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Visualizing an Enterprise Social Network from Email

Weizhong Zhu
College of Information Science and Technology, Drexel University
3141 Chestnut Street
Philadelphia, PA, 19104
wz32@drexel.edu

Chaomei Chen
College of Information Science and Technology, Drexel University
3141 Chestnut Street
Philadelphia, PA, 19104
chaomei.chen@ischool.drexel.edu

Robert B. Allen
College of Information Science and Technology, Drexel University
3141 Chestnut Street
Philadelphia, PA, 19104
rba@drexel.edu

Categories and Subject Descriptors
H.5.2 User Interface

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1. Introduction
Understanding the patterns of sending and receiving email within an organization may help us to understand the historical and social dimensions of that organization [1, 3]. In addition to asynchronous person-to-person communication, email is also used for other purposes such as task management and personal archives. However, tools for visualizing, analyzing, and understanding communication patterns tend to focus on a static view of such patterns. We are developing a visualization system to help users perform tasks from perspectives based on temporal and connectivity patterns. Specifically, our system is designed to support browsing the email archive of W3C working groups. The archive has been made available to the TREC 2005 Enterprise Competition. This system supports both temporal views and linkage views. Temporal views can help users easily find a mail. Linkage views show emails that belong to the same discussion group. Linkage views make it easy to extract related information by showing the relationships of those messages and senders.

2. Goals of the Design
We are particularly interested in how an email network of an enterprise working group evolves over time [4]. The World-Wide Web Consortium (W3C) working group email archive contains emails exchanged between group members between 1994 and 2004. Our focus is on the URI working group because the history of this working group is closely related to the growth of W3C itself. 4460 email transactions are included in this dataset. We construct email networks as follows. Vertices in a network are individuals who sent or received email in this archive. Edges in such networks represent the communication strengths between two individuals. The 10-year period is divided into a number of consecutive time frames. Participating members are then clustered with attributes such as interaction frequency (i.e., send-reply pairs), email thread, and betweenness centrality. We expect to find emergent communication patterns over email can lead to insights into the social dynamics of the underlying working group. For example, one may want to find out the most active group member in terms of the number of emails sending out or email flows during a given period. The following figure generated by Pajek [2] shows the preliminary result from network analysis of time-based email patterns.

![Fig.1 2002-2003 Social Movement of W3C URI Working Group based on Analysis of Email Communication Patterns](image)

3. An Integrated Approach
While previous research has shown these actor types can be identified from patterns in their posting behavior rather than the content of their posts [3], our aim in this study is to integrate linkage analysis and content analysis to distinguish these actors. We consider all participating actors in the thread with linkages between them. We will demonstrate how our design can help us understand the roles of actors in terms of their influence and contributions to concept building in the social networks. A variety of techniques are integrated, including linkages, information gain, Latent Semantic Indexing, content analysis, and PageRank analysis weighted by interaction frequency.

4. REFERENCES

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