
Cognitive Models of User Behavior in Social Information Systems

Wai-Tat Fu

Beckman Institute
University of Illinois, Urbana-
Champaign, IL 61801
wfu@illinois.edu

Thomas George Kannampallil

College of Information Sciences
and Technology
Penn State University, University
Park, PA 16802
thomasg@ist.psu.edu

Abstract

The widespread popularity and adoption of social information systems ranging from social networking systems to social book marking systems has resulted in an increased research focus on studying user interactions in such systems. Recent research literature has reported on analysis of large datasets of logs of social interactions as a way to describe the structure of these systems and to characterize individual behavior. There is significantly limited research on cognitive behavior of individual users in social information systems. Research on individual behavior can help us develop nuanced perspectives of social information use and can provide insights for developing more effective systems for users.

Keywords

Social information systems, cognition, modeling

ACM Classification Keywords

H.5.3 [Group and Organization Interfaces]: Collaborative computing. H5.4. [Information interfaces and presentation (e.g., HCI)]: Hypertext/Hypermedia.

General Terms

Human Factors, Performance

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Introduction

How do people use Web 2.0 based social information systems? We broadly define social information systems as the range of applications including social networking, social bookmarking, and systems that support sharing of photos and videos. Examples include facebook, MySpace, del.icio.us, flickr, etc., that support online social interaction and collaboration. Our knowledge about the use of social information systems is primarily based on recent research literature that reports on the structure of user interactions by analysis of snapshots of long-term user interaction patterns such as logs of user activities, connections between users, etc. (e.g., [1, 7]). These analyses are useful in characterizing the overall emergent social behavioral patterns (macro-structures). But, very little is known about the underlying cognitive mechanisms during these interactions (micro-structures). Understanding the micro-to-macro link requires a deeper understanding of the dynamic processes among individuals that give rise to the emerging social behavioral patterns. We believe that a better understanding of the individuals' actions and interactions and the underlying cognitive representations and processes is essential for developing this micro-to-macro link, which will facilitate better engineering designs that support user behavior in social systems. Additionally, models that aim at characterizing these mechanisms can potentially complement existing research and provide a basis for better grounding and a more complete explanation of emergent social behavior in social information systems.

Consider the following scenario: a graduate student is trying to find new information to write his literature review for his thesis. How does he go about searching for relevant information? What tools will be useful for

him? How would he use those tools? How does his level of knowledge about topics that he is researching (expertise) affect the way he uses these systems? What role does his specific information needs (searching for relevant literature on a topic) affect his search or interaction behavior? Given a specific information need, would he be diverted to unrelated topics due to the haphazard nature of social information? Our knowledge is limited to a general description of structures of interactions in social information systems.

In general, most prior research has focused on exploring overall properties social information systems through statistical analysis and network modeling to describe overall social interactions. There is limited reported research (exceptions include [2-6, 9]) on the underlying cognitive aspects of human interaction with social information systems. With the increasing popularity and adoption of online social information systems, it is important to develop a better understanding of the nuances of individual cognitive behavior to support their development and design. The lack of research studies investigating individual behavior can be attributed to a number of factors such as: difficulty in creating an artificial environment to simulate social behavior, challenges to creating tasks that are similar to real-world tasks, and using large enough sample of users to approximate social systems. Additionally, with an extremely high number of studies that report on analysis of large social behavior datasets, it almost seems to have become the norm in studying user behavior in social information systems.

The "individual user" in a social information system has been always considered as part of a continuum of users (as part of a group, community or some other

characteristic that links users). While this is often an accurate description of their role, it fails to capture two important characteristics: first, what type of available social information individual users are using during their interaction? For example in the case of a social bookmarking system, what available tags or information do users use to create new tags? Second, how do users process the available social information? For example, are their actions influenced by their own personal goals and needs or are they driven by their social needs and goals?

The appropriateness of using studies of individual behavior to investigate social processes and behavior has been reported in several prior studies (e.g., [8, 10]). Given the significant social effect in the individual activities in a social information system, it is reasonable to assume that such interactions exist and can lead to useful insights about their use. The investigation of individual cognitive behavior can provide a strong basis for understanding emergent social behavior patterns by imposing theory-based constraints, representations, and processes of individual cognitive agents [3, 6] in a social information system. In other words, studies on cognitive behavior of users in the use of social information systems can act as a source for understanding the emergent overall social behavior that is observed in these systems. Another potential benefit of using cognitive approaches is the ability to investigate how knowledge structures (e.g., expert vs. novice) affect user behavior in these systems. This is especially significant in a variety of niche collaborative tools for organizations or community of researchers. A detailed understanding of the differences in knowledge structures can help in developing design guidelines for profiling users with differing skills thereby improving

their social interactions. In other words, through this workshop we hope to develop a bottom-up approach to studying social information systems by evaluating individual user behavior to describe, predict and model overall social behavior.

Workshop Goals

The main goal of this workshop is to identify, discuss and organize the current knowledge about the use of cognitive models to describe human behavior at both the individual and social levels, and to predict effects of different interface features to inform engineering decisions in social information systems. This workshop will provide a venue for researchers in academia and industry to collaborate on developing a clearer perspective on the use of cognitive models to study social systems.

The two key goals of this workshop are: (a) bring together researchers in academia and industry with different backgrounds (cognitive science, computer science, HCI, psychology) to discuss how models of human cognition may inform designs of large scale, web-based social information systems and (b) identify research ideas and methods for developing cognitive models of users in social information systems that scale up to explain emergent behavior at the social or network levels. The topics for the workshop include the followings:

- How do individuals use social information systems? Can models be used to characterize user behavior? (Example citations can be found in the extended abstract)
- What are the kinds of models (e.g., descriptive, predictive, qualitative, or quantitative) that can

be developed, and what are their pros and cons?

- How can models be developed to facilitate engineering decisions during the designs of social information systems?
- How can we use individual behavior to describe social behavior?
- Cognitive models of use of social information systems

Based on this workshop, we hope that new approaches on the study of social information systems from a cognitive perspective are developed drawing on researchers from researchers from computer science, psychology and cognitive science. With this, we expect to develop a better understanding on user behavior in social information systems. These diverse perspectives will guide researchers and designers in developing the next generation of social information tools.

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