan Society for the Promotion of Science (JSPS) from April 2008 to March 2010. From April 2010 to March 2011, he was an Assistant Research Fellow in the Centre for Asian and Pacific Studies, Seikei University, Japan. He is a Member of IEEE, ACM, IPSJ and IEICE. His research interests include mobile computing, ubiquitous computing, mobile ad-hoc networks, wireless sensor networks and vehicular networks.

Fatos Xhafa received his PhD in Computer Science in 1998 from the Department of Computer Science of the Technical University of Catalonia (UPC), Spain. Currently, he holds a permanent position of *Professor Titular (Hab. Full Professor)* at UPC. He was a Visiting Professor at University of London, UK, 2009–2010 and Research Associate at Drexel University, USA, 2004/2005. He has published in international journals, conferences/workshops, chapters, books and proceedings. He is Editor-in-Chief of *IJGUC* and *IJSSC*, Inderscience and of the Elsevier Book Series '*Intelligent Data-Centric Systems*'. His research interests include parallel and distributed algorithms, massive data processing and collective intelligence, optimisation, networking, P2P, Cloud computing, security and trustworthy computing, among others.

Leonard Barolli is a Professor at the Department of Information and Communication Engineering, Fukuoka Institute of Technology (FIT), Japan. He received his BE and PhD from Tirana University and Yamagata University in 1989 and 1997, respectively. He has published more than 600 papers in Journals, Books and International Conference. He has served as a Guest Editor for many journals. He has served as PC Chair and general chair of many international conferences. He is Steering Committee Co-Chair of AINA, CISIS, BWCCA and NBiS International Conference. His research interests include ubiquitous computing, next generation networks, network protocols, P2P system and intelligent algorithms. He is a Member of IEEE, IEEE Computer Society, IPSJ and SOFT.

Ubiquitous computing is an emerging field of research for computing paradigms in the 21st century. This emergence is the natural result of research and technological advances mainly in wireless communications, mobile computing, embedded computing, autonomic computing and agent technologies. The goal of ubiquitous computing is to enable the fabrics of everyday life with seamless and intelligent computers, devices, technologies and services.

The aim of this special issue is to present the innovative researches, and technologies as well as developments

related to efficient and secure algorithms for ubiquitous computing. We received 31 papers for this special issue and we accepted six papers based on their quality and suitability to the special issue.

In the first paper, Yu et al. propose two Eclat-based vertical mining algorithms (UBEclat and NDUEclat) for probabilistic frequent patterns mining in uncertain mobile environments. The UBEclat algorithm is applied to mine exact probabilistic frequent patterns in uncertain mobile environments efficiently. Also, by the Normal distribution-based approach, the NDUEclat algorithm is suitable for mining probabilistic frequent patterns approximately in mobile environments with huge uncertain data. The authors test two proposed algorithms on a number of uncertain datasets and compare them with well-known frequent patterns mining algorithms. The extensive evaluations on real and synthetic datasets show that the Eclat-based algorithms outperform the comparative ones in performance of efficiency and precision.

In the second paper, Ruscelli and Cecchetti are focused on Immediate Dynamic TXOP HCCA (IDTH) scheduling algorithm and its new evolution Immediate Dynamic TXOP HCCA plus (IDTH+). Their reclaiming mechanisms, refined by the monitoring of transmission duration, aim at overcoming the limits of fixed pre-allocation of resources by varying the stations transmission time and avoiding waste of resources. Simulations and theoretical analysis based on the imprecise computation model show that the integration of IDTH and IDTH+ can achieve improved network performance in terms of transmission queues length, mean access delay and packets drop rate and to efficiently manage bursty traffic.

In the third paper, Choi et al. propose a new key pre-distribution scheme for high security and efficiency in wireless sensor networks (WSNs). This is achieved by the keys obtained using *LU*-decomposition of a symmetric matrix. Mathematical analysis and computer simulation reveal that the proposed scheme significantly reduces the overhead required for secure connectivity and energy efficiency of the sensor nodes compared with the existing approaches. The superiority of the proposed scheme becomes more substantial when the memory size of the sensor nodes is small.

In the fourth paper, Ye et al. propose a new improved outsourcing algorithm for secure outsourcing of modular exponentiations. In the proposed algorithm, the modular exponentiations need to be computed are hidden to the malicious server. In the computation procedure, the server cannot obtain any information with respect to the input and output while the client can verify the returned result efficiently. Compared with other algorithms, the proposed algorithm is superior in checkability. In addition, the proposed algorithm can promote the efficiency of all security protocols based on discrete logarithm.

In the fifth paper, Ma et al. propose a collaborative prediction approach for detecting distributed denial-of-service (DDoS) in advance. Different from many state-of-the-art methods that mainly focus on packet level analysis and require much audit and monitoring information, their approach provides a clean and direct solution to attack defence. Considering that the DDoS attacks follow certain patterns when employing a large number of compromised machines (attackers) to request for service from the servers in the victim system, the authors construct an attacker-server utility matrix by the number of packets and adopt matrix factorisation to detect potential attackers collaboratively. They derive the latent attacker vectors and latent server vectors to predict the unknown entries in the matrix. Experimental results using NS-2 show the superiority of the proposed approach.

In the sixth paper, Cui et al. propose a novel comprehensive Fuzzing test algorithm called CG-Fuzzing (Comprehensive Genetic-Based-Fuzzing). The CG-Fuzzing algorithm contains three parts: structure-based, boundary-based and genetic algorithms. The author also presents an evolutionary model for test cases that helps to achieve high rates of passing filtering rules and vulnerability triggering. Compared with the traditional Fuzzing methods, the number of test cases is reduced and they are more efficient. Experimental results prove that the synthesised performance of CG-Fuzzing is very good. The Fuzzing test with the algorithm takes only 4 min to exploit a previously known vulnerability of ZigBee.