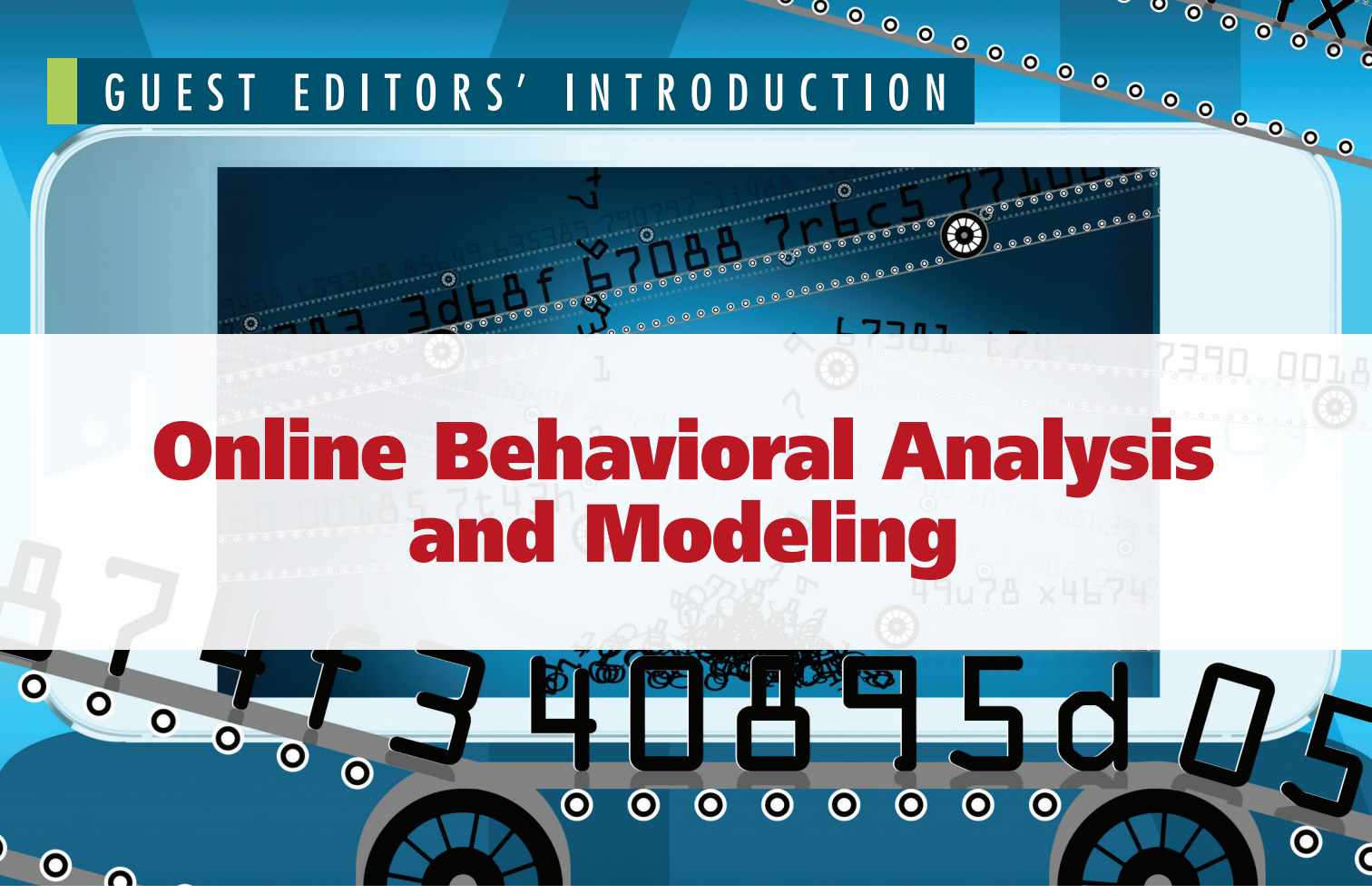

Online Behavioral Analysis and Modeling

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With the rapid proliferation of Web applications for search, e-commerce, and social networking, more user behaviors are available online, opening a new perspective for behavioral data analytics that focuses on Web interactions. For example, users can build friendships with, send messages to, and make phone calls with other users, creating user-user interactions; they can also post messages, buy products, and check in at restaurants, creating user-item interactions.

A Growing Field

Developing computational methods to model user behaviors, analyze different behavioral patterns, understand mechanisms underlying behavioral logs, and eventually predict future behaviors or detect strange ones is of paramount importance because it could both tremendously improve applications and potentially stop fraud, spam, and other attacks. Recognizing this need, the US Department of Defense (DoD) listed computational models of human behavior as one of its six Disruptive Basic Research Areas in 2014 (https://community.apan.org/afosr/m/alea_stewart/135113/download.aspx). However, this new field presents clear

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challenges to behavior modeling: user behavior depends on content, intention, and context in complex online environments. Moreover, the online setting brings big challenges to behavioral data analysis because user behavioral data is Web scale, heterogeneous, multidimensional, highly sparse, and dynamic.

Online behavioral analysis and modeling has aroused considerable interest from closely related research fields such as data mining, machine learning, and information retrieval. We feel now is the right time to review and consolidate recent progress in user behavior analysis as well as chart future research challenges. This special issue provides a forum for researchers in behavior analysis to review pressing needs, discuss challenging research issues, and showcase state-of-the-art research and development in modern Web platforms. The selected articles underwent a rigorous extra refereeing and revision process.

In This Issue

Modeling online user behavior for social good is becoming an important and promising research direction. To prevent the conduct that can lead to obesity and to promote wellness and healthy behavior in a social network, Nhathai Phan, Javid Ebrahimi, Dave Kil, Brigitte Piniewski, and Dejing Dou propose a model in their article, "Topic-Aware Physical Activity Propagation in a Health Social Network," that analyzes activity propagation in different granularities; the authors also empirically analyze the correlation between the detected communities and health outcome measures.

Location is an important context for modeling user behaviors. With the rapid development of location-based services, users want better point-of-interest (POI) recommendations. In "Point-of-Interest Recommendations via Supervised Random Walk," Guandong Xu, Bin Fu, and Yanhui Gu propose a new POI recommendation framework that simultaneously incorporates check-in, review sentiment, and side information. The authors extensively evaluate their proposed method on real data and demonstrate its advantages.

Besides analyzing and modeling user behaviors, how to induct user behaviors is another key problem of ample significance. In "Trust Agent-Based Behavior Induction in Social Networks," Lei Li, Jianping He, Meng Wang, and Xindong Wu investigate the problem of user behavior induction in social networks. They introduce the trust agent, design features for trust agents according to group behavior characteristics, and propose a dynamic control mechanism to coordinate the behaviors of participants in social networks. Their experimental results show that the proposed method can effectively control negative group behaviors in social networks.

In addition to legitimate behaviors, there's still a nontrivial part of user behavior that's motivated by profitable or social purposes, such as click fraud, malware distribution, or cyberbullying. The last (but not least) article, "Suspicious Behavior Detection: Current Trends and Future Directions," by Meng Jiang, Peng Cui, and Christos Faloutsos, describes detection scenarios in which techniques are employed to ensure security and long-term growth of real-world systems. The authors also discuss current trends in application problems and solutions and present possible future directions in this line of research. ▪

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The pressing needs, challenging research issues, and interesting opportunities discussed in this special issue should stimulate new thinking and create new methods for online behavioral analysis and modeling.

Selected CS articles and columns are also available for free at http://ComputingNow.computer.org.