Keeping Up with Friends' Updates on Facebook

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Abstract. Users of social network sites, such as Facebook, are becoming increasingly overwhelmed by the growing number of updates generated by their friends. It is very easy to miss potentially interesting updates, it is hard to get a sense of which friends are active and especially, which are passive or completely gone. Such awareness is important to build trusted social networks. However, the current social network sites provide very awareness of these two kinds.
This paper proposes a interactive method to visualize the activity level of friends. It creates a time- and an activity-pattern awareness for the user, as well as an awareness of the lurkers. The proposed visualization help the user to browse her friends depending on how recently they have posted and how much interactions their updates have caused.

1 Introduction

Social Network Sites (SNS) have experienced an explosive growth in recent years. There are more than 845 million active users on Facebook, and more than 57% of them log on to Facebook on any given day[4]. A large proportion of these users share updates of their status with friends, including messages about their thoughts, their current location, links to interesting articles or videos, statements of activities (e.g. they have befriended other users, or the messages generated as a side effect of playing games). Such status updates will be called "social data" in this paper. A large amount of social data is generated every day, which triggers an information overload for users.

However, it is very easy to miss something important or interesting, if one has not logged in for one or two days, and a lot of updates were shared by her friends during this period. Also it is not easy to find out if a particular user has posted something recently, or who is generally active on Facebook and who is just a lurker. Therefore, it is necessary to provide a better way to organize and present social data to make users aware of the pattern of online social activities. Information visualization technology can provide effective approaches for presenting large amounts of data intuitively, which can help users to get insights into the data, discover patterns and find information of interest easily.

[4] http://newsroom.fb.com/content/default.aspx?NewsAreaId=22

This paper proposes an intuitive and easy to understand visualization method for data streams that creates the needed awareness for the user about her social network. The implemented visualization application was designed for Facebook and provides navigational and interactive methods to access posts of all the user's friends, so she can browse the social data shared by her friends more easily and selectively.

The rest of the paper is organized as follows: section 2 presents an overview of existing social visualization tools. Section 3 describes the conceptual design and implementation of the proposed approach. Section 4 presents the future work and concludes the paper.

2 Related Work

Social visualization can be defined as the visualization of social data for social purposes [4]. In other words, social visualization uses information technology and focuses on people, groups and their conversational patterns, interactions and relationships with each other and with their community [4]. Visualizations of social data can be used for increasing awareness of one's social activities, motivating users to participate in social communities, and coordination. There are various social visualization approaches and techniques that have been proposed.

The Babble system [2] is one of the first approaches integrating the social visualization technology into an online chat room system. Each person in the system is represented by a dot of different color. A gray circle in the center of the visualization represents the proxy of the current chat room. All users, who have already logged in to the system, but not in the current chat room, will be positioned outside the gray circle. The dots located inside the circle denote users who are in the current room. When people are active in the conversation their dots move to the center of the circle, and then drift back out to the edge when they stop talking for 20 minutes.

Comtella [6] is a file-sharing community that uses a metaphor of a night sky in which every user is represented by a star. The size of the star indicates a user's number of contributions. A star with more red hue (warmer) represents a user who has shared more new files than the number of downloaded files from other users, and a star with more blueish hue (colder) represents a user who downloaded more files than she has shared in the community. The big yellow star represents the "best user" who shares more than everyone else and has contributed new things to a community. Therefore, the visualization encourages social comparison among users to increase the diversity of resources in a community.

Data portraits are very useful for this purpose. For example, PeopleGarden [8] is designed for online interaction environments such as web-based message boards, chat rooms, etc. In PeopleGarden, a flower metaphor, including magenta petal (for initial post) and blue petal (for response) has been used for each user in the system. Dots on the petal indicate the number of answers to this post. The height of the flower reflects how long the user has been in the system.

Faded petals are used to indicate old posts. People may be motivated by the visualization to post more, and in this way get more petals for their flower.

IBlogVis [3] uses the digital footprints method to help a user find interesting articles when she is browsing blog archives. In IBlogVis, each blog entry is displayed as a point on the time line located in the middle of the page. A vertical line above each point represents the length of each entry, and a second vertical line below each point represents the total length of comments this entry has collected. The circle's radius on the end of this line indicates the number of comments for each entry. This visualization application provides a rich overview of a blog.

Data streams visualization mainly focuses on high throughput streams and the objective is to visualize trends in the stream. Wong *et al* in [7] present two methods that can be combined to visualize data streams. Their methods are based on multidimensional scaling and represent objects from the stream as vectors. The vectors are then displayed on a plane. When dealing with text streams, their method can be used to extract the topics discussed in the stream. This method is designed to display a large quantity of data on a screen and therefore cannot embed all the information required by the human reader.

Facebook, as one of the most popular online communities, also has some visualization applications to help its users to explore their social data. All visualizations for Facebook, like Facebook Social Graph[5], Facebook Friend Wheel[6], Facebook visualizer[7] or Nexus[8] offer the user a better representation of her social network by organizing her friends and their relations or affinities in a graphical way. To the best of our knowledge, there is still no social data streams visualizations that allow users to efficiently browse their social data.

All those visualization methods may help the user have a better understanding of her social network or the activity occurring inside a community but none help her browse a data stream in a more efficient way. Users spend a lot of time browsing over updates they don't care about or that they might already have read if those which are popular stay on top of the representation.

This paper proposes an interactive visualization approach for Facebook's social data stream that allows discovering the time patterns and the main current contributors, as well as the lurkers.

3 Proposed Visualization

Classic data streams present social data in a reverse-chronological order. In order to ease its users navigation and not force them to browse the entire stream before finding something interesting, Facebook reorganizes the social data using its "top stories"[9] mechanism. Even without considering the fact that the "top stories"

[5] `http://www.mihswat.com/labs/app/facebook-social-graph`
[6] T. Fletcher. Friend Wheel. `http://thomas-fletcher.com/friendwheel/`, 2009.
[7] `http://vansande.org/facebook/visualiser/`
[8] `http://nexus.ludios.net/`
[9] `http://www.facebook.com/help/?faq=277741542238350`

might not be accurate for not regular Facebook users, or users that didn't fully fill their profile, the social data is still presented in a stream and includes all its limitations. First it is impossible to get an overall picture of who has posted updates recently, how recently, how many updates, and which of the friends have not been active, since only a couple of stories are presented on the screen at any given time. Also it may be overwhelming to view the posts if the user has not logged in for a long time, or if her friends have been very active during her offline period. It is also very easy to miss posts that could be potentially interesting either because they are too low in the stream or not have been selected as important by the mechanism. While Facebook provides the option to check the updates of a specific friend, it is not easy, since only a few friends are presented at a time on the screen, and to find a particular friend, a user has to search for him/her.

For these reasons, it is important to make users visually aware of who has posted and at what time, the number of posts, i.e. how active the user has been recently and how popular the posts are, i.e. how many likes and comments were received by each post.

The goal of the proposed visualization, called Rings[10], is to ensure an alternative way of browsing the stream of social data on Facebook, which allows the user to see which of her friends has been active recently, who posted many popular updates recently or not and who has stopped sending updates. This will reduce the cognitive overload of the user and will allow her to quickly check posts by particular friends, to be aware of (and possibly ignore) the most active users, and also to be aware of the users who are not posting and may be lurkers.

The design includes each individual user's representation in the visualization (for simplicity, it will be called "avatar"), visualization layout, functions, and application user interface. The avatar focuses on how to reflect the number of posts from a user during last 30 days in the visualization. How to arrange a large quantity of avatars in a neat and appealing way is a challenge that the visualization layout has to address. Rings' user interface and functions aim at providing an easy way for the user to navigate in the visualization and access the usual Facebook content through it.

Avatar Visualization. In Rings, each user is represented as a spiral. The number of the posts in last 30 days is scaled into one of the six different levels of contribution. To visualize these levels, different sizes and colors of spirals are applied to represent the six levels (see Fig. 1).

In addition to this, the related usability research shows that approximately 10% of human males, along with a rare sprinkling of females, have some forms of color blindness[11]. Thus, the six colors are carefully chosen and tested under all the forms of color blindness on Colblindor[12]. In order to help users recognize

[10] `http://rings.usask.ca`

[11] A. Wade. Can you tell red from green? `http://www.vischeck.com/info/wade.php`, 2000

[12] `http://www.colblindor.com`

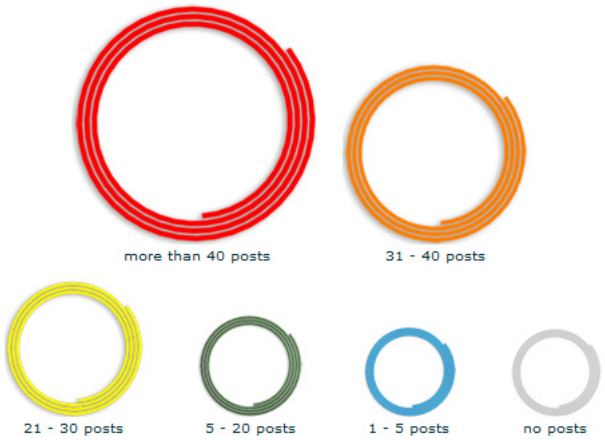

Fig. 1: Each level of quantity is indicated with a specific color and size.

Fig. 2: The profile picture and the username are displayed in the spiral.

their friends more easily, the profile picture and the username of each user on Facebook are displayed in the spiral, along with the number of posts the user has contributed during the last 30 days as shown on Fig 2.

In order to see the posts made by one of her friends, the user only has to hover the mouse over her friend's avatar to see a detailled list of her friend last 30 days activity. To reflect how interesting/popular posts are, the numbers of likes and comments they receive are used. According to the total number of likes and comments, each post is classified into 5 different popularity levels displayed with different emphasis on the screen by means of different shades of gray. All the 5 levels are presented with 5 different gray colors [1]. For example, a post with many likes and comments is shown in solid black color, while a post with no likes or comments is shown in light-gray color. Additionally, to indicate the exact numbers of likes and comments, a bracket with two numbers is added at the very beginning of each post in the floating window if there are some likes and comments for this post. For instance, [L:4 C:3] means there are 4 likes and 3 comments on this post.

This strategy is also applied to the avatar visualization on the screen to provide awareness for the user to see at a glance which Facebook friends have some interesting/popular posts. As discussed in the last paragraph, each post

is classified into one of the five different popularity levels according to the total number of likes and comments. Similarly, the avatar visualization is also classified into one of the five different popularity levels according to the highest popularity level of posts that the user has got and five different opacity levels are used to present the five different popularity levels of users.

Fig. 3: Layout of the visualization

Layout. The number of friends varies drastically among Facebook users. For example, there are quite a few users with over 1000 friends. Considering the acceptable loading time, the unavoidable timeouts of the Facebook API, and the resulting crowded screen, it is impossible to display all the friends of such a user on the screen at the same time. Therefore a restriction was introduced in the design on the number of friends that can be displayed in one screen. If a user has more than 200 friends on Facebook, they will be separated in groups of equal size $k < 200$. The user can select any of these groups to display. Then the visualization will only display these selected k friends after an acceptable loading time. The groups are balanced to prevent one screen to be packed while one has only a few users.

In order to represent how much time has elapsed since the latest post by a specific friend, the background layout was designed as a set of concentric rings, where the friends who have posted most recently are displayed in the center, and people who have posted long time ago will be shown at the periphery. There are several rings on the screen to indicate different time periods in the past. The

rings, from the center to the periphery, show the last 3 hours, last 12 hours, last 24 hours, last 3 days, last week, last 30 days, and no posts. We chose to display the activity of the user's friends during the last month, since it is a long enough period to realize who among her friends has stopped posting updates. Indeed, some users might stop posting during a couple of weeks because they are on vacations, while no activity during a whole month is much more significant. Also the next scale was to display a whole year of activity which is way too much for any user to browse efficiently her friends' social data. Each avatar representing a Facebook friend is placed on a specific ring according to the post-time of her latest post as represented on Fig 3. For example, a user will show up at the very center in the visualization if she posted something in the last 3 hours. If she stops posting anything from then on, her avatar will keep drifting to the periphery in the visualization over the next 30 days and will finally settle somewhere on the outmost ring.

Since research shows that humans naturally tend to focus their attention to the center of an image, the user's attention will focus on the most recently active users, similar to the default display option in most streams (the most recent or most popular at the top). This design also naturally focuses the attention of the user to the center (the "Bull's Eye"), where the action is, and the most recent posts are.

The concentric rings design allows for scalability, since the time periods represented with concentric circles are getting longer as they are getting further from the center of the visualization. There will be fewer people who posted very recently and the space in the center is limited, while there will be many more people who have posted in the past, the more distant the past, the larger the ring and more space available to accommodate more avatars without being crowded.

4 Future Work and Conclusion

This paper introduced an intuitive and interactive visualization creating an increased awareness in the user about her social network on Facebook and allowing her to get insight about the level and pattern of posting activities of her friends. It provides an alternative way to browse Facebook's social data stream.

The next step is to conduct a large-scale evaluation of Rings.The objective of this study will be to show that the Rings visualization helps users access the information they are interested in faster and are not bother by the noise in their social data stream. The authors have already conducted small scale studies that showed promising, while not statistically significant, results.

We also need to improve some elements of the current of Rings. Currently if a user possess more than 200 friends, they will be automatically separated into balanced groups of $k < 200$ users. This separation is currently done without any specific algorithm to regroup cluster of users together and cannot be influenced by the user. The first modification is to authorize users to rearrange groups as they like while developing an algorithm that will regroup more connected people together.

Also there are several visual parameters currently unused by Rings. First it will be really interesting to explore the angle in the visualization to position the avatars in proximity to each other, depending on different criteria, e.g. if they are friends with each other (in this way, it will create awareness of the structure of social network), or if they belong to the same organization, or share similar interests (addressed by other social graph visualizations, e.g. for LinkedIn). Various criteria for proximity can be used. In order to keep the main focus of the visualization on the time pattern of posts, the proximity would be secondary to the time pattern of posts, which is the main criterion for arranging the avatars on each ring.

Rings could take into account evidence of other user activities, such as liking or commenting, or just logging in or scrolling, rather than just number and recency of updates. This would require enhancing the visual language to distinguish visually the different forms of activity. It would be an important extension since many online community users don't consider themselves lurkers, if they read, comment or rate [5].

Finally, applying a similar visualization to other social network sites, such as Google+, Twitter or LinkedIn and creating an aggregator for all the users' social network sites is a natural extension of this work.

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