Technology-Mediated Social Participation: Deep Science and Extreme Technology

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Abstract. The dramatic success of social media such as Facebook, Twitter, YouTube, Flickr, blogs, and traditional discussion groups empowers individuals to become active in local and global communities. With modest redesign, these technologies can be harnessed to support national priorities such as healthcare/wellness, disaster response, community safety, energy sustainability, etc. This talk describes a research agenda for these topics that develops deep science questions and extreme technology challenges.

Keywords: social media, participation, motivation, reader-to-leader framework

1 Introduction

The remarkable expansion of social media use has produced dramatic entrepreneurial successes and high expectations for the future. Beyond these commercial successes, many observers see the potential for social transformations in economic, political, social, educational, medical, and many other domains. Understanding how to increase the motivations for participation is a deep science question that will occupy researchers for many decades. Similarly, building scalable technological foundations that are secure and reliable will challenge software designers and implementers.

The goal of these deep science and extreme technologies is to provide billions of users with the capacity to share information, collaborate on ambitious projects, and organize successful governance structures, while coping with malicious attacks, providing high levels of security, and ensuring reliability.

2 Deep Science

The enduring questions of raising human motivation have taken on new importance in the age of social media. Wikipedia is a great success story because of its innovative strategies for motivating users to contribute the knowledge and to collaborate with others. But even in this success story, only one in a 1000 readers become registered contributors, and even fewer become regular collaborators who work together over

weeks and months. Similarly, while there are billions of viewers of YouTube the numbers of contributors of content is small.

Motivation or persuasion is an ancient human notion, but the capacity to study it on a global scale is just becoming a reality. The move from controlled laboratory experiments to interventions in working systems is happening because designers and researchers have enabled the capture of usage patterns on a scale never before possible.

The Reader-to-Leader Framework [1] (Fig. 1) provides an orderly way of discussing the strategies and conducting research. At each stage innovative entrepreneurs and researchers have developed these strategies such as showing the number of views of a video, enabling ratings of contributions, honoring richer collaborations, and empowering leaders.
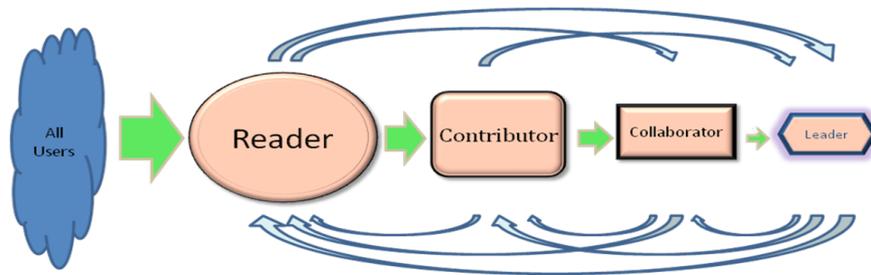

Fig. 1. The Reader-to-Leader Framework suggests that the typical path for social media participation moves from reading online content to making contributions, initially small edits, but growing into more substantive contributions. The user-generated content can be edits to a wiki, comments in a discussion group, ratings of movies, photos, music, animations, or videos. Collaborators work together over periods of weeks or months to make more substantial contributions, and leaders act to set policies, deal with problems, and mentor new users [1].

Many other theories and frameworks are being proposed as commercial, government, and academic researchers rapidly expand their efforts. Traditional social science theories are being adapted to understand, predict, and guide designers who seek to increase trust, empathy, responsibility, and privacy in the online world. Similarly, mathematical theories of network analysis are being enhanced to accommodate the distinctly human dynamics of online social systems. The shift from descriptive and explanatory theories that are based on statistical analyses to predictive and prescriptive theories that provide guidance for community managers is happening rapidly, but much work remains to be done.

3 Extreme Technology

The past 40 years of computing technology have produced remarkable progress. Strong credit goes to the chip developers who made the rapid and sustained strides characterized by Moore's Law – doubling of chip density, speed, capacity every 18 months. Equal credit goes to the user interface designers who opened the doors to billions of users by creating direct manipulation interfaces based on carefully designed menus, effective graphical interfaces, convenient input devices, and comprehensible visual presentations.

The current agenda is rapidly moving to encompass the large-scale social media communities, such as the half billion users of Facebook and the four billion users of cell phones. Newer services such as Twitter have acquired more than 100 million users with billions of exchanges per month, but that is just the beginning. As individuals, organizations, companies, and governments increase their usage, the volume and pace of activity will grow bringing benefits to many users, but so will the impacts of service outages, privacy violations, and malicious attacks.

Developers now recognize the primacy of the user interface in determining outcomes, so there is increased research, training, and exploratory design. Simultaneously, there is a growth in tools to track, analyze, and intervene in social media networks to as to promote more positive outcomes.

One such effort is the free and open source NodeXL Project (Network Overview for Discovery and Exploration in Excel), which was initially supported by Microsoft Research (www.codeplex.com/nodexl). This tool enables importing of social media networks from Outlook, Twitter, YouTube, Flickr, WWW, etc. into Excel 2007/2010, and then gives users powerful analysis tools, plus rich visualization support [2, 3] (Fig. 2).

NodeXL was designed to speed learning by social-media savvy business professionals who already use Excel, as well as by undergraduate and graduate students who are learning social network analysis. By providing easy import of data from important social media tools, NodeXL dramatically expands the community of users who can carry out analyses that lead to actionable business insights and research studies. NodeXL provides a rich set of visualization controls to select color, size, opacity, and other attributes of vertices and edges. The variety of layout algorithms and dynamic query filters allows users to tune the display to their needs. Varied centrality metrics for directed and undirected graphs, as well as a growing number of clustering algorithms, support exploration and discovery.

NodeXL is an ongoing project that will be supported through the emerging Social Media Research Foundation (www.smrfoundation.org).
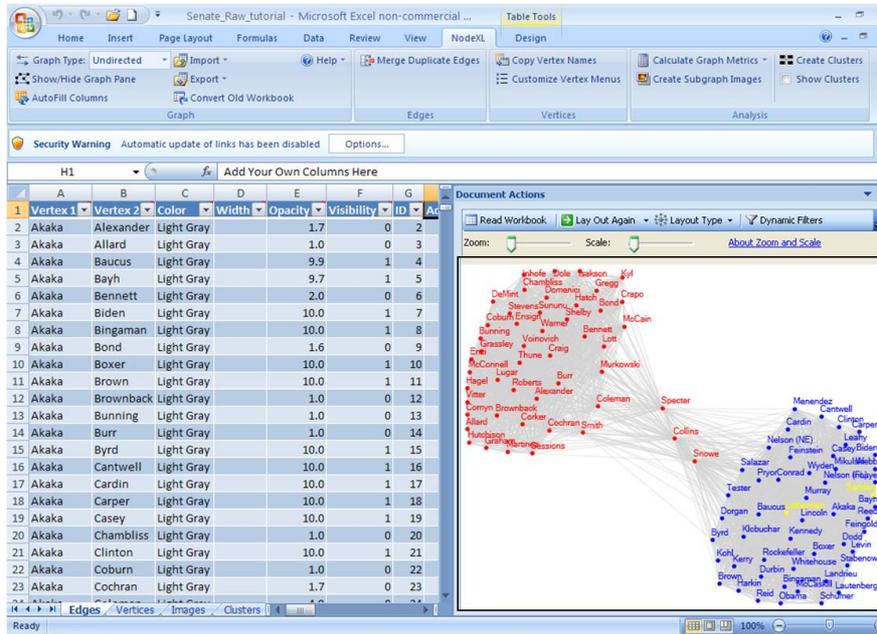
Fig. 2. This NodeXL screenshot shows the U.S. Senate voting patterns during 2007. The 100 Senators are linked to each other by edges whose strength is related to the number of similar votes. By restricting edges to those greater than 65% similarity and using a force directed layout algorithm, the clusters of Democrats (blue nodes on lower right) and Republicans (red nodes on upper left) become visible.

References

1. Preece, J. and Shneiderman, B., The Reader-to-Leader Framework: Motivating technology-mediated social participation, *AIS Transactions on Human-Computer Interaction 1*, 1 (March 2009), 13-32, available at http://aisel.aisnet.org/thci/vol1/iss1/5/
2. Smith, M., Shneiderman, B., Milic-Frayling, N., Mendes-Rodrigues, E., Barash, V., Dunne, C., Capone, T., Perer, A., and Gleave, E., Analyzing (social media) networks with NodeXL, *Proc. Communities & Technologies Conference* (2009).
3. Hansen, M., Shneiderman, B, and Smith, M. A., *Analyzing Social Media Networks with NodeXL: Insights from a Connected World*, Morgan Kaufmann Publishers (2010).