

Visualizing the Republic of Letters

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ABSTRACT

Collaborative experiments that engage computer scientists and humanities scholars in visualizing large-scale historical data sets present rich opportunities both for creating new knowledge in the humanities and for exploring how scholars interpret and use data visualizations. We present visualization tools we created to explore the Electronic Enlightenment [1], a database of thousands of letters exchanged between prominent intellectuals in the 17th and 18th centuries known as the Republic of Letters. We discuss the value of our interdisciplinary collaboration for the historians and computer scientists involved in it.

KEYWORDS: Spatial, temporal, humanities, history, collaboration.

INDEX TERMS: D.2.2 [Design Tools and Techniques]: User Interfaces; H.5.1 [Information Interfaces]: Multimedia Systems; J.5 [Computer Applications]: Arts and Humanities.

1 INTRODUCTION

Historians and other humanities scholars are increasingly seeking to develop and use visualization tools, methods, and theories for making sense of patterns in large sets of heterogeneous historical data with multiple dimensions [2]. For example, the Electronic Enlightenment [1] database of over 55,000 letters and documents exchanged between 6,400 correspondents in the Republic of Letters presents a typical challenge confronting the emerging field of digital humanities. How can humanities scholars trained in close reading of individual documents make sense of patterns in large sets of data?

The new challenges posed by an exponentially growing corpus of online historical data also present an opportunity for collaborations with computer scientists interested in data visualization, interpretation, and human-computer interaction. Computer scientists are deeply interested in how users interact with visualization tools to explore, explain, and engage with data to create meaning [3]. We engaged in an iterative, collaborative effort that brought together historians, computer scientists, and an academic technology specialist to design data visualizations to represent the intellectual network of the Republic of Letters.

2 VISUALIZATION DESIGN

Large historical datasets such as this are often difficult to explore, analyze, and understand due to their size, number of dimensions, and ongoing growth as new corpuses of correspondences are added to collections. We used a metadata table from the Electronic Enlightenment with spatial, temporal, and nominal attributes to create a coordinated multi-view visualization of the

Republic of Letters. Our web-based visualizations run in the Adobe Flash Player and use the Flare visualization toolkit [4].

Humanities scholars in our group wanted to see the Republic of Letters whole at different times and from the perspective of correspondents in different places. As these spatial and temporal dimensions were most important to scholars, a zoomable vector map and a user-adjustable time slider are the most prominent features (see Figure 1). However, because the data is so rich and complex in other attributes, condensing the entire dataset into a single visualization was impractical. Instead, we enabled users to select from multiple views of graphs and animations to illustrate different attributes of the data.

2.1 Connections View

The connections view seen in Figure 1 depicts the traffic of letters between correspondents in European cities between selected years. By redundantly encoding volume with hue, opacity, and thickness of the links, the view presents a high-level overview of the correspondence network.

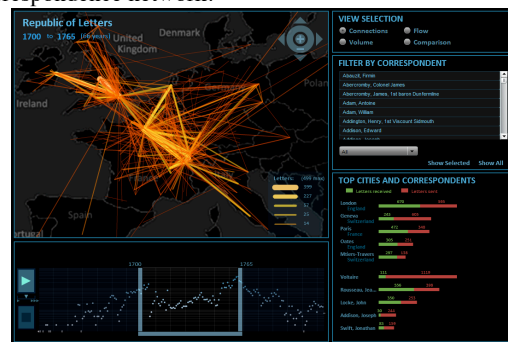


Figure 1: Connections view provided ways for humanities scholars to explore and make sense of a large dataset.

2.2 Volume View

The volume view (Figure 2) uses circular area to show the volume of correspondence to and from each city. The ratio of inbound to outbound correspondence is discernable by opposing colors.

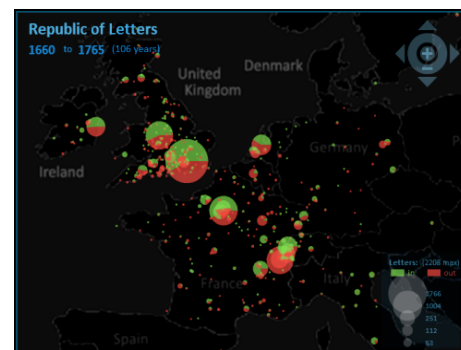


Figure 2: Volume view gives scholars a way to see the amount of correspondence exchanged by cities.

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2.3 Flow View

Because neither the Connections nor Volume views illustrated directionality of letters between cities, we sought to design a view that would reveal this dimension of the network as well. Various static views we attempted failed to represent flow clearly because of visual clutter, so we elected to animate the view. In the view captured in Figure 3, dots travel between cities, with frequency and alpha used to encode volume, and direction of movement to encode directionality.



Figure 3: Flow view offers what historian Anthony Grafton imagined and described in print as “pulsating highways.”

2.4 Comparison View

Since correspondences between authors are of key interest, an additional comparison view was made to accomplish this. The comparison view allows the user to select two sets of authors, and using two differently-colored connection visualizations, displays possible correspondences between the authors.

3 DISCUSSION

Our interdisciplinary collaboration to create an interactive visual analysis tool for humanities scholars resulted in important insights for both sides of our collaboration. For the humanities scholars, the visualization provided a wholly new perspective on the changing nature of the Republic of Letters at different times and in different places, as well as new opportunities for comparison of individual correspondents within different networks and within the larger network. Just as importantly it persuaded the humanities scholars that data visualization could be a productive element of their research process and not just a final illustration of research results. For the computer scientists, it revealed how humanities scholars interact with data visualizations in ways that are unique to their research questions. Most importantly for both sides, it opened up new questions that provide incentives for exploring further collaborations in visualizing historical data.

3.1 Interdisciplinary Collaboration

In this project, it quickly became apparent that choices about visual representations of the data that were being made by computer scientists were also interpretive choices to which the humanities scholars needed to contribute. Through discussions about the data and draft views, the computer scientists and humanities scholars learned to understand and appreciate the other’s intellectual, theoretical, and methodological approaches. One of many outcomes of this iterative process was the Comparison view, which did not exist in the first iteration. During reviews the historians expressed a desire to compare the networks of individual correspondents. Taking this specific request into account, but also cognizant of the historians’ interest in

directionality, the computer scientists chose to add both the comparison between individuals as well as a comparison view between the direction of correspondence. The result provided an entirely new dimension of exploration of the correspondences that was an extremely useful point of inquiry, but which the historians had not specifically requested.

3.2 Learning By Sharing Stories About Views

We found that one of the key ways that humanities scholars used the data visualization, in both draft and final forms, was by sharing stories about views of the data. Nearly every view provoked a conversation about the data that ranged from explanations for the patterns, such as why Voltaire’s network became more centralized after the success of his play *Candide*, to questions about particular correspondents in far off nodes of the network such as India and Panama, to new sources of data from additional correspondents that would be interesting to add to the visualization. Thus the visualization became part of the humanities research process. At the same time, the stories that the scholars told suggested additional elements for the computer scientists to consider for future iterations of this and other visualizations, such as the ability to annotate, comment, and narrate within the visualization or in a related view (c.f., [5]).

3.3 Opening Up New Questions

This visualization is still being used by humanities scholars to explore the Republic of Letters. But in many ways the questions that this visualization has opened up for humanities scholars have already proved more important than the direct insights and answers that the visualization has provided. These new questions include direct questions about the data, such as missing data and missing attributes, but also questions that will lead historians back to the archives to discover other sources to explain patterns such as the appearance and disappearance of network nodes never perceived to be important in past scholarship. This too presents new challenges for computer scientists to explore how these questions can be actively related to the data in the visualization, e.g., how missing data could be indicated and new data integrated directly within the visualizations. Our experiences suggest that visual analysis tools could benefit from more comprehensive support for the full sensemaking cycle [3].

4 CONCLUSION

For humanities scholars this collaboration provided direct new insight into the changing shape of the network of intellectuals that constituted the Enlightenment. For computer scientists this collaboration offered insights into designing productive data visualizations for scholars. Both sides concluded that such iterative collaborations around building data visualizations can be productive elements of our research processes and produce new knowledge in each of our disciplines.

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