Computational Dissemination: Toward Precision and Smart Impacts for Computational Social Systems

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W ELCOME to the last issue of the IEEE TRANS-ACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS (TCSS) of 2017. TCSS is now in a great shape and has an increasing supply and inventory of high-quality papers in its review pipeline. As an important part of our task of rejuvenating TCSS, we planned to publish at least ten papers in each issue, and we actually have 12 papers ready for this issue. However, due to the limit imposed by 2017 page budget, we have only 36 pages left, so only 3 out of these 12 papers can be published in this issue. I apologize to those authors whose papers will be postponed to the next issue. The situation will be significantly improved next year.

During October 5–8, the 2017 IEEE International Conference on Systems, Man, and Cybernetics was held in Banff, AB, Canada. On behalf of the editorial board of TCSS, I reported the state and several key issues related to the future plan of TCSS at the annual meeting of the Board of Governors. A TCSS Editorial meeting was held after the BoG Report.

I would like to share some figures from my report with the readers and authors. First, we have witnessed almost triple growth in our daily average submission. In the past three years before April 1, 2017 (1064 days to be precise), we received a total of 167 submissions, 0.157 submission per day on average. These numbers increase to 76 submissions in 175 days with a daily average of 0.434 submissions from April 1, 2017 to September 22, 2017. Second, we have recruited ten associate editors (AEs) since April 1, 2017, who are well-recognized researchers in various fields of computational social systems. We organized the editorial board meeting during SMC 2017, and have a constructive discussion about the future development of TCSS. With the expectation of TCSS to take off in the coming 2018, we really need more active researchers on-board to make a better TCSS. Third, thanks to the efforts of all our AEs and anonymous reviewers, all long-overdue papers have been cleared up from our review pipeline. Finally, we received seven proposals of special issues, covering various important topics such as social Internet of Things (IoT), visual and social intelligence, social media analytics for behavioral healthcare, parallel and distributed processing for computational social systems (CSS), intelligent management and control of CSS, CSS for public policy and citizen wellbeing, as well as service-oriented software and its applications in the emerging computing paradigm. The first special issue that passed the evaluation of our editorial board is "Integrating social

Fig. 1. EiC Fei-Yue Wang and AEs after the Editorial meeting at the IEEE SMC 2017 in Banff, AB, Canada.

networks with IoT solutions," submitted by the guest editor team, including Prof. Jun Zhang from the University of Denver, Dr. Shancang Li from the University of the West of England, and Dr. Shuangshuang Han from Chinese Academy of Sciences, among others. Other proposals are still under evaluation.

As a result of the increased submissions and upcoming special issues, two motions were submitted to the BoG for approval. The first one is to increase the page budget of TCSS to 1200 pages, and the second is to change the frequency of TCSS to six issues per year, all starting from 2018.

Scanning the Issue

The first paper in this issue is entitled "Consumers and Curators: Browsing and Voting Patterns on Reddit," by M. Glenski, C. Pennycuff, and T. Weninger. It introduces and makes available a new data set containing the activity logs that recorded all activities for 309 Reddit users for one year. Using this newly collected data, it presents findings that highlight the browsing and voting behavior of the study's participants. It finds that most users do not read the article they vote on and 73% of posts were rated (i.e., upvoted or downvoted) without first viewing the content. Evidence of cognitive fatigue in the browsing sessions of users that are most likely to vote has also been shown.

The second paper is entitled "Semantic Social Network Analysis by Cross-Domain Tensor Factorization," by M. Nakatsuji, Q. Zhang, X. Lu, B. Makni, and J. A. Hendler. Here, a Cross-domain Tensor Factorization (CrTF) is proposed to perform communication prediction that predicts links among users in social network analysis and the topics

discussed among them. It can avoid strong bias toward particular domains and solve the sparsity problem in tensor factorization. Experiments show that CrTF achieves higher accuracy than the state-of-the art tensor-based methods, and it can also extract key topics and social influencers for each domain.

The third paper is entitled "A Fast Overlapping Community Detection Algorithm Based on Weak-Cliques for Large-scale Networks," by X. Zhang, C. Wang, Y. Su, L. Pan, and H.-F. Zhang. In this paper, a weak-clique percolation method for overlapping community detection in large-scale networks is proposed, which utilizes a new measure for characterizing the similarity between weak cliques to check whether the weak cliques can be merged into a community. Through experiments with synthetic and real-world networks, the competitive performance of the proposed method over six popular overlapping community detection algorithms in terms of both computational efficiency and quality of found communities is demonstrated. Moreover, the proposed method is proved suitable for detecting large-scale networks with an unclear community structure under different levels of overlapping density and overlapping diversity.

Computational Dissemination

Traditionally, the quality and speed of the review process are widely considered and used as two quantitative indices in evaluating the editorial service of a journal. In my viewpoint, however, good editorial service is far more than publishing high-quality papers in a timely fashion. More importantly, we should advertise the right research findings to the right readers in the right time, so as to maximize the influence by increasing the numbers of views, downloads, and citations. This creates a critical need of an emerging new research area called computational dissemination, which aims to achieve the precision and smart impact for academic publications and other communication channels, via integrating big data from social media and networking, analytical approaches from computational advertising, as well as incentive mechanisms from computational economics. To me, TCSS is an excellent platform for applying computational dissemination, and also has considerable similarities with other computational advertising platforms. For example, in TCSS and other journal ecosystems, *authors* stand in the demand side and typically try to advertise their *articles* as advertisements, while *readers* in the supply side search for the best-matched articles, just like Web users in the advertising ecosystems looking for recommended advertisements. TCSS journal platform can sell its limited page resources (like ad slots) using diversified trading mechanisms, thus bridging the authors and the readers.

Therefore, almost all ad-delivering techniques and trading mechanisms in computational advertising ecosystems can be naturally used to fulfill the computational dissemination tasks in the journal ecosystems.

TCSS has created a task force dedicating in establishing computational dissemination platforms and maximizing the influence of published papers. Three specific tasks are identified in this knowledge automation process: 1) real-time influence monitoring and evaluation based on open-source intelligence in online social media; 2) precision analyzing, profiling, and matching for TCSS entities (i.e., readers, authors, reviewers, editors, and so on); and 3) mechanism design and exploration to improve the efficiency of TCSS. Specially, the first task aims to monitor the number of views, downloads, and citations in real time for each single published article, and also its collaboration network. A specialized impact evaluation framework for articles and authors is also designed, including quantity entropy, strength entropy, collaboration entropy, sentiment entropy, and so on. The second task is dedicated to analyzing the demographics features, research interests, collaboration networks, behavioral performance of the TCSS entities, and also developing algorithms to recommend best-matched entities. The third task is building artificial TCSS journal ecosystems that evolve in parallel with the real one, so that various kinds of computational experiments can be conducted to optimize the mechanisms, procedures, and algorithms in TCSS. For example, inspired by the "quality score" and "real-time bidding" from computational advertising markets, we are trying to design a specific "quality score" in evaluating TCSS papers and a "real-time bidding" process in scheduling TCSS papers, so as to ensure that those papers of high quality and with the latest and hot research topics and findings can be automatically scheduled at the optimized position of the publication pipeline.

We have entered an era of social media, which will definitely reshape the publication procedure, and in turn the journal ecosystems. I firmly believe that computational dissemination is the future in this era, and I would like to try my best to establish its first successful use case in TCSS. I warmly welcome the interested researchers to join me in this important first step toward the precision and smart impact of computational social systems.

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Fei-Yue Wang (S'87–M'89–SM'94–F'03) received the Ph.D. degree in computer and systems engineering from Rensselaer Polytechnic Institute, Troy, NY, USA, in 1990.

He joined The University of Arizona, Tucson, AZ, USA, in 1990, and became a Professor and the Director of the Robotics and Automation Laboratory and the Program in Advanced Research for Complex Systems. In 1999, he founded the Intelligent Control and Systems Engineering Center, Institute of Automation, Chinese Academy of Sciences (CAS), Beijing, China, under the support of the Outstanding Overseas Chinese Talents Program from the State Planning Council and the 100 Talent Program from CAS. In 2002, he joined the Laboratory of Complex Systems and Intelligence Science, CAS, as the Director, where he was the Vice-President for Research, Education, and Academic Exchanges with the Institute of Automation from 2006 to 2010. In 2011, he was named the State Specially Appointed Expert and Director of the State Key Laboratory for Management and Control of Complex Systems, Beijing. His current research interests include methods and applications for parallel intelligence, social computing, and knowledge automation.

Dr. Wang has been the general or program chair of more than 30 IEEE, INFORMS, ACM, and ASME conferences. He was the President of the IEEE ITS Society from 2005 to 2007, the Chinese Association for Science and Technology, USA, in 2005, and the American Zhu Kezhen Education Foundation from 2007 to 2008. He was the Vice-President of the ACM China Council from 2010 to 2011 and the Chair of IFAC TC on Economic and Social Systems from 2008 to 2011. Since 2008, he has been the Vice-President and the Secretary General of the Chinese Association of Automation. He was elected as a fellow of INCOSE, IFAC, ASME, and AAAS. He was a recipient of the National Prize in Natural Sciences of China in 2007, the IEEE Intelligent Transportation Systems (ITS) Outstanding Application and Research Awards in 2009, 2011, and 2015, and the IEEE SMC Norbert Wiener Award in 2014. He was the Founding Editor-in-Chief (EiC) of the *International Journal of Intelligent Control and Systems* from 1995 to 2000 and the IEEE *ITS Magazine* from 2006 to 2007. He was the EiC of the IEEE INTELLIGENT SYSTEMS from 2009 to 2012 and the IEEE TRANSACTIONS ON ITS from 2009 to 2016. He is currently the EiC of the IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS, and the Founding EiC of the IEEE/CAA JOURNAL OF AUTOMATICA SINICA and the *Chinese Journal of Command and Control*.