Visualizing Time, Space, and Genealogy Sets with Maps

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INTRODUCTION

Where did my ancestors live? On the surface, this question is fairly straight forward.

In order to visualize where my ancestors lived in a clear manner using computers and maps, most people tend to use latitude and longitude coordinates. This works fairly well for cities because they do not tend to move around. With very few exceptions, cities tend to stay put once they are created. Although the tectonic plates of earth constantly move, the approximate location of a given city, say Rome, is approximately where it was when it was founded.

On the other hand, countries, states, and other large political boundaries do not behave nearly as nicely. Knowing exactly where they are at a particular time in history can be difficult and is an active research area in cartography. Even knowing exactly the boundaries of modern-day countries can sometimes be problematic due to boundary disputes.

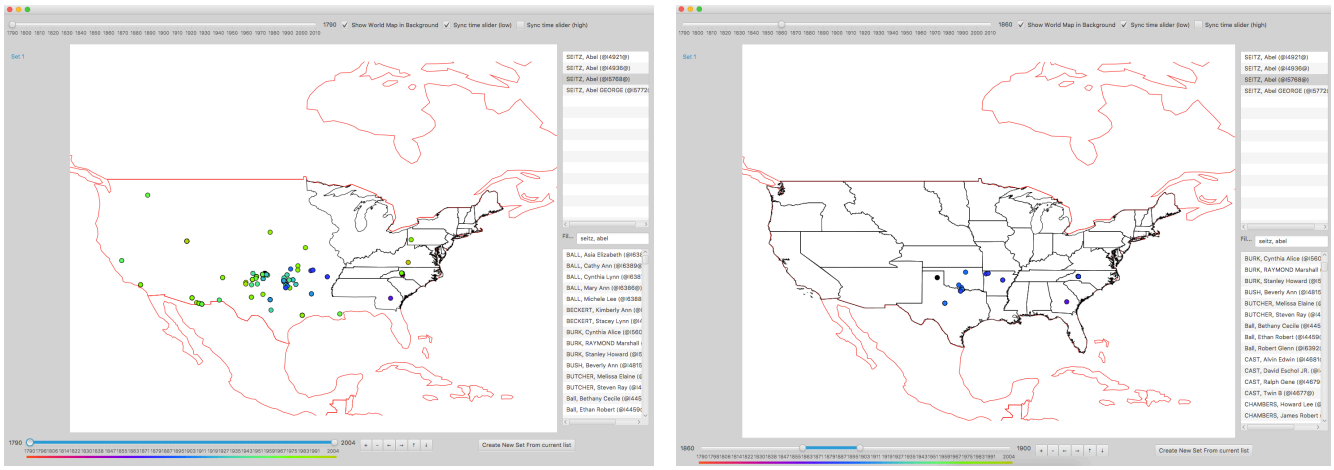
Consider a genealogical example. If all that is known about an individual is that they were born in Virginia, then there can be a potential problem.

Following tradition, an individual is visualized in the center of the particular political boundary, the middle of a city, the middle of a state – whichever place is the most exact. In this case, all that is known is the State of Virginia, so the person would be visualized in the center of Virginia. However, present-day Virginia is much smaller than it was historically. When Virginia was a colony it covered the areas of present-day Kentucky, Virginia, and West Virginia. Thus, showing a person from the center of modern-day Virginia is inaccurate and can lead to incorrect conclusions.

GENEALOGICAL ANALYSIS VISUALIZATION TOOL

In order to more accurately show where people were located geographically in the past, we present a new visualization analytical prototype that shows people in the historically-correct political boundaries based on the year of the events in their lives, **not** on the present-day map (see Figure 1).

For example, a person born in Virginia in 1810 would be shown in a historically-correct map of 1810 Virginia, not present-day Virginia.



a) b)

Figure 1. Example of the prototype showing all known descendants of Abel Seitz (born 3 Oct 1818 in Hickory, North Carolina). a) Shows all of Abel Seitz's known descendants. The map is the 1810 historically-correct map of around when he was born. The range slider (bottom left of the image) shows the entire range of all his descendants. The circles on the maps are the events (e.g. birth, death, etc.) of his descendants' lives. The color spectrum (from red to yellow) of the circles shows approximately when the different events occurred.) b) Shows Abel's known descendants between the years 1860 and 1900 (based on the range slider) shown with the historically-correct 1860 map.

Related Work

For visual analytics, the main idea is to "develop knowledge, methods, technologies and practices that exploit and combine the strengths of human and electronic data processing" [3]. Analyzing genealogical records for further insight is not a new idea (e.g. [2]).

The reason to visualize the information with maps is to help humans better grasp the meaning of the data in a more efficient manner [4]. Visualization is "the means through which humans and computers cooperate using their distinct capabilities for the most effective results. Visualization is particularly essential for analyzing phenomena and processes unfolding in geographical space" [1].

Prototype features

The unique features of our genealogical analysis visualization prototype are the following:

1. The historically-correct map presented changes based on what year the user wishes to analyze (see Figure 1).
2. The genealogical record can be broken into sets in order to better analyze the information (see Figure 2).
3. Year ranges can be analyzed instead of just viewing one static year.

Sets

In order to analyze different aspects of genealogical records, the prototype provides a number of set theory operations. For example, union, intersection, and symmetric difference are shown in Figure 1.

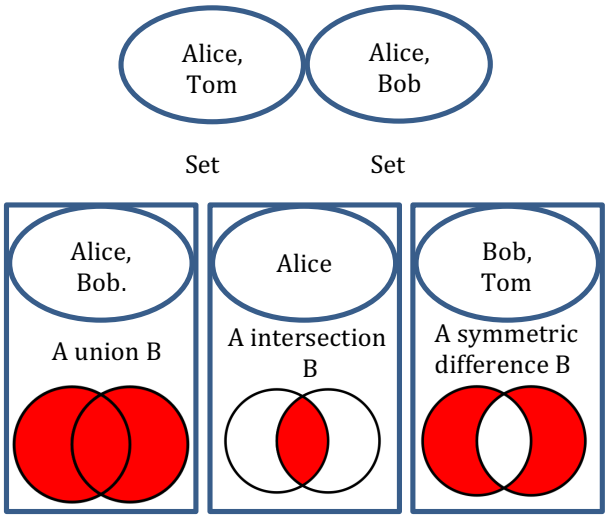


Figure 2 Visual explanation of basic set theory. The top two ovals, Set A and Set B represent two genealogical records. The bottom left box shows what the results of the operation of A union B, the bottom center box shows what the results of the operation of A intersection B, and the bottom right box shows the results of the operation of A symmetric difference B.

Year ranges

The prototype also has a range slider. Instead of a traditional slider that can only select one year, the range slider shows a range of years.

Figure 2.a shows the range slider from 1790 to 2004 – the oldest to most recent events in the selected set. The figure shows all of Abel's known descendants at once using the 1790 historical map. Figure 2.b shows only a forty-year range (1860 to 1900) showing all of Abel's known descendants during that forty-year window of time using the 1860 historical map.

Other Features

A wide variety of features could easily be added, such as pictures of the people, lines between ancestors and descendants, etc. However, in the interest of presenting the new paradigm of showing people's locations in time with historically-correct political boundaries, we have left many such features out.

Limitations

The first limitation for our prototype is that if the place and year are not known for a particular event in a person's life then no visualization is possible for that event.

The second limitation, as with all maps, is the accuracy of the historical maps is based entirely on the source of the map and not the visualization prototype.

The third limitation is showing different historically-correct political maps. Getting computer-based historically-correct political boundaries is not trivial. They can be expensive and difficult to find.

However, there is a growing number of archived maps available on the Internet. Even if most of them have not been digitized, it allows the researcher insight into ancient maps that are accurate for the time period. For example, www.oldmapsonline.org provides thousands of scanned-in historical maps. They can be easily identified or searched by zooming-in to the present-day map. For instance, zooming into modern-day Texas the website presents a series of historical maps that are relevant to that area (e.g. historical Mexican maps of old Texas, Civil War maps, etc.).

A number of digitized resources exist as well. The following list is a few examples of historically-correct digitized maps and is by no means a comprehensive list:

- Historically-correct maps of Africa from 1879 to the present: http://www.brown.edu/Research/AAAH/map.htm
- Ancient maps of Japan: http://www.fas.harvard.edu/~chgis/japan/archive/
- Historically-correct maps of China from 221 BC – 1911 AD: http://www.fas.harvard.edu/~chgis/data/chgis/downloads/v4/

- The National Historical Geographic Information System (NHGIS) - GIS-compatible boundary files for the United States between 1790 and 2010: www.nhgis.org/
- Ancient Greece and Rome: http://pleiades.stoa.org/

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