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Social Computing: An AI Perspective

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Social computing has remained a research hotspot for years, with multiple research communities actively working on related topics and strong interests from the industry. As evidence attesting to its relative maturity as a field of study and recognized importance, social computing is making its way into formal degree programs. To name a few sample programs, the University of Michigan's School of Information started to offer a master's degree with a concentration in social computing in 2007. The Chinese Academy of Sciences recently began to offer both master's and doctoral programs in social computing. The University of Kaiserslautern just announced a social computing program at both the undergraduate and master's levels.

On the research side, the number of research labs and groups that use "social computing" as part of their designations has skyrocketed in recent years. Most top-ranked computer science and informatics programs around the globe have a social computing group. Just to name a few, MIT Media Lab, Stanford's School of Engineering, and Carnegie Mellon's Human-Computer Interaction Institute all have dedicated social computing groups. Many premier industry labs, such as Microsoft Research, IBM Research, and HP Labs have also established social computing groups. In academic gatherings, most of the mainstream conferences in Web computing, data mining, text mining, and AI have dedicated tracks on social computing-related discussions (more on this later). Several conference series focusing solely on social computing issues have been quite successful. Various conferences, such as the IEEE International Conference on Social Computing (SocialCom); the International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction (SBP); the IEEE International Conference on Cyber, Physical and Social Computing (CPSCom); the Chinese National Conference on Social Computing; and the International Workshop on Social Computing (SOCO) have played an active role in fostering the growth of the social computing research community.

When you look at how active and productive the social computing research community has been over time in the past two decades, "exponential growth" would be a fairly accurate characterization. Figure 1a plots the number of the articles indexed by Thomson Reuters' Web of Science that contain "social computing" as a keyword. Figure 1b shows the number of times for which these social computing articles have been cited. (In both Figures 1a and 1b, the numbers for 2013 are from January to June 2013.) As Figure 1 shows, the research output by the social computing community has been reaching a steady state in recent years, whereas the citation count of social computing articles

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continues to grow. Most would agree that social computing research has already reached a point of major presence with lasting academic impact.

Social Computing and IEEE Intelligent Systems

Among all major publications, *IEEE Intelligent Systems* is perhaps the most persistent promoter and supporter of the social computing research agenda. Thanks to the academic leadership of the two previous editors-in-chief, James Hendler and Fei-Yue Wang, both of whom are leading social computing researchers, *IS* has published a series of articles and special issues on social computing-related topics.

In a March/April 2007 "Trends and Controversies" department article titled "Social Computing: From Social Informatics to Social Intelligence," a social computing research agenda was put forth. A "social computing" special issue, which I helped put together as a guest co-editor, was published in September/October 2007. In July/August 2010, a social learning special issue was published. In November/December 2010, a social media analytics and intelligence special issue was published, and in November/December 2011, *IS* published a special issue on social and economic computing.

Furthermore, we've established a department dedicated to cyber-physical-social systems. In mid-2014, *IS* will publish a special issue on social intelligence and technology.

Shifting Foci and an AI Perspective

In looking at previous topics covered, it came as no surprise that social computing work was focused primarily on social information processing years back. In particular, social media analytics and related applications

have a heavy presence in the social computing landscape. As such, there has been quite a close bond between social computing and text mining. However, this bond seems to be loosening, very likely benefiting both research fields.

Just to provide some relevant statistics, my graduate students and I scanned through the recent proceedings of several major conferences that publish both social computing and text analytics/mining work. Our small-scale exploration yielded some interesting findings.

We found that a significant portion (close to 30 percent) of the papers published through these proceedings have something to do with social computing. Among those papers that can be classified as social computing papers, 25 percent rely heavily on text analytics/mining approaches. Among all text-mining papers, about 30 percent investigate problems related to social computing.

The interwoven nature of the interaction between social computing and text mining is complex. In some cases, social computing studies are built on top of the output generated by a text-mining approach as applied to social media. In other cases, social computing concepts or applications are leveraged to improve the performance of a text-mining approach. Increasingly, the ideas behind social computing are enabling text-mining researchers to expand the application scope of their research and formulate new technical problems.

Social network analysis is another pillar, and one of the most active sub-areas of social computing research. With it still dominating the field, it's encouraging to observe that new and innovative ideas continue to be explored by social computing researchers. Figure 2 depicts a tag cloud made of the words from the abstracts of

First, from the point of view of data, largely due to mobile applications, spatial data are expected to play an increasingly important role in social computing. Spatial computing isn't just about spatial statistics or spatial data mining. Lots of challenges concerning spatial semantics, commonsense reasoning, and the level of abstraction in representation, among others, need further research. AI could be a great source of tools and frameworks to deal with such challenges.

Second, as social information processing and informatics tools mature, and we see the great strides made in network mining and characterization; predictive analytics and automated reasoning that can take various

cognitive, behavioral, group, and social factors into consideration in various application contexts are becoming highly sought-after capabilities.

Third, data-driven empirical studies are expected to continue to grow. However, passing beyond descriptive investigations, probably these studies will be rooted in social theories and models, while aiming to test and expand them.

Last, as social computing systems move from research labs to real-life adoption, related system engineering, evaluation, and adoption issues must be examined in a systematic framework. At the tools level, open-source components and integration frameworks will likely become more readily available and adopted.

Social computing is a young and exciting field that's full of potential. I hope to see more influence from AI in this field's development. In the meantime, new problems arising from social computing could be challenging the state of the art of AI, triggering exciting advances in core AI. ■



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