Editorial: Big Data and Cyber-Physical-Social Computing

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Editorial:

Data is becoming an increasingly decisive resource in modern societies, economies, and governmental organizations. Big Data is an emerging paradigm encompassing various kinds of complex and large scale information beyond the processing capability of conventional software and databases. Cyber-Physical-Social Computing (CPSC) is characterized by the deep complex intertwining among cyber/physical components and integrating Human into Computing. CPSC encompasses not only cyberspace and physical world, but also human knowledge, mental capacity, and sociocultural elements. This nature of “big data” imposes fundamental challenges on the design and management of CPSC in multiple aspects such as performance, energy efficiency, security, privacy, reliability, sustainability, fault tolerance, scalability and flexibility. Tackling these challenges necessitates innovative big data techniques for handling massive data in CPSC. This special issue presents the state-of-the-art research results on the topic of big data sensing, processing and storage for CPSC and enabling technologies in developing and optimizing the architecture, design, and operation of CPSC.

This special issue features five selected papers with high quality. The first article, “RLPAS: Reinforcement Learning-based Proactive Auto-Scaler for Resource Provisioning in Cloud Environment”, authored by Bibal Benifa, propose the RLPAS (Reinforcement Learning based Proactive Auto-Scaler) algorithm that allocates necessary resources by learning the environment dynamically. It outperforms existing auto-scaling approaches in terms of CPU utilization, response time and throughput.

The second article titled “Green Massive Traffic Offloading for Cyber-Physical Systems over Heterogeneous Cellular Networks” presents an analysis on CPS offloading rate and achievable throughput when small cells base stations (SCBSs) are powered by solar energy. The solar energy harvesting allows SCBSs to offset the costs of serving CPS devices.

In the next article with the title “Local Core Members Aided Community Structure Detection”, the authors propose an effective method in detecting community structure in social networks based on the closeness of relations among neighbors. This method calculate the gravity between each neighbor node to core nodes, then makes judgement if the node should be classified in the community or not, and finally form the process of community detection.

The fourth article titled “A Prediction Model of the Project Life-span in Open Source Software Ecosystem” provides an insight on the project life-span for a free open source software ecosystem. The statistical analysis of some project characteristics in GitHub is presented, and authors find that the choices of programming languages, the number of files, the label format of the project, and the relevant membership expressions can impact the life-span of a project. Based on these discovered characteristics, authors also propose a prediction model to estimate the project life-span in open source software ecosystems. These results may help developers reschedule the project in open source software ecosystem.

The last article titled “Exploring Temporal Analytics in Fog-Cloud Architecture for Smart Office Healthcare” investigates utilizing the potential of IoT Technology to provide a novel Fog-Cloud architecture for efficient healthcare services in smart office. Specifically, a Fog-Cloud architecture has been proposed to monitor and analyze various health attributes of a person during his working hours. Moreover, the framework indulges various activities in the ambient office environment with the purpose of analyzing it for health severity. In order to realize this, a probabilistic measure, named as Severity Index (SI) is defined to evaluate the adverse effects of different activities on personal health. Finally, an application scenario

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of temporal healthcare predictive monitoring and alert generation is discussed to depict the ideology of Smart Office Healthcare.

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