Guest Editorial: Special Issue on Human-Centric Cyber Social Computing

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EMERGING cyber technology permeates not only our working environment but also our daily life. We enjoy various cyber-enabled online services, e.g., using smartphones for navigation and friendships via social network services (SNS) and doing business through the cyberspace, where a large amount of human-centric data are produced in both the man–man and man–machine systems. This issue aims to enhance the next generation of human-centered social computing and provide relevant theoretical and algorithmic support for the application of social networks. Accepted articles included in this special issue cover topics on human-centric big data analysis, social influence analysis, data-driven interdisciplinary modeling and analysis, user behavior modeling and analysis, cyber-enabled and artificial intelligent (AI)-enhanced healthcare services, and so on. These contents may draft promising perspectives for future research and demonstrate a variety of issues and solutions related to social computing. With the AI-enhanced technical analysis, these human-centric data can be effectively used to better serve humanity.

Social networks seamlessly integrate people's daily lives, work, and social activities. Human-centric data have become an important resource, and a great number of human activities are carried out in the complex cyber-physical systems and generate a large amount of data in social applications that are supported by the heterogeneous networks. By using these human-centered data, we can conduct user behavior modeling and analysis, dynamic community detection, semantic analysis, information diffusion, and trust and privacy security analysis. It is beneficial to our daily life and work. Therefore, it is necessary to explore the human-centric network and social computing technology, solve new phenomena in the cyberspace, and develop models, strategies, and technologies to deal with human-centric big data to support social applications of the networks.

This issue on human-centric data analytics and cyber-enabled social applications aims to bring together researchers and engineers from both academia and industry to disseminate their innovations on the fundamental theories, computational models, and technological solutions for cyber-enabled social applications in terms of human behavior data analysis. Therefore, this special issue is expected to have a great significance and profound impact on: 1) addressing original analyzing technology and practice-oriented developments in the human-centric data analytics and related fields; 2) presenting the foundational models, methodologies, and architectures, which can improve technologies to deal with human-centric data in cyber-social computing; 3) promoting the practical technologies to realize infrastructural frameworks, functional tools, and adaptive services regarding cyber-enabled applications; and 4) exploring interests to seek potential collaborations and push forward the development of human-centric data analytics in cyberspace with other related frontiers.

Scanning the Special Issue

In [item 1) in the Appendix], the researchers aimed to study a human-centric cyber social computing model. A microblogging social network, such as Twitter, is a typical human-centric cyber social system. Shi *et al.* [item 1) in the Appendix] proposed a human-centric social computing (HCSC) model for hot event detection and propagation in microblogging networks. The proposed model can effectively detect hot events while identifying the influential spreaders in these popular events. The performance of the proposed HCSC model has been evaluated via experiments. The experiment results show that the proposed HCSC model can significantly improve the efficiency of hot event detection and propagation when compared to the existing state-of-the-art methods.

With the surging of human-centric devices, cyber-enabled services, and wireless infrastructures, Mobile CrowdSensing (MCS) has become a promising paradigm for data collection in urban-scale monitoring applications. MCS benefits from human-centric cyber social computing.

Xia *et al.* [item 2) in the Appendix] proposed a novel framework based on mobile edge computing (MEC) in MCS systems. Since the MEC-enhanced architecture allows computing/storage resources at network edges close to the targeted mobile devices, it enables significant improvements to handle the users' uncontrollable mobility. Based on this architecture, this article leverages the data implicit correlation and compressive sensing to reduce the data redundancy and ensure the data quality and then uses a trajectory-based task allocation algorithm to achieve the spatiotemporal coverage of the sensing areas. At last, this article demonstrates the effectiveness and availability of the proposed algorithms through extensive experiments.

In order to facilitate the remote access by potential users and gain more profits, web APIs' sharing platforms are necessary. Qi *et al.* [item 3) in the Appendix] extracted the

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app-API invocation records from the historical usage data of 18 478 APIs and 6146 apps and, thereby, built a big APIs' correlation graph to analyze the compatibility between different web APIs. Finally, a compatibility-optimal web APIs recommendation solution is achieved to reduce the heavy burden on the software developers, as the solution can significantly reduce the development cost and risks. Therefore, this article presents a data-driven high-quality app development solution, which enriches the utilization manner of existing service sharing communities considerably.

Zhou *et al.* [item 4) in the Appendix] presented an integrated method that models the large-scale group decision-making problem for social recommendations in scholarly big data environments. Based on the profiling for scholarly decision makers in a constructed network model, measures are proposed to evaluate one researcher's academic performance and research outcome and quantify the correlations between them. A two-stage large-scale decision-making solution is then proposed for social recommendations. As an application for cyber social computing, the designed model and two-stage solution are exploited in scholarly big data environments. Experiments using the real-world data crawled from "ResearchGate" demonstrate the usefulness and effectiveness of the proposed approach, which can provide researchers with more reliable recommendations to support their academic activities and research collaborations.

Academic teams have been recognized as a general form of scientific activities. Scholars are making sustained efforts to improve team-based collaboration quality. Currently, academic team formulation has been regarded as one of the most fundamental issues in this research area. Yu *et al.* [item 5) in the Appendix] aimed to formulate academic team via Liebig's barrel and verified their formulation based on two real-world large-scale data sets. The model is formulated based on Liebig's barrel, whose features correspond to academic teams. The experimental results show the effectiveness of the proposed model. They also discovered an interesting phenomenon in academia called anti-cask effect, which means that an academic team's output quality mainly lies on the member having the maximal research ability rather than the one having the minimal.

Financial organizations, such as banks, are moving quickly toward more human-centric financial services for their customers. Therefore, these organizations are collecting an unprecedentedly large amount of data about their customers from difference sources, considering their cyber, physical, and social activities. Wang *et al.* [item 6) in the Appendix] studied the problem of information sharing and aimed to lower the communication overhead among different nodes for distributed big data architectures in the context of human-centric banking services. This article proposed a novel rhombic dodecahedron topology and implemented a distributed banking big data mining framework based on the proposed topology. The authors implemented a feature reduction prototype for banking customers in a real-world banking environment and demonstrated the practicality of their proposed topology and framework and addressing real-world challenges in the big data analysis for human-centric financial services.

Li *et al.* [item 7) in the Appendix] studied a typical human-centric cyber social computing system, which uses cyber-enabled social computing and data mining to give healthcare services on breast cancer prediction and evaluation. The article "Association rule-based breast cancer prevention and control system" illuminates an association rule-based breast cancer prevention and control system by using the item association rule (IAR) and N-IAR algorithms to discover risk factors for breast cancer in the cloud environment, and the risk of breast cancer is evaluated by a machine learning-based method and experiment data set.

Yin *et al.* [item 8) in the Appendix] studied human business behavior. They first analyzed the business characteristics and processes in the new retail and redefined the core elements, people, product, and place. Then, the new business model [called entity feature model, meta-model, and base model (EMB)] was proposed to describe the new retail mode. It involves the three submodels: EMB. Finally, the article verified the EMB model by a real electronic certificate business in Taobao and showed a satisfactory reusability, applicability, and configurability.

In the field of human-centric cyber social computing, action recognition can be widely applied to areas, including user behavior modeling and analysis, and AI-enhanced healthcare services. Chen *et al.* [item 9) in the Appendix] proposed a novel hierarchical posture representation that helps to model human actions in a brand new perspective. Compared with the traditional action description based on the spatial characteristics, the proposed method can not only provide a more robust representation but also explain how skeletal points form an action. Besides, the authors designed an adaptive action recognition network, which achieves promising recognition accuracy on various scenes.

We thank the reviewers for their hard work and dedication in reviewing the submissions. We would also like to thank F.-Y. Wang, the Editor-in-Chief of the IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS, for his great support and helpful advice.

APPENDIX
RELATED WORKS

1) L. L. Shi *et al.*, "Human-centric cyber social computing model for hot-event detection and propagation," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
2) X. Xia, Y. Zhou, J. Li, and R. Yu, "Quality-aware sparse data collection in MEC-enhanced mobile crowdsensing systems," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
3) L. Qi *et al.*, "Finding All you need: Web APIs recommendation in Web of things through keywords search," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
4) X. Zhou, W. Liang, S. Huang, and M. Fu, "Social recommendation with large-scale group decision making for cyber-enabled online service," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, 2019.
5) S. Yu, F. Xia, and H. Liu, "Academic team formulation based on Liebig's barrel: Discovery of anticask effect," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
6) H. Wang, S. Ma, and H.-N. Dai, "A rhombic dodecahedron topology for human-centric banking big data," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
7) A. Li *et al.*, "Association rule-based breast cancer prevention and control system," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.

8) Y. Yin, R. Zhang, H. Gao, and M. Xi, "New retail business analysis and modeling: A Taobao case study," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.
9) Y. Chen, L. Yu, K. Ota, and M. Dong, "Hierarchical posture representation for robust action recognition," *IEEE Trans. Computat. Social Syst.*, vol. 6, no. 5, Sep. 2019.

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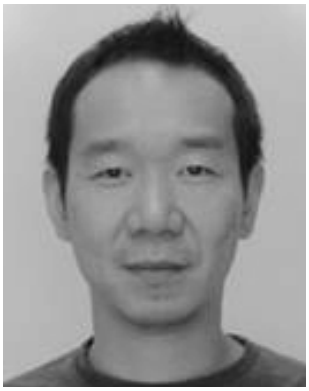
Dr. Li has served on the program committee of several noted international conferences. He has served as the program co-chair for several workshops supported by the IEEE and Springer. He has been invited to be a reviewer of several international journals, including the IEEE/ACM TRANSACTIONS and SCI indexed journals.



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