

Guest Editorial: Special Section on Social and Economic Computing

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RECENTLY, social computing has become one of the central themes across several fields in information and social studies. Social computing can be broadly defined as the computational facilitation of social studies and human social dynamics as well as the design and use of computing technologies that consider social contexts. With the development and adoption of social computing technologies, social computing systems are increasingly involved with the economic contexts and applications. In addition, with the development of economic systems, researchers are employing computational technologies both for computational economic modeling and for the computational solution of analytically and statistically formulated economic problems. Similar to social computing, economic computing is an interdisciplinary area which explores the intersection of computational sciences and economics. It is the key to the development of computational theories, models, and tools that facilitate economic studies, and the design and construct of economic systems using computing technologies.

Social computing and economic computing are closely related to each other and share many common underlying frameworks and technologies; for example, in computational modeling approaches, and programming and experimental environments. An economic system can be viewed as part of a social system and, as such, social computing technologies can facilitate the development of the theory and practice of economic computing. At the same time, economic computing can facilitate social computing as economic insights and economic modeling tools (in particular, the mechanism design framework) can inform the design and operations of social computing systems and applications. In recent years, the scope of social and economic computing has expanded tremendously with almost all branches of computing research and practice strongly feeling its impact. It has attracted significant interest from researchers in computing, social and economic studies, business analysts, web entrepreneurs, digital government practitioners, and software and online game vendors, to name a few.

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For-profit businesses are tapping into social and economic computing both as a new way for information and a business execution platform for product design and innovation, consumer relationship management, and marketing. For them, social and economic computing is an essential component of the next-generation business intelligence and analytics platform. For policy makers and analysts, social computing provides an ideal vehicle and information base to gauge public opinion on policies and political positions. For public health officials, social and economic computing could potentially provide valuable, early clues about disease outbreaks and also provide feedback on public health policies and response measures. For think tanks and social sciences and economics researchers, social and economic computing is the right technology to help test hypotheses about social and economic production and interactions as well as their political, societal, and economic implications. There is no doubt that social and economic computing has already penetrated a wide spectrum of applications with remarkable impact and it is expected to continue enabling new exciting applications and revolutionizing many existing ones.

Given the significant growth and maturing of the social and economic computing academic literature, there is a critical need to publish a collection of representative research pieces to provide an integrated and synthesized view of the current state-of-the-art, identify key challenges and opportunities for future studies, and promote community-building among social and economic computing researchers and practitioners. This special section will meet this need. In this special section, the chairs selected three top research papers after a rigorous and careful review process. The papers address different problems of great relevance and significance to services computing.

The first paper, "Finding the Optimal Social Trust Path for the Selection of Trustworthy Service Providers in Complex Social Networks," by Guanfeng Liu, Yan Wang, Mehmet A. Orgun, and Ee-Peng Lim, presents a novel complex social network structure incorporating trust and important social information. A new concept, Quality of Trust (QoT) is developed, and the optimal social trust path selection with multiple end-to-end QoT constraints is modeled as an NP-Complete Multi-Constrained Optimal Path (MCOP) selection problem. Toward solving this challenging problem, it proposes a novel Multiple Foreseen Path-Based Heuristic algorithm, MFPB-HOSTP, which can efficiently identify the social trust paths with better quality than the H_OSTP algorithm proposed previously.

The second paper, "Budget Strategy in Uncertain Environments of Search Auctions: A Preliminary Investigation," by Yanwu Yang, Jie Zhang, Rui Qin, Juanjuan Li,

Baiyu Liu, and Zhong Liu, presents some preliminary efforts to deal with uncertainties in search marketing environments, following principles of a hierarchical budget optimization framework (BOF). It proposes a stochastic, risk-constrained budget strategy, considering a random factor of clicks-per-unit cost to capture a kind of uncertainty at the campaign level. Uncertainties of random factors at the campaign level lead to risk at the market/system level. Some desirable properties are analyzed to illustrate the theoretical soundness. Computational experiments are conducted with real-word data collected from reports and logs of search advertising campaigns to prove the superiority of the proposed budget strategy.

The third paper, "Artificial Societies, Computational Experiments, and Parallel Systems: An Investigation on a Computational Theory for Complex Socioeconomic Systems," by Ding Wen, Yong Yuan, and Xia-Rong Li, addresses issues related to the development of a computational theory and corresponding methods for studying complex socioeconomic systems. It proposes a novel computational framework called ACP (Artificial societies, Computational experiments, and Parallel systems), targeting the creation of an effective computational theory and developing a systematic methodological framework for socioeconomic studies. Based on ACP, an experimental platform called MacroEconSim is discussed, which can be used for modeling, analyzing, and experimenting on macroeconomic systems. Through case study on economic inflation, the key research areas and algorithms integrated in this platform are illustrated.

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Fei-Yue Wang received the PhD degree in computer and systems engineering from Rensselaer Polytechnic Institute, Troy, New York, in 1990. Currently, he is a professor and the director of the State Key Laboratory of Management and Control for Complex Systems, Institute of Automation, Chinese Academy of Sciences. He was the founding editor-in-chief of the *International Journal of Intelligent Control and Systems* from 1995 to 2000, the *Series on Intelligent Control and Intelligent Automation* from 1996 to 2004, and *IEEE Intelligent Transportation Systems*, and the editor-in-chief of *IEEE Intelligent Systems*, the *IEEE Transactions on Intelligent Transportation Systems* from 2009 to 2012, and *Acta Automatica Sinica*. He was the president of the IEEE Intelligent Transportation Systems Society from 2005 to 2007, the Chinese Association for Science and Technology in 2005, and the American Zhu Kezhen Education Foundation from 2007–2008. Currently, he is the vice-president and secretary general of the Chinese Association of Automation. He is a member of Sigma Xi and an elected fellow of the IEEE, INCOSE, IFAC, ASME, and AAAS.



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