SeeMail: Visualizing Email Response

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Abstract

We are developing SeeMail, a web-based system for visualizing email response patterns. SeeMail processes user email headers to generate visual summaries of response behavior. In this position paper, we describe the motivation for SeeMail interface and some results from a think-aloud study of the system.

Keywords

Email, electronic mail, visualization, response timing, conversation, communication

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Email continues to be an important means of communication. A great deal of research in CSCW and HCI has examined people use email, and how its design can be improved to better support the many functions it serves [1, 4, 6, 7]. Despite advances in the design of email clients, users continue to struggle with email management. Namely, effectively responding to emails in a timely manner is difficult for many users.

Response is perhaps one of the most fundamental behaviors in email, and a central aspect of any

communication interaction regardless of medium. The timing and frequency of response has important social implications, but it is not directly apparent when scanning the email inbox. Email is an asynchronous medium, meaning response times can vary substantially because individuals can delay response to a time convenient for them [7].

Whether intended or unintended, the timing of a response sends a clear social signal to the sender of a message and has important relationship implications. Previous work suggests that response delays can negatively influence impressions of the responder and their work ethic [2]. Tyler and Tang found that we mentally catalog our correspondents by their expected response time, based on a few interactions [4]. But we are largely unaware of our own response behavior.

Visualization techniques provide new opportunities for understanding rhythms of behavior over time Previous work suggests that visualizations of email behavior may reveal important patterns of use and help individuals reflect on their use of email and their relationships with others [5]. The previous work on email visualization has explored techniques to reveal social networks behind email, and patterns of content exchanged over time [5]. However, none of this previous work has directly visualized response patterns over time.

SeeMail

We have been developing the SeeMail system, a novel web-based tool for visualizing email response patterns.

The SeeMail architecture

The SeeMail system is web-based, and users log in with their email address and password. On the first log in,

we connect with the user's IMAP email server to download their email header information and store a hash of that information to ensure data security. For each message, we obtain the following fields: message id, to, from, cc, subject line, and the time and date the message was sent. This data is used to calculate statistics used in our visualizations.

SeeMail applies visualization techniques for displaying patterns over time and providing direct comparisons in order to make hidden patterns of communication visible to users. The SeeMail system is designed to help users understand their email response behavior and reflect on their relationships with others. SeeMail visualizes a user's response delay to a message, the inter-temporal interval between when a message was received and the response.

The relationship is an important unit of analysis for email response behavior. Communication timeliness can influence relationship quality and duration [3]. In addition, mental models of responsiveness seem to be stored at the relationship level. Tyler and Tang found that individuals formed unique response expectations for each communication partner [4]. These expectations were largely based on past experience with the person. Because of the importance of relationships as a unit of analysis, we organized the data in our visualizations, either by color-coding individuals or stacking charts so that each row represented a different individual.

Visualizations

SeeMail includes six visualizations: overview, trends, comparisons, intervals, strips, and summary table. The

SeeMail visualizations present response time aggregated at three different levels:

- by user (overview)
- by time period (trends)
- by communication partner (comparisons)

We have contrasted these aggregated representations with response time visualized on a per message basis over time (intervals) and by communication partner (strips).
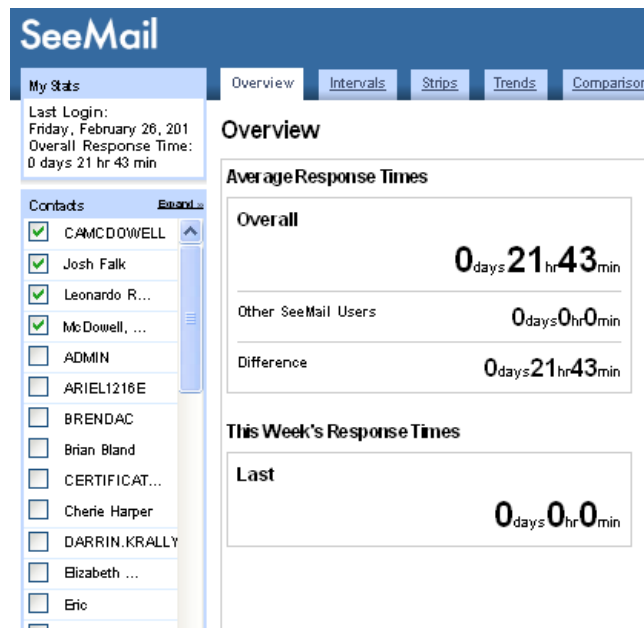

Figure 1: SeeMail Overview page presenting aggregated response time across all messages.

We conducted a think-aloud study with 20 users who uploaded their email to the SeeMail system and viewed all six visualizations. Below we describe three out of our six visualizations and a sampling of user reactions to the visualization during our think-aloud sessions.

Overview
The Overview page on the SeeMail website (Figure 1) provides users with a summary of their overall response time across all messages. In think-alouds users had three reactions to the aggregated response time statistic: guilt because they felt the number was higher than it should be, disbelief that it was accurate, or confusion about what was normal.

Comparisons
The Comparisons visualization aggregated response time at the relationship level, and uses a bar chart to plot a contact's response time to message from the user versus the user's response time to message from that contact. In our think-alouds users found this infographic easy to interpret and enjoyed interacting with it. They expressed concern about whether relationships were 'balanced', and this seemed to vary based on the nature of the relationship (e.g. boss versus close friend).

Intervals
The intervals visualization displays response time on a per message basis over time. Each message response interval is drawn as an arc, beginning at the point on the horizontal axis when a message was received, and ending at the point when a response was sent. This means that messages that were responded to after a long interval will have very large arcs (like the highlighted message in Figure 2, bottom). Messages that did not receive a response are drawn as a single thin line. Responses sent by the user are plotted as arcs above the horizontal axis line, while responses received are plotted below the line.
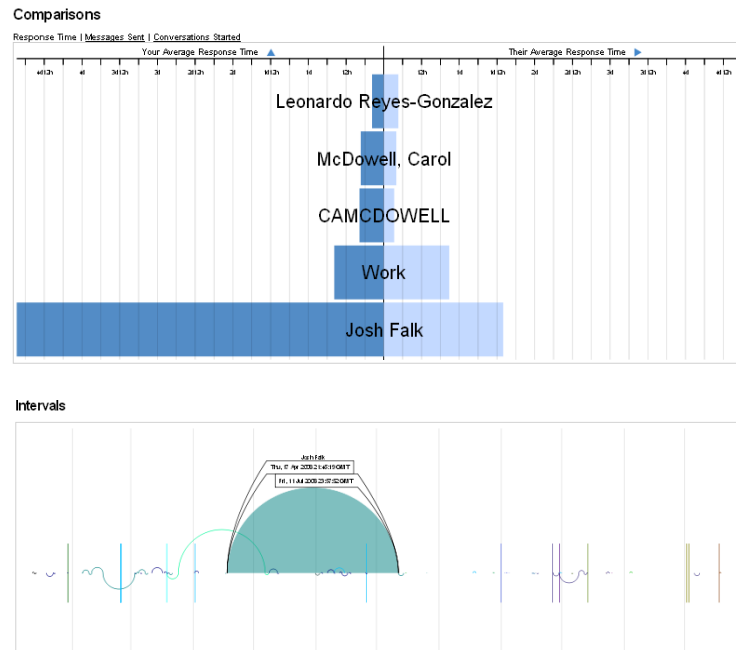
Figure 2: Comparisons visualization (top) and Intervals visualization (bottom)

Our think-aloud study suggested that SeeMail allows users to generate useful insights about their email behavior over time and their relationships with others. We are planning to add a goal-setting component to the SeeMail system and deploy it more widely to see if using SeeMail changes email response behavior. Personal information visualization systems like SeeMail present a unique opportunity for individuals to reflect on their own information management patterns and their relationships with others, and change specific behaviors for the better.

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