

FGCS Special Issue Editorial: Selection from IoTBD 2016, COMPLEXIS 2016 and CLOSER 2016, and recommendations for the future trends

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1. Introduction

Cloud Computing has been regarded as one of the emerging technologies and services since 2007 [1]. There are papers focusing on storage [2], high performance computing [3], applications [4], cost management [5-6] and security [7-9]. While demands for business, research and individual requirements have been on the way up, a bottleneck has been reached. In order to move forward, more emerging services and technologies are on the rise, including Internet of Things (IoT), Big Data, Complex Information Systems and security for all of these domains. IoT provides platforms to collect all different types of data and connects to different devices through wireless connections [10]. Big Data deals with the processing, analysis, presentation and making sense of all the data collected from IoT. Implications and summary from Big Data analysis can make business and organizations more competitive, since present and future business performance, areas of improvement and future forecasts can be revealed to the stakeholders, especially decision-makers and customers [2-6]. Complex information systems represent the term to sum up the fusion between Cloud, IoT, Big Data, Artificial Intelligence and Machine Learning together. Notably, security and privacy for all these services are highly important [7-9].

This special issue invites top papers from the 1st International Conference on Internet of Things and Big Data (IoTBD 2016), the 1st International Conference on Complexity, Future Information Systems and Risk (COMPLEXIS 2016), and the 6th International Conference on Cloud Computing and Service Science (CLOSER 2016), together with their related workshops and events. These three international conferences and all collated events were held in Rome, Italy, between April 23 and 25, 2016. The acceptance rate for the conference papers was around 20%. We were honored and pleased to have Prof. Peter Sloot as the keynote speaker and honorable guest of our conferences.

Only the best paper winners, papers in top rankings, or winners in these events were invited. Eventually only nine papers were accepted, after passing rounds of vigorous review process. We divided the selection into two stages. In the first stage, four papers were selected and published as regular papers. In the second stage, we have selected five articles for this special issue, which can be divided into three areas: (i) modeling and prediction, (ii) Big Data and Cloud, and (iii) security enhancement.

2. Selected papers for this special issue

For modeling and prediction, Jeon et al. [4] made use of Big Data for predicting stock price by tracking similarities of historical price graph patterns. This is a very hard problem because of irregularities. They proposed a novel complex methodology with multiple steps: (i) find most

similar patterns to the current situation with a Dynamic Time Warping algorithm, (ii) select features the most affecting stock prices with Stepwise Regression Analysis, and (iii) predict the best stock price with an artificial neural network model based on the selected features as training data. They demonstrated their predicted accuracy of three stocks based on Jaro–Winkler distance with Symbolic Aggregate Approximation

Next, Mønster et al. [11] assesses the strengths and weaknesses of Convergent Cross-Mapping (CCM) algorithm for the evaluation of complex information systems such as Clouds and Internet of Things. They performed robustness tests based on a model system of two coupled logistic maps with noise and external driving signal added. They found that CCM could fail even under low and intermediate coupling, and noise could reduce the level of cross-mapping fidelity roughly while the convergence rate had little sensitivity to noise. Therefore, they proposed controlled noise injections in intermediate-to-strongly coupled systems for a more accurate evaluation of CCM applicability.

For Big Data and Cloud, Nabti and Seba [12] proposed an approach to querying massive graph data with a compress and search approach. Querying data is a highly fundamental issue and they addressed the problem of sub-graph isomorphism search by enumerating the embedding of a query graph in a data graph. The most known solutions of this NP-complete problem are backtracking-based and result in a high computational cost with massive graph databases. The authors addressed this problem via graph compression with modular decomposition, and evaluated the proposed algorithms on nine real word datasets. The experimental results showed that their approach is efficient and scalable.

Next, Acevedo et al. [13] proposed a multi-workflow store-aware scheduler in a cluster environment to determine the best location of data files in a hierarchical storage system. Their algorithm was tested with bioinformatics synthetic workflows and common benchmarks, and further tuned and validated with real infrastructure. The evaluation demonstrated promising results with significant improvement over existing approaches.

For security enhancement, Li, et al. [7] presented an application of multi-key privacy-preserving deep learning in cloud computing, which is currently creating research impact and attention in recent years. They proposed two schemes as solutions: a basic scheme based on multi-key fully homomorphic encryption (MK-FHE), and an advanced scheme based on a hybrid structure by combining the double decryption mechanism and fully homomorphic encryption (FHE). They demonstrated their proposed schemes over encrypted data being secure, with multiple advantages over similar approaches.

3. Conclusion

The guest editor team has ensured that best papers in each category can be selected and disseminated for the community. Some of authors may have the choice to present their work in the forthcoming High Quality Journal Forum, in conjunction with IoTBDS 2017 and COMPLEXIS 2017 held in Porto, Portugal, between April 24 and 26, 2017. We thank FGCS board, Elsevier editor team and Prof. Peter Sloot for their ongoing support and kind assistance to make our scholarly activities more influential and beneficial for the community. We always ensure the high quality journals can be selected while maintaining a high level of efficiency to complete special issues on time. We hope that we can work with FGCS again and disseminate the best papers for our special issue in the near future. Our contributions are not only in academia but also in industry, as evident by the support from Accenture, USA.

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Yours sincerely,

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