Social Visualization:

Exploring Text, Audio, and Video Interaction

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Abstract
In this workshop, we address the importance and uses of social visualizations. In particular, we explore visualizations of text, audio, and visual interaction data to uncover social connections and interaction patterns in online and physical spaces. We stress the need to move beyond typical visualizations to date and explore new design approaches for creating social visualizations. Finally, we address the need for comparing and evaluating the effectiveness of social visualizations and the approaches used to create them.

Keywords
social visualization, communication, collaboration

ACM Classification Keywords
H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces --- synchronous interaction, collaborative computing; H.5.2: GUI

Introduction
Our networked environment has provided us with many opportunities for mediated interaction - online and face-to-face. The immensity of data existing in email archives, blogs, voice-over IP, and camera footage is increasing and is often stored for future perusal. These connections are multiplying and many of them such as webcams exist 24 hours, seven days a week. Oftentimes, it becomes difficult to understand the environment of this data and to lose oneself in the midst of the crowds. Social visualizations are one way to "describe" our online environments and make inter-

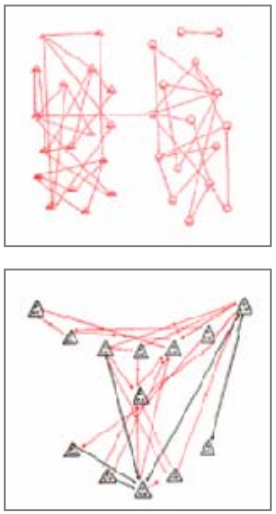


figure 1. (top) Graph of friendship lineages among fourth graders. Triangular nodes on the left represent boys. Circular nodes on the right represent girls. This graph shows Moreno using location to segregate the boys and the girls and differently shaped nodes to represent them. (bottom) Graph of positive and negative connections within a football team. The red lines are positive choices; the black lines are negative choices. The layout of the nodes was made to more or less coincide with the position of the players in the field.

action patterns and connections salient. This workshop is aimed at understanding and creating social visualizations.

It investigates concepts of social visualization and their use in both online environments and the real world. We define social visualization as the visualization of social data for social purposes. Social data can be thought of as the traces that people leave as they go about their daily routine. These data may come from different sources such as the online world (i.e. email archives, IM logs, blog postings, etc.) and the physical world (i.e. captured through sensors such as voice by microphone, movement and location data by camera, GPS, cell station, etc.). Visualizations of these kinds of data can be used for increasing awareness of one's social environment and for highlighting cues and patterns implicit in communication.

Previous work on understanding online social interaction has shown that visualization techniques are important aids in helping users and researchers understand social and conversational patterns in online interactions [11].

Related Work

Social Networks and Sociograms

Social visualizations are a subset of information visualization. The key distinction is that social visualizations focus on people, the groups they form, their patterns, their interactions, and how they relate to their communities.

When one thinks of social visualizations, perhaps one immediately thinks of “Social Networks”. They are not unrelated. Social networks are a form of social visualization. Social network visualizations are aimed at unveiling two types of organizational patterns: social groups (collections of people that are linked closely together) and social positions (people who are linked within a larger structure in similar ways) [3]. It is interesting to note that the design of social networks, predominantly point and line drawings, has not changed drastically from the 1930’s to date. What have changed are the tools used to produce them.

Freeman classifies five different phases in the creation of point and line visualizations for social networks. These are: (1) Hand-drawn images beginning in the 1930’s. The effectiveness of these visuals depended heavily on the artistic skill and insight of the creator. (2) The 1950’s introduced computational procedures such as classification into the drawings. (3) In the 1970’s, the availability of the computer brought automatic machine drawn visuals. (4) In the 1980’s, the advent of the personal computer allowed for the creation of graphs on the monitor screen and in color. (5) In the 1990’s the world wide web (WWW) and the browser created a new environment for display.

In many ways, the computer-generated graphs have lost the style and effectiveness of the original hand-drawn maps. One of the main points of this workshop is to make these visuals intuitive and less computational-looking.

The first person recognized for drawing sociograms was Jacob L. Moreno in the 1930’s [3]. He developed a set of rules for creating sociograms such as: “The fewer the number of lines crossing, the better the sociogram.” [7]. This rule cannot always be adhered to and results in ineffective social visualizations as the node population increases; the visuals might be aesthetic, but the patterns become illegible. Moreno is also credited with: drawing directed graphs, using color to draw multi-graphs (see Figure 1b), varying shapes of nodes to denote different characteristics of members in the graph (see Figure 1a), and using the location of the node as a valuable marker for understanding the structure in the network (see Figure 1).

Time-based Bar and Line Graphs

The above work highlighted patterns among groups of people with little emphasis or visualization of time. In this section, we look at time as an axis for social visualizations.

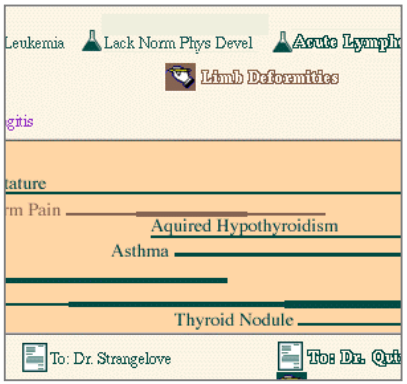


figure 2. Snapshot of a portion of the LifeLines interface used to explore medical histories for one patient.

figure 3. The Visiphone dome.

The books and examples of Tufte highlight the power of time lines for showing multiple facets in information. A nice example of a spatio-temporal visualization is the famous graphic of "Napoleon's March to Moscow" by Charles Joseph Minard [9].

A pioneering project entitled, LifeLines [8] in 1996, showed how a time-based visualization can be effective in depicting salient points of a person's life. In particular, they highlighted police records and medical records (see Figure 2).

Studies of LifeLines showed that the visualization:

- Made it easier to spot patterns and anomalies.
- Reduced chances of missing information.
- Increased chances of finding new added information.
- Remained simple to read while it provided links to more detailed information.

Social Visualizations

In this workshop, we will further the discussion of social visualizations and how they coexist with our networked communities have focused primarily on text forums and have been built for several different purposes, including:

Visualizing online communities:

- Visualizing communities in terms of posting activity, tone, and content to understand the social dynamics of different groups [1][11][12] (see Figure 4).
- Extracting the social network structure embedded in communication archives such as email collections and newsgroup conversations [12] (see Figure 4).
- Understanding the birth, growth, and death of networked communities such as discussion groups and online gaming sites [1] (see Figure 4).

Visualizing individuals:

- Finding key contributors and similar or complementary individuals in a community.
- Visualizing reputation in commerce applications such as e-bay and in online question/answer communities.

Visualizing activity in real-world environments:

- Seeing conversational dominance in remote collaboration and negotiation scenarios [2][4] (see Figure 3).
- Getting a sense of social wear-and-tear (i.e. people's past presence and activity) in public physical spaces [5][10] (see Figures 4).

Goals

We are interested in exploring new approaches to social visualization that improve our understanding of communities and social interaction. This full-day workshop seeks participation from researchers and practitioners to address the ways in which social visualization can be used to enhance social legibility and expression. The workshop will consider three specific domains:

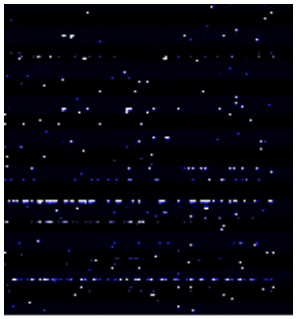
1. Textual Online Interactions

What are innovative ways of visualizing textual interactions in online environments?

Given new online social environments where threaded conversation is not the focal point of interaction - such as blogs and wikis - how can visualization aid social legibility?

2. Audio Visualizations

Despite the ubiquity of email, mediated communication does not happen solely via textual media. Improvements in bandwidth and the growing adoption rates of voice-over IP (VoIP) systems such as 'Skype' have increased audio presence online and within physical spaces. What happens when the social data of visualizations is audio? Can visualizations of audio help a user navigate the audio through time? Can abstracted audio visualizations provide enough privacy for the user in a public space?



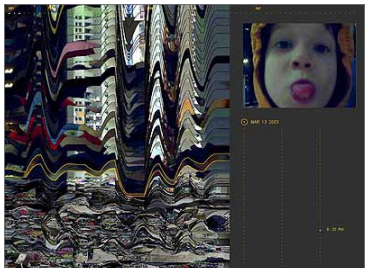


figure 4. (top) Snapshot of Loom visualization. It shows tone of messages with color. One can reconfigure the interface through zoom and thread navigation. (bottom) Snapshot of the public display in Artifacts of the Presence Era. The wall visualization aggregates images carved in the shape of corresponding audio waveforms. The carvings are placed on top of one another to create this sedimentary visual in one space over time.

3. Video Visualizations

How can we depict endless hours of video footage in meaningful and convenient ways? It is not unusual to think there may be several cameras on any one person at one time. Walking down the street alone, ATM cameras follow us in our daily routines. If everyone wears a camera as well, how would they document the highlights of their day, year, life?

Privacy

Today, many people feel they have privacy through obscurity since there is so much data out there. Social visualizations, however, help parse that data and make it salient. As designers and engineers, we need to address the issues of identity, authorization, and levels of disclosure in these interfaces and make them apparent in the interface.

Summary

The visualization approach we propose in this workshop suggests it is time to extend social visualizations from just the text domain and move beyond text to the realm of audio and video. Furthermore, we want to move beyond traditional point-line visualizations and bar graphs. The connections in point-line visualizations and the linearity of bar graphs highlight those labeled connections and obscure other connections such as place and communication frequency. To move beyond these approaches, we will present alternate visualization techniques such as abstraction, transformation, and motion in the workshop.

We argue that reconfigurable interfaces are needed that can flow between synchronous data visualizations and asynchronous data visualizations. This added context makes these visualizations all the more powerful and highlights the history component that is difficult to portray in existing point-line visualizations.

The workshop will include formal presentations, working group breakout sessions, and full-group discussion of the results. The organizers will also set up a wiki site for documentation and discussion.

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