Visualization Annotation at Internet Scale

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Abstract

Visualization annotation allows users to communicate within a visualization as opposed to outside it. While effective in research settings, the technique has not found a home on today's social data analysis sites. Scaling the technique to an Internet-sized audience represents the most significant obstacle to its widespread adoption. In this paper, we discuss the problem and propose four interaction techniques to help visualization annotation scale for a Web audience. Our designs strive for clarity of the underlying visualization while providing integrated and rapid feedback about annotations.

Introduction

People analyze data through discussion (i.e., the *social* part of social data analysis). It lays the foundation for common ground and, down the road, collective sensemaking. Social data analysis research prototypes [3, 6] have advocated an integrated, fundamentally visual approach to discussions around data (see Figure 1). The proposed technique is similar to Flickr's in-image commenting [2] and annotation systems designed for web pages [4].

However, today's social data analysis sites [1, 7, 8] have adopted a more traditional Web 2.0 approach: lists of textual comments that accompany a visualization. Notably, Many Eyes also provides the ability to restore a visualization's state. This is the state
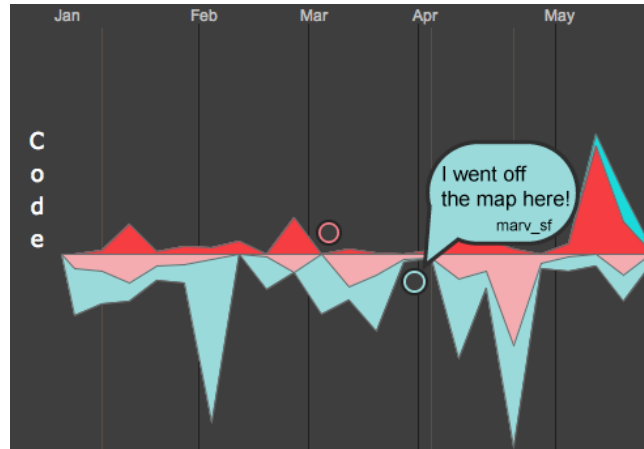
figure 1. CodeSaw's graphical commenting interface. Users leave comments tied to visualization state. Comments appear when the visualization enters a comment's corresponding state.

of the art on the Web today. While helpful, a user must ultimately break their flow with the visualization to explore comments left by other people.

Issues of scale most likely explain why we do not see visualization annotation on the Web today. The technique works well in controlled conditions, under the close watch of a researcher. But public social data analysis sites need to support many unsupervised users navigating complicated information spaces. At the moment, we do not know the techniques that can support visual annotation at Internet scale. In other words, how can many Internet users leave comments and annotations inside a visualization without overwhelming it?

In this short position paper, we explore this question. We first divide the problem into two categories: navigating annotations in the current visualization state, and navigating to annotations in another visualization state. We conclude by proposing a few simple interaction techniques designed to help visualization annotation scale to an Internet-sized audience.

Two types of navigation

When a user finds herself in a particular visualization state, she first needs a way to browse the annotations in that state. After a popular visualization has lived in the wild for some time, lots of annotations could easily obscure it. The challenge here is to represent annotations in a way that does not obscure the underlying visualization.

Beyond this, a user needs a way to navigate to other interesting visualization states (suggested by annotations in those regions). In order to maintain a user's flow of interaction with a visualization, we suggest that a visualization's interface depict the annotation space as well. In other words, as a user interacts with a visualization, its interface should provide rapid feedback on how the annotations will change. The challenge here is to do so as unobtrusively as possible.

Possible interaction techniques

In this section we propose four interaction techniques designed to help visualization annotation scale to larger audiences. Many possible solutions exist. With our designs, we aim to suggest potential directions, but more importantly, to spark discussion about visualization annotation. (Figures 2 through 4 are adapted from Many Eyes. Figure 5 is adapted from NameVoyager [9].)
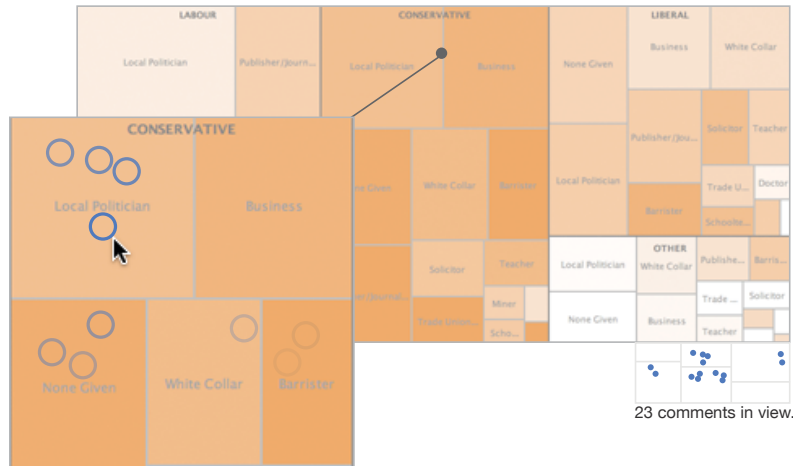
figure 2. Interaction technique for browsing annotations coupled to the current visualization state. A small thumbnail maps out each annotation while the mouse cursor acts a spotlight to reveal nearby annotations.
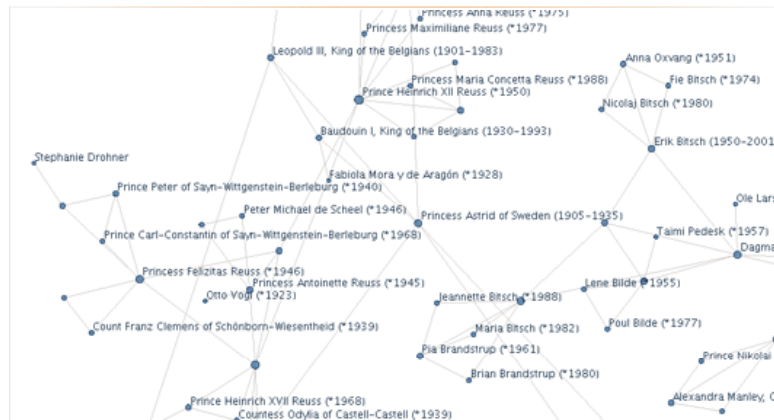

figure 3. A zoomable visualization in which the user can pan. The borders are saturated with color according to the direction in which the user will find annotations.

Figure 2 shows our prototype for browsing annotations coupled to the current visualization state. We based the design on a spotlight metaphor. Initially, annotations do not appear on the visualization, but a small thumbnail of the visualization documents each annotation's location. When the user mouses to an area of the visualization containing annotations, the annotations become visible, as if the user had shone a spotlight on them. Annotations close to the mouse pointer appear distinctly, but annotations farther from the mouse only appear as faint rings. Annotations far from the mouse do not appear at all.

Figures 3, 4 and 5 show potential solutions for providing users with rapid and integrated feedback on annotations as they interact with a visualization. In Figure 3, a user is interacting with a zoomable user interface in which he can pan. The borders of the interface direct the user's attention to other parts of the visualization containing annotations. To see how this works, imagine drawing a thick line between an annotation off-screen and the center of the view. The border in Figure 3 is saturated proportional to the amount of overlap with these lines. The border updates whenever the user pans or zooms.

Figures 4 and 5 show standard UI widgets adapted slightly to provide feedback on how an action will change or is changing the annotation space. In Figure 4, a user sees that more people found interest in exploring calories than sugar, for instance. In Figure 5, as the user refines a search query, a small label updates in response to show the changing number of annotations in the view.

figure 4. A standard drop-down widget extended to incorporate information about the annotation space. As a user decides how to change a visualization, she gets feedback on how her choices will affect annotations.
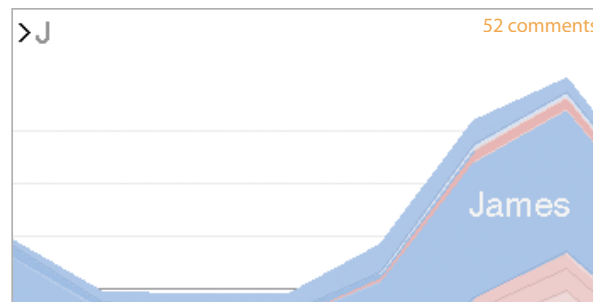

figure 5. A user refines a search query which affects the visualization underneath. As the query changes, so does information about the number of annotations in the resulting view.

Conclusion

Visualization annotation allows users to maintain their flow of interaction with a visualization while staying aware of places other people find interesting. We hope it soon finds a home on public social data analysis sites. Looking ahead, social data analysis will soon leave the walled gardens of dedicated sites for other destinations on the Web (e.g., Facebook, blogs, etc.). As this happens, designers will lose control over the context in which their visualizations appear. In order to promote collective sensemaking, the annotations, comments and discussions should stay with the visualizations. Incorporating visualization annotation is one way to ensure it.

References

[1] Chartall. http://www.chartall.com

[2] Flickr. http://flickr.com

[3] Gilbert, E. and Karahalios, K. CodeSaw: A Social Visualization of Distributed Software Development. In Proc. of Interact 2007.

[4] Golder, S. Webbed Footnotes: Collaborative Annotation on the Web. MS Thesis, MIT, 2005.

[5] Google Earth. http://earth.google.com

[6] Heer, J., Viégas, F., & Wattenberg, M. Voyagers and Voyeurs: Supporting Asynchronous Collaborative Information Visualization. In Proc. of SIGCHI 2007.

[7] Swivel. http://swivel.com

[8] Viégas, F., Wattenberg, M., et al. Many Eyes: A Site for Visualization at Internet Scale. Infovis 2007.

[9] Wattenberg, M. Baby Names, Visualization, and Social Data Analysis. In Proc. of InfoVis 2005.