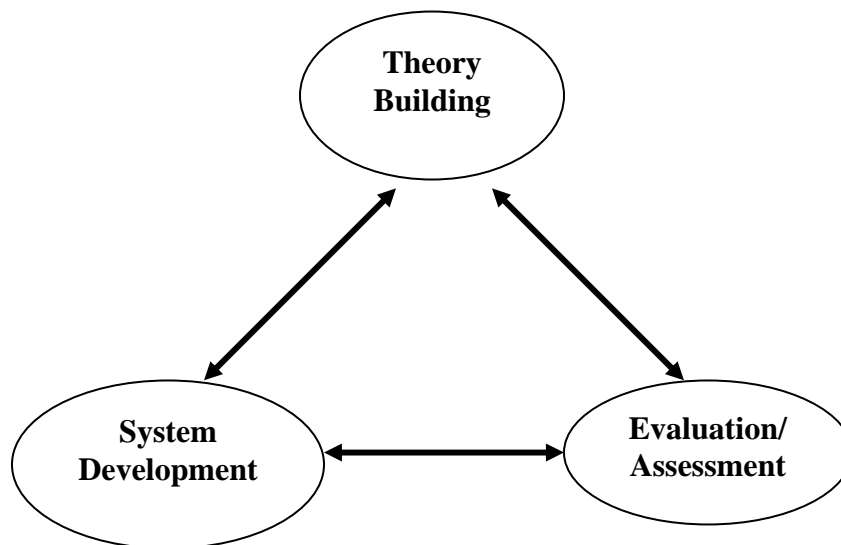


Research Page

RESEARCH APPROACH

My research aims to address various issues in technical, theoretical, and social aspects. From the theoretical perspective, I am interested in developing theories or generic research frameworks that can provide theoretical guidance for developing effective and efficient information systems. From the technical perspective, I am interested in developing and evaluating intelligent information systems by using cutting-edge technologies. From the social perspective, I am centered on assessing the impact of information technology and information systems on real life. So far, I have produced more than 60 articles in refereed journals, conferences, and book chapters, including premier journals in Information Systems and Computer Science, such as *Journal of Management Information Systems (JMIS)*, *Communications of the ACM (CACM)*, *IEEE Transactions on Multimedia*, *IEEE Transactions on Systems, Man, and Cybernetics*, *IEEE Transactions on Professional Communication*, *Decision Support Systems*, *Information & Management*, *Journal of the American Society for Information Science and Technology*, among others.

In general, my research approach can be described as follows:



CURRENT RESEARCH

Adaptive and Personalized Mobile Web (Partially supported by a Google Research Award from Google, Inc.)

In recent years, we have witnessed the explosive growth of the use of handheld mobile devices such as cell phones, palm pilots, and personal digital assistants (PDA). The ability to communicate from virtually anywhere by using those devices and the

convergence of Web and wireless technologies offer an unprecedented level of flexibility and convenience, particularly for ubiquitous information access through mobile devices (Mobile Web). The unique features of mobile devices (e.g., small screens, low display resolutions, slow processing speed, and low memory), however, present critical challenges for taking advantage of the convenience of handheld devices for information access. Most Web sites today are designed and optimized exclusively for desktop, broadband clients, which are poorly suited for mobile devices, making direct presentation of those pages on small devices aesthetically unpleasant, hard to navigate, and in the worst case, completely illegible. Users have to frequently use scroll bars to move up/down/left/right in order to browse and find information of their interest, which can be time consuming and often result in the loss of context. In addition, different users may prefer content to be displayed on their mobile devices in different ways.

To address the above problems, I am interested in developing and evaluating innovative approaches to improve the effectiveness and efficiency of Web content delivery, presentation, and browsing on handheld devices. We have developed a prototype system that integrates dynamic adaptation for client-side navigation, automatic content re-authoring, as well as personalized content presentation.

Information Personalization

In the information retrieval context, we face the challenge of how to identify the appropriate information or/and tailor the content automatically to meet individual information needs. User profiling has been proven to be an effective approach to specifying users' information needs and improving the performance of information retrieval. I am interested in several aspects of this line of research, such as how to generate and maintain user profiles automatically.

Additionally, I am also doing some research on collaborative filtering in recommender systems. In our daily life, we face questions like "Which movie should I rent for the weekend?"; "Which restaurant should I go to for dinner tonight?"; "Who should I ask for help on this issue in the company?" etc. Recommender systems are designed to recommend answers to those questions to users. In general, a recommender system predicts user preferences on unrated items by aggregating information about items, users and user preferences on items. The basic underlying assumption is that people who shared the same interests on different items in the past will tend to agree with each other on other items too in the future. The major objective of this research is to develop innovative techniques to improve the effectiveness of collaborative filtering based recommender systems by addressing the problems of sparsity, cold start, item weighting, etc.

Computer-Mediated Communication (CMC)

My research interest in this area includes cross-cultural effect on group tasks via CMC and online deception detection.

Cultural effect on CMC

The trend of globalization has provided more opportunities and requirements for collaborative work of culturally diverse groups. Many current theories and practices in

management and group support systems are deeply rooted in North American culture and strongly reflect North American values. Consequently, scholars and practitioners are now beginning to be more concerned with the extent of applicability of such theories beyond North America. Computer-mediated communication (CMC) is the electronic exchange of information using computer terminals joined together via communication links. It is believed that CMC can reduce social presence, thus affecting group decision making and problem solving process. In this research, we are attempting to investigate the potential cultural impact on major influence, status effect, and group polarization in CMC environments through empirical studies. The research involves subjects with diverse culture (e.g. Americans and Chinese). The findings will provide some insights into the adaptation of CMC and GSS theories for different cultures.

Follow the linguistic footprint for online deception detection

Another area in this line of research I am interested in is online deception detection. Deception is defined as information knowingly transmitted to create a false impression or conclusion. Deception research, aiming to identify cues to deception and support deception detection, has been a major focus in social science, psychology, and communication in the past few decades, as well as in information systems and computer science recently. The literature, however, shows that most studies mainly focus on deception in rich media (e.g., Face-to-Face (FtF) communication). As globalization and popularity of virtual teams increase, people increasingly rely on online communication (e.g., emails and instant messaging) for interpersonal communication, information acquisition, and information dissemination. Online communication breaks down communication barriers by making people less sensitive to contextual restrictions on behavior. The physical separation of communication partners may stimulate one to initiate deception on his/her partners. As a result, online communication may offer more fertile grounds for deception than traditional communication media and alter the social and legal distribution of deceptive practices. While there is ample research on deception and on online communication separately, there is relatively little theoretical and empirical work on their interaction until recently. To narrow this knowledge gap, in the past few years, we have conducted some innovative research on deception detection in online communication from both theoretical and empirical perspectives, and obtained a variety of interesting findings on linguistic cues to deception. Those cues can help detect online deception, provide guidance to the development of automatic deception detection systems, and help educate the public to improve deception detection.

Information Extraction, Retrieval, and Question-answering

The explosion in storage capacity is adding urgency to the research. Currently, a terabyte of disk space costs about \$1,600. In two to three years, it will only cost \$400 and, consequently, become increasingly common. A terabyte, however, can hold one person's entire conversations from a lifetime, or all the video if someone kept a camera in his or her head for six months. More stored data and a vaster storage space makes finding something all the more difficult.

Information Extraction is a technology that is futuristic from the user's point of view in the current information-driven world. Rather than indicating which documents need to be read by a user, it extracts pieces of information that are salient to the user's

needs. Links between the extracted information and the original documents are maintained to allow the user to reference context. The kinds of information that systems extract vary in detail and reliability. For example, named entities such as persons and organizations can be extracted with reliability in the 90th percentile range, but do not provide attributes, facts, or events that those entities have or participate in. See more details about IE research at http://www.itl.nist.gov/iaui/894.02/related_projects/muc/.

I am also particularly interested in cross-lingual information retrieval and question answering. Cross-lingual information retrieval refers to the situation where a user submits a query in language L1 (e.g., English) and the system retrieves relevant documents in another language L2 (e.g., Chinese). Question answering (QA) is a type of information retrieval. Given a collection of documents (such as the World Wide Web or a local collection) the system should be able to retrieve answers to questions posed in natural language. QA is regarded as requiring more complex natural language processing (NLP) techniques than other types of information retrieval such as document retrieval, and it is sometimes regarded as the next step beyond search engines. I have conducted some preliminary studies on cross-lingual QA.

Multimedia-based E-Learning

Learning is perhaps the most indispensable activity in the current knowledge-based economy, which is characterized by industrial change, globalization, increased intensive competition, knowledge sharing and transfer, and the information technology revolution. Globalization requires new methods of delivering education and training, partly to enhance traditional methods of knowledge acquisition and to convey new skills and tools. E-Learning technology, which is used to deliver educational material electronically via the Internet, has been widely used in both academic education and corporate training. The emergence of multimedia presenting technology and the wide adoption of e-Learning present an opportunity of both technological breakthrough and theoretical advancement in online learning. From a technical perspective, I am trying to explore engineering solutions for integration of multimedia instructions in online learning environments. From a theoretical perspective, I am focusing on identifying influential factors and developing research frameworks for improving e-Learning effectiveness.

If you are interested in any of the above research topics, please feel free to contact me at zhangd@umbc.edu. Thank you.