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Transactions on Computational Collective Intelligence TCCI XXXIII

Editorial Preface

Volume XXXIII of LNCS *Transactions on Computational Collective Intelligence* (TCCI) covers research topics such as Performance Optimization in IoT, Big Data, Reliability, Privacy, Security, Service Selection, QoS and Machine Learning, among others. The volume includes nine interesting and original papers, which have been selected via the peer-review process. In the papers, the authors present new findings and innovative methodologies as well as discuss issues and challenges in the field of collective intelligence from big data and networking paradigms while addressing security, privacy, reliability, and optimality to achieve QoS to the benefit of final users.

The nine papers of this volume are arranged as follows.

The first paper, "Performance Optimization in IoT-based Next-Generation Wireless Sensor Networks," by Behzad et al. proposes a novel framework for performance optimization in Internet of Things (IoT)-based next-generation wireless sensor networks. The aim is to overcome certain bottlenecks appearing in such systems, namely, drainage of battery and data degradation. The proposed framework comprises mechanisms to ensure the efficient and optimized use of resources. The framework is analyzed both mathematically and by extensive simulation results to sustain the claims of optimization and efficiency.

Kyriazis, in the second paper "Enabling Custom Security Controls as Plugins in Service-Oriented Environments," analyzes the concerns of non-adopters of service-oriented environments related to privacy and security. The use of security controls as plugins that can be ingested in service-oriented environments are proposed. The aim is to allow users to tailor the corresponding security and privacy levels by utilizing security measures that have been selected and implemented by themselves. The challenges and an architecture with the corresponding key building blocks that address these challenges are presented. Trustworthy requirements within the proposed approach are also discussed.

The third paper, "A Flexible Synchronization Protocol to Learn Hidden Topics in P2PPS Systems," by Nakamura et al. considers hidden topics in P2PPS (peer-to-peer type of topic-based publish/subscribe) models where each peer process can publish and subscribe event messages with no centralized coordinator. In such settings illegal information flow to the target peer may occur. The authors propose a flexible synchronization for hidden topics protocols. By experimental evaluation, it is evidenced that the fewest number of event messages are prohibited from being received in the proposed protocol when compared with the other protocols.

Bhattacharya and Choudhury, in the fourth paper "QoS Preservation in Web Service Selection," discuss the challenge of delivering a QoS solution satisfying the requirement of a consumer with minimum possible execution time, whereby many conflicting

QoS objectives increase the complexity of the problem. Therefore the problem may be formulated as a multi-objective, NP-hard optimization problem. The authors propose a goodness measure that replaces all QoS metrics by a single one, aiming at dimension reduction while satisfying all the QoS requirements of a consumer in most of the cases. The experimental results substantiate the claims of the proposed model.

In the fifth paper, "File Assignment Control for a Web System of Contents Categorization," Kohana et al. deal with the effect of the controlling file assignment on the file transfer time for a Web-based content categorization system. The authors propose an algorithm that estimates categories of contents based on the terms and the content categories already added. The longer file transfer time issue is solved by a distributed Web system that uses multiple calculation machines by controlling the file assignment. Thereby the large files are assigned to the Web browser process while the smaller files are assigned to the calculation machines over the network.

The sixth paper, "Byzantine Collision-Fast Consensus Protocols," by Saramago et al., analyzes Byzantine failures in atomic broadcast protocols, which are fundamental building blocks used in the construction of many reliable distributed systems. By observing that the collision-fast atomic broadcast algorithm, which uses m-consensus to decide and deliver multiple values in the same instance, is not Byzantine fault-tolerant, a requirement for many a modified version of the algorithm is presented to handle Byzantine failures. The authors prove that there are no Byzantine collision-fast algorithms in an asynchronous model as traditionally extended to solve consensus. Finally, the authors present a Byzantine collision-fast algorithm that bypasses the stated impossibility by means of a unique sequential identifier generator trusted component.

Calzarossa et al. in the seventh paper, entitled "A Methodological Approach for Time Series Analysis and Forecasting of Web Dynamics," address the problem of modelling and predicting Web dynamics in the framework of time series analysis and forecasting. The authors present a general methodological approach that allows the identification of the patterns describing the behavior of the time series, the formulation of suitable models, and the use of these models for predicting the future behavior. Also, aiming to improve the forecasts, a method for detecting and modelling the spiky patterns that might be present in a time series is proposed and analyzed through the temporal patterns of page uploads of the Reuters news agency website over one year. It is shown that the overall model of the upload process accurately fits the data, including most of the spikes.

In the eighth paper, "Static and Dynamic Group Migration Algorithms of Virtual Machines to Reduce Energy Consumption of a Server Cluster," Duolikun et al. envision the green society and the need to reduce the consumption of electric energy for information systems, especially servers in clusters like cloud computing systems. The authors identify some energy-related issues in a process migration approach to reducing the total electric energy consumption of clusters by migrating virtual machines. Both static and dynamic migration algorithms where a group of virtual machines migrate from a host server to a guest server are discussed. In the evaluation, the authors show the total electric energy consumption of servers can be reduced more in the dynamic setting algorithm compared with other algorithms.

Dawoud et al., in the last paper "Unsupervised Deep Learning for Software Defined Networks Anomalies Detection," analyze security and vulnerability threats in software-defined networks (SDN), where a centralized network controller is a target for the attackers. Providing security measures is a crucial procedure to leverage the SDN's model capabilities. The authors analyze the detection of network anomalies in view of recent advances in machine learning and of deep learning, in particular. Then, an intrusion detection framework based on unsupervised deep learning algorithms is proposed. The experimental results showed a significant improvement in detection accuracy.

I would like to sincerely thank all the authors for their valuable contributions to this TCCI volume and the reviewers for their timely and constructive feedback. I would like to thank the Editor-in-Chief of TCCI, Prof. Ngoc Thanh Nguyen, for the opportunity to edit this volume. The support by the managerial team of TCCI is highly appreciated.

April 2019 Fatos Xhafa

Transactions on Computational Collective Intelligence

This Springer journal focuses on research in applications of the computer-based methods of computational collective intelligence (CCI) and their applications in a wide range of fields such as the Semantic Web, social networks, and multi-agent systems. It aims to provide a forum for the presentation of scientific research and technological achievements accomplished by the international community.

The topics addressed by this journal include all solutions of real-life problems for which it is necessary to use CCI technologies to achieve effective results. The emphasis of the papers published is on novel and original research and technological advancements. Special features on specific topics are welcome.

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