Guest Editorial Preface

Special Issue on New Techniques for Collaborative Information System and Applications

Fatos Xhafa, Department of Computer Science, Technical University of Catalonia, Barcelona, Spain

With the rapid development of wired and wireless communication technologies, smart e-business services, peer-to-peer or cloud computing, research works that will lead to development of adaptive, secure, mobile, and intuitive intelligent systems for these collaborative platforms are very important nowadays. Indeed, collaborative Internet systems, short message service (SMS), e-business, e-government, cloud computing, sensors and RFID tags etc. have provided rich collaborative information platforms for many application domains. However, how to efficiently utilize these collaborative information systems for more demanding applications is a challenging problem.

This special issue solicited papers presented new techniques and applications in this area. The accepted papers in this special issue present recent developments and research achievements. They are closely related to theoretical and practical aspects of collaborative information systems, such as collaborative security analysis on existing network protocols, load balance for collaborative cloud servers, collaborative SMS classification for spam filter, collaborative sensor network information collection for analyzing kinetic energy impact, directional AF cooperative communication system, collaborative RFID tags for indoor localization and business process mining based insider threat detection etc. These papers are selected from best papers of the 8th International Conference on Intelligent Networking and Collaborative Systems (INCoS-2016) and the 11th International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2016), they have been significantly revised by the authors and rigorously reviewed again.

Concretely the papers in this special issue are arranged as follows:

Hu and Pei et al. in the first paper "*Dynamic Combined with Static Analysis for Mining Network Protocol's Hidden Behavior*" mainly focus on the theme of unknown protocol's hidden behavior and its effect on network security. Their paper takes the captured messages and the binary code that implements the protocol both as the studied object, which is a typical collaborative information system. According to the hidden behavior triggered conditions, new protocol messages with the sensitive information are generated, and the hidden behaviors are executed by dynamic triggering. HiddenDisc prototype system can sense, trigger and analyze the protocol's hidden behaviors. According to the statistical analysis results, the authors propose the evaluation method of Protocol Execution Security. The experimental results show that the present method can accurately perform mining the protocol's hidden behaviors, and can evaluate unknown protocol's execution security.

In the second paper by Li et al. "*A Minimum-Aware Container Live Migration Algorithm in the Cloud Environment*", they mainly discuss on Load imbalance problem faced by the distributed cloud computing platform, which requires close collaboration by each server in the cluster to carry out the container migration. In their paper, an optimal minimum migration algorithm (OMNM) is proposed. By fitting the growth rate of Docker containers in the source server, the model can estimate the growth

trend of each Docker container and determine which container needs to be migrated. Experimental results show that the algorithm is effective to reduce the total number of live migration of Docker containers and reduce the workload of migration. Thus, it achieves the load balancing of cloud resources.

The third paper by Ma et al. with title "*Bi-Term Topic Model for SMS Classification*" discusses the Short Message Service (SMS) spam filter topic, which is also a collaborative task for SMS providers. The content of SMS spam messages is miscellaneous and distinct from general text files, such as shorter, usually including mass of abbreviations, symbols, variant words and distort or deform sentences, the traditional classifiers aren't fit for the task of SMS spam filtering. In this paper, the authors propose a Short Message Bi-term Topic Model (SM-BTM), which can be used to automatically learn latent semantic features from SMS spam corpus for the task of SMS spam filtering. The experiments in their work show the proposed model SM-BTM can acquire higher quality of topic features than the original BTM, and is more suitable for identifying the miscellaneous SMS spam.

Qi *et al*. in the fourth paper "*A special collaborative information system and its application in kinetic energy Impact*" present a special collaborative information system based on Hybrid III 50th percentile male dummy (hybrid III dummy), it is validated to assess and predict the risk of non-lethal kinetic energy impact. Two types of non-lethal kinetic energy projectiles were used to attack the thorax region of the dummy surrogate at six levels of distance. Not only the sensors inside the dummy as a mechanics information system recorded all the kinetic energy impact measures accurately and effectively, but also other systems like acquiring and processing information system including hardware and software played their roles respectively. The results show that the measurement from the special system is reliable for non-lethal kinetic energy projectiles. The maxima of displacement, viscous criterion (VC) and kinetic energy are both lower than correlative injury thresholds.

The fifth paper "*Directional AF Cooperative Communication System Based on Outage Probability*" by Tan et al. present a single relay AF cooperative communication protocol based on directional antenna. They deduce the outage probability of system in fully directional mode theoretically so as to deduce the lower bound. The simulation result shows that on the condition of high SNR (Signal to Noise Ratio) or greater difference of channel coefficient between two terminals and relay, the lower bound and accurate value are approximated and the outage property of fully directional cooperative communication is superior to that of traditional mode.

In the sixth paper "*Indoor Localization Using the Reference Tags and Phase of Passive UHF-RFID Tags*", an RFID-based collaborative information system, Tagrom, for indoor localization using COTS RFID readers and tags is proposed. Unlike former methods, Tagrom works with reference tags and phase of Passive UHF-RFID tags, which improves traditional distribution of reference tags and utilize RF phase replace of traditional RSSI or multipath profile to determine the position of target RFID tags. The experimental simulated data are used to verify that Tagrom could achieve the accurate value and resist environment factors influence.

Finally, Zhu et al. in the final paper "*Insider Threat Detection Method based on Business Process Mining*" propose a collaborative insider threat detection system. The system firstly establishes the normal profiles of business activities and the operators by mining the business log, and then detects specific anomalies by comparing the content of real-time log with the corresponding normal profile in order to find out the insiders and the threats they have brought. The authors have performed experimentation using the ProM framework and Java programming, with five synthetic business cases, and found that the system can effectively identify anomalies of both operators and business activities that may be indicative of potential insider threat.

We would like to thank all the authors for their contribution to the special issue and the reviewers for giving their constructive comments and feedback to authors. We would like to sincerely thank Prof. Zoubir Mammeri, the Editor-in-Chief of IJBDCN journal, for the opportunity to edit this special issue and for his support. The support by the Journal's Editorial Office is also highly appreciated.

Fatos Xhafa
Guest Editor
IJBDCN

REFERENCES

Hu, Y. J., & Wang, X. A. (n.d). Dynamic Combined with Static Analysis for Mining Network Protocol's Hidden Behavior.

Li, P., Nie, H., Xu, H. & Dong, L. (n. d.). A Minimum-Aware Container Live Migration Algorithm in the Cloud Environment.

Ma, J., Zhang, Y., Zhang, L., Yu, K., & Liu, J. (n. d.). Bi-Term Topic Model for SMS Classification.

Qi, W., Zhuang, H., & Zhao, F. (n. d.). A special collaborative information system and its application in kinetic energy Impact.

Xu, H., Ding, Y., Li, P., & Wang, R. (n. d.). Indoor Localization Using the Reference Tags and Phase of Passive UHF-RFID Tags.

Zhe, L.I., Ruilian, T.A.N., Kai, S.H.I., & Baoxiang, R.E.N. (n.d). Directional AF Cooperative Communication System Based on Outage Probability.

Zhu, T., Guo, Y., Ju, A., Ma, J., & Wang, X.A. (n. d.). An Insider Threat Detection Method based on Business Process Mining.