Presenting Time-Evolving Activities Using Communication Archive Data

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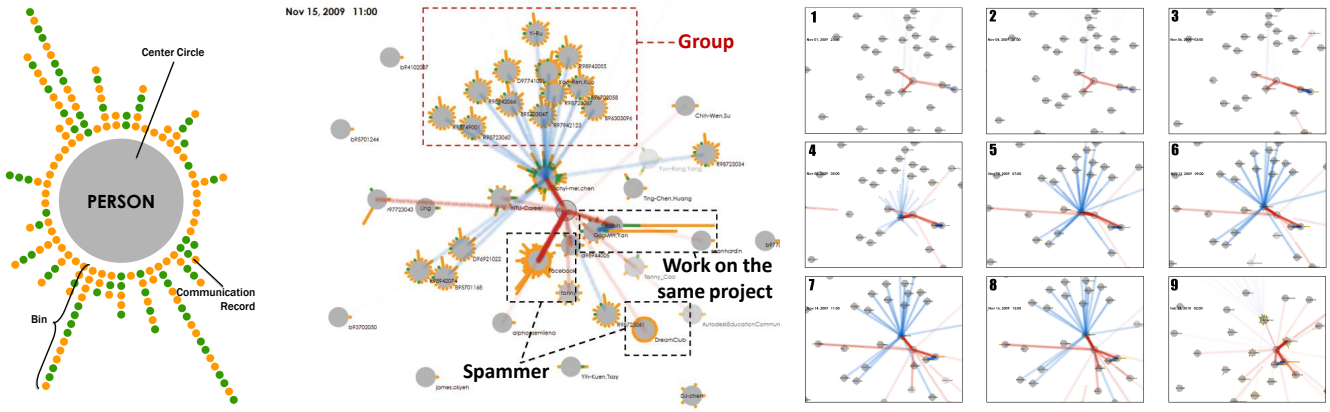

Figure 1: ***Left:*** *Each person is characterized with communication records surrounding it. The color of the communication records refers to the message types.* ***Middle:*** *An example email data of an undergraduate student is visualized. The characterized nodes reveal the communication history between a person and the student.* ***Right:*** *Animation presents the communication among these people through time. From 4th to 8th frames, the blue lines depict the group messaging behavior happened within a certain period of time.*

1 Introduction

With the growing use of online communication (e.g., email or instant message), communication data becomes rich in multiple dimensions. The data silently record our daily activities over the years, and the ability to collect and utilize such data can help to recall our everyday lives. However, the browsing of thousands of communication messages is tedious, and there is no effective ways to present past activities and interesting events to users. In this extended abstract, we present a visualization system that is designed for presenting the underlying personal activities found within large communication data. The visualization of communication archives aims to provide a qualitative view of the data, and can be brought to casual users. We characterize each person according to the communication volume, structures, and history. With the aid of animation, the system depicts the communication activities and the change of relations over time. By using the visualization, users can extend their memory from the messaging behaviors to the details of their past activities.

2 Overview

Communication records are the essential information to build the visualization. We first extract the information provided by a message, including *sender*, *receiver(s)*, *content*, *timestamp*. Then each person is characterized as a "glyph" by stacking the communication records around the person. People who share similar communication history would look similar. The system also calculates the closeness score between two people by using the communication history between them for every time step, and place them on the screen using a force-directed placement algorithm [Fruchterman and Reingold 1991]. Finally, each message is visualized as an instance when the animation is played back.

3 Characterizing each Person using Communication Records

In the visualization, the nodes are used to represent the individuals. To further understand the social position of an individual, we utilize the communication records between two people to visually encode the nodes as "glyphs" to help to disclose the types of these people. Formally, a node i at time t is defined as $N_i^t = (C_i^t, H_i^t)$, where C_i^t is the center circle of N_i, and $H_i^t = \{h_{ij}^t : 1 \leq j \leq n_i\}$ formulates the histograms formed by messages. h_{ij}^t here stands for a bin j stacked by a set of messages sent before time t, and n_i is the number of message sets of the node i. As shown in Figure 1(***Left***), the messages are visualized as small colored circles to form the message histograms surrounding the node, and the bins are evenly distributed on the circumference. In our design, the messages belonging to the same conversations are grouped together and stacked in the same bins. Figure 1(***Middle***) shows that in an example visualization of email data, people who share similar communication history look similar in our "glyph" design.

4 Presenting Activities using Communication Records

Animation is used to present the time-evolving communication activities. The design principle is that people who are close to each other is placed near on the screen. When playback animation, the message is visualized as an instance emitted from the sender to the receiver(s), with a tail following it. Figure 1(***Right***) shows the example animation of the email data, there is obvious group messaging behavior happened within a certain period of time.

5 Conclusion and Future Work

Communication archives are passive life-log materials that most people have. When using our designed system to visualize these sentiment and meaning communication archives, users are surprised to extend their memory from the communication activities to the details of their past events. In the future, we would improve the usability of the interaction model and generalize the visualization to other data.

References

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