Introduction to Spatial History and Mapping

Doing Digital History

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These are notes and slides for a workshop on spatial history for the Doing Digital History NED-ODH summer institute at George Mason University.

Plan for the day

1. Overview of mapping/spatial history
2. Hands-on session:
   StoryMaps.js (Spencer Roberts)
3. Hands-on session:
   Data maps with Google Map Engine Lite
4. Hands-on session:
   Georectification with MapWarper

Within this overview, I have a few preliminary points to make, which I hope will quickly turn into a conversation. Stop me any time. I want to go through the purposes of historical mapping; describe briefly the fundamental techniques of historical mapping; show you where to find data; and if we have time, discuss one bad map.

Most of the day will be hands on. Pardon me if I use maps from my own work: the idea is that I can explain how they were made and that it will be easier for you to critique them.

Maps are really old.

An obvious point, certainly. But in what ways are maps old?

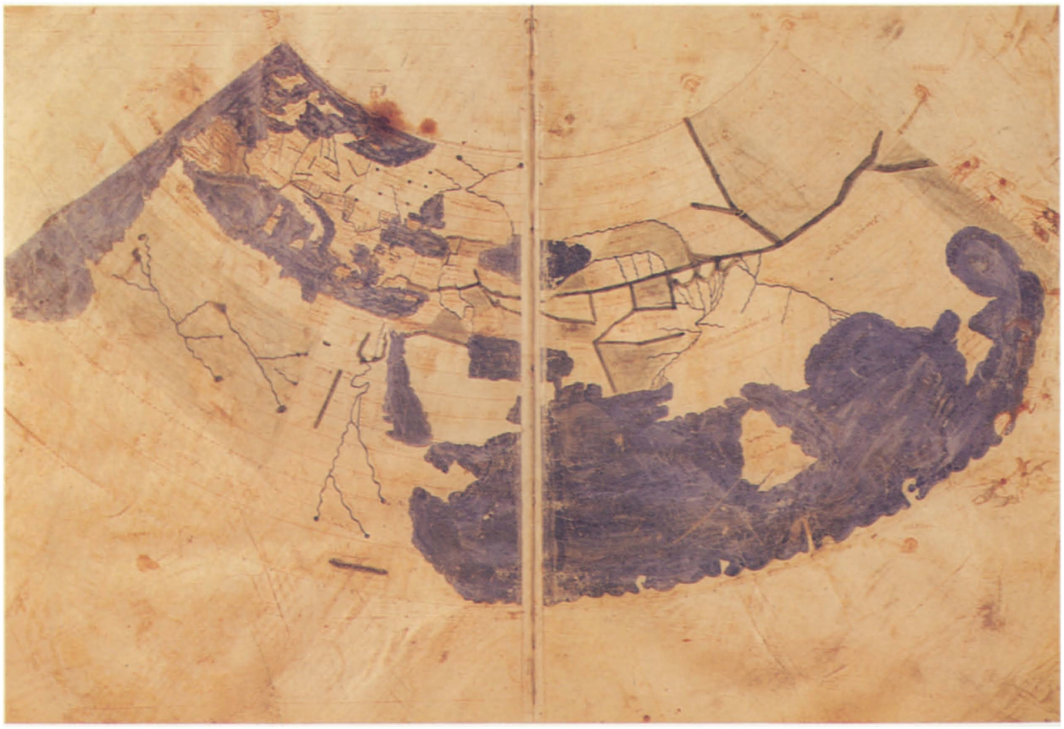


Figure: Map from a manuscript of Ptolemy's *Geography*; thirteenth-century Byzantine manuscript.

This is a map based on the work of the second-century Greek geographer Ptolemy. Mapping as a formal science is ancient.

Image from J. B. Harley and David Woodward, eds., *The History of Cartography*, vol. 1, *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean* (Chicago: University of Chicago Press, 1987), plate 9. This volume is available as a PDF online.

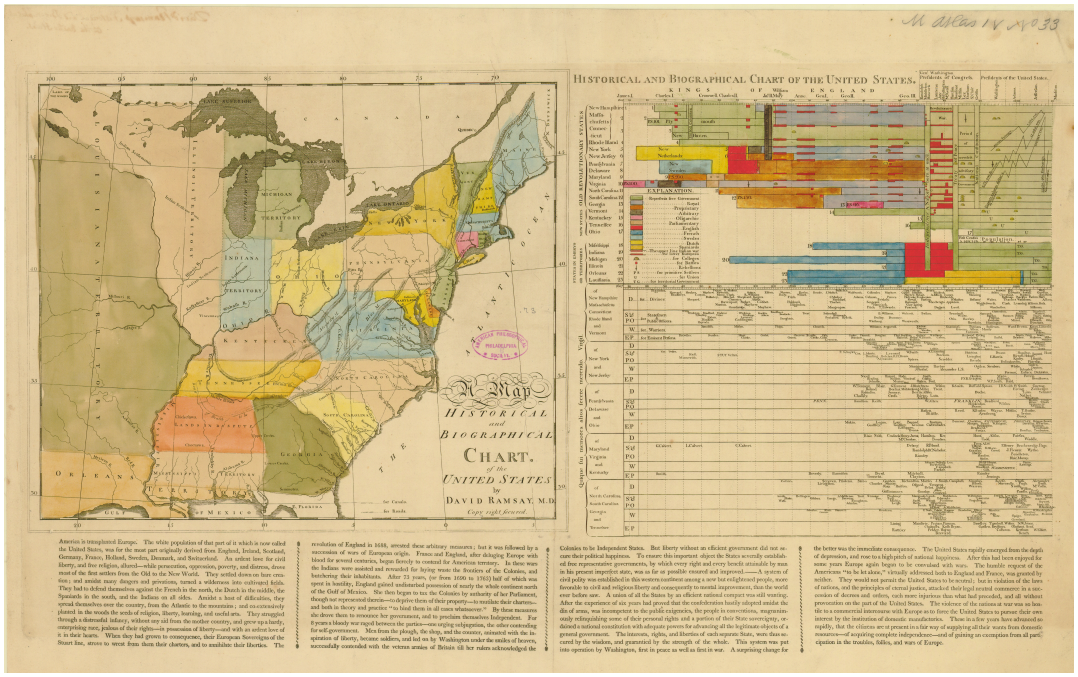


Figure: David Ramsay, *A Map Historical and Biographical Chart of the United States* (1812).

Some of the very earliest attempts to understand United States history were undertaken with maps and visualizations, as Susan Schulten has shown in *Mapping the Nation*.

This map is taken from the companion website to Schulten's book.

Figure: Frederick Jackson Turner's seminar room at the University of Wisconsin in 1894.

Frederick Jackson Turner's essay *The Significance of the Frontier in American History* is spatial history: not simply in the sense of using maps, but in the sense of trying to understand what space means for the historical process.

Spatial history is fundamental, then, (1) to the people whom we study for whom maps created a sense of nationhood, and (2) to the founding of the history as a profession in the United States.

If it seems like we are going through a spatial turn today, it is only because the linguistic turn and (perhaps) the cultural turn moved us away from using maps. (How many here received training in the era of quantitative history? How many after the linguistic turn?) The spatial turn is actually a *return* to older methods of history.

This means that digital mapping, unlike many other digital historical techniques, is not a new technique: we have a long history of knowing how to do use maps and study space.

What uses might digital mapping and spatial analysis have for your research or teaching?

But digital mapping really does hold promise for our scholarly work. I have a few ideas about what difference the *digital* in *digital mapping* makes, which we will get to in a minute. But first, I want to hear from you: how might you use digital mapping? What are your interests? (These might come from your own observations or from the reading.)

The advantages digital mapping brings

- Accessibility
- Rapid iteration
- Interactivity: scale, selection, change over time
- Integration with argument and evidence
- Abundance and scarcity
- Space integrates sources
- Addresses problem of place vs space

Accessibility means that the tools of makers are more available to both researchers like you and me who are not formally trained in cartography, as well as to students.

Rapid iteration means that we can make experimental maps.

Interactive (or animated) maps, permit us to solve some basic problems of doing history.

Scale means index, change over time means animation, selection means filtering data (the fundamental action of a historian) none of which is readily available in printed maps.

Evidence can be embedded in maps, which generally work overview to zoom to data on demand.

Mapping lets us show bring abundant sources within a manageable compass; it lets us get more out of scarce sources.

Space can be the unit of comparison that brings together disparate sources which might otherwise not be comparable.

Mapping techniques of particular interest to historians

Those theoretical ideas aren't much use to use if we can't put them into practice, and some of those ideas might not even make any sense until we run into the problems of practical map making.

Georectification

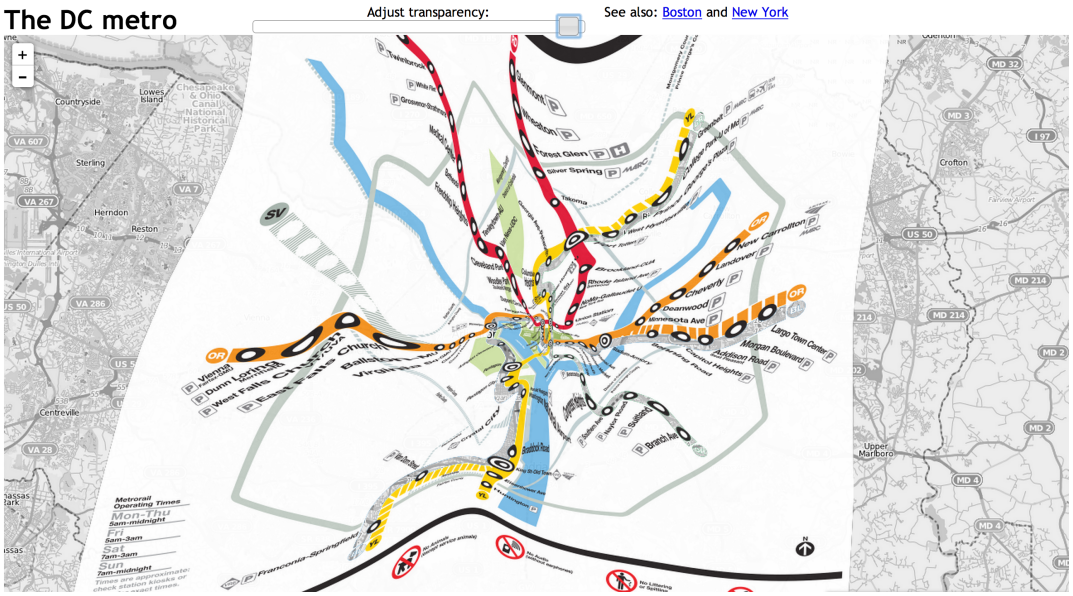


Figure: Ben Schmidt's georectified map of the Washington DC Metro

Georectification is the process of taking an image of a map and identifying which points on the image correspond to which points in a coordinate reference system (e.g., latitude and longitude) so that the image can be warped to fit that system.

The technique normalizes historical maps to a standard set of coordinates, so that we can layer them on top of contemporary maps or other historical maps and do comparisons or extract data.

The NYPL has many georectified maps: `http://maps.nypl.org/warper/`.

The image is from Ben Schmidt's website.

Geocoding

	B	F	G
	diocese	geo.lon	geo.lat
1	Baltimore, Maryland	-76.6121893	39.2903848
2	New Orleans, Louisiana	-90.0715323	29.9510658
3	Boston, Massachusetts	-71.0597732	42.3584308
4	Louisville, Kentucky	-85.7584557	38.2526647
5	New York, New York	-74.0059731	40.7143528
6	Philadelphia, Pennsylvania	-75.163789	39.952335
7	Richmond, Virginia	-77.4360481	37.5407246
8	Charleston, South Carolina	-79.9309216	32.7765656
9	Cincinnati, Ohio	-84.5120196	39.1031182
0	St. Louis, Missouri	-90.1994042	38.6270025

Figure: Turning place names into coordinates

Geocoding takes a place name and looks up its coordinates. There are any number of services that can do this for you: most of them use the Google API.

Geocoding is a particular problem for historians since place names change. Like most GIS tools, it is oriented to contemporary rather than historical data.

Named entity extraction

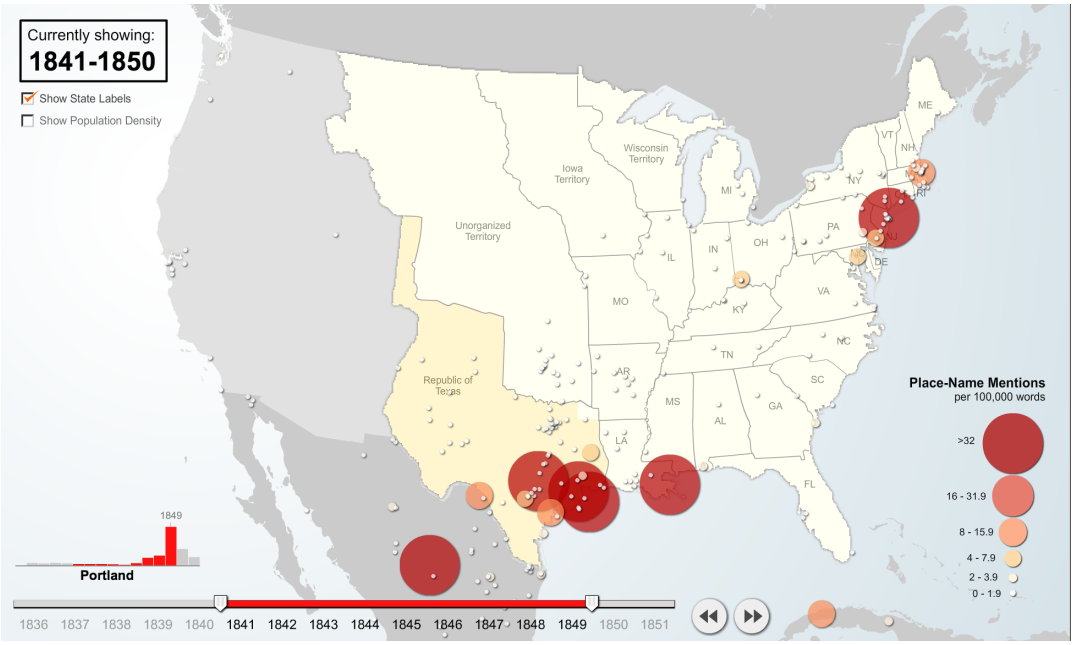


Figure: Cameron Blevins's *Mining and Mapping the Production of Space* (2014)

Named entity extraction uses computer code to find names of places (or people, etc.) in large bodies of text. These names can then be geocoded, as in Cameron Blevins's recent *Journal of American History* article and accompanying website about several Texas newspapers.

Vector maps vs raster maps

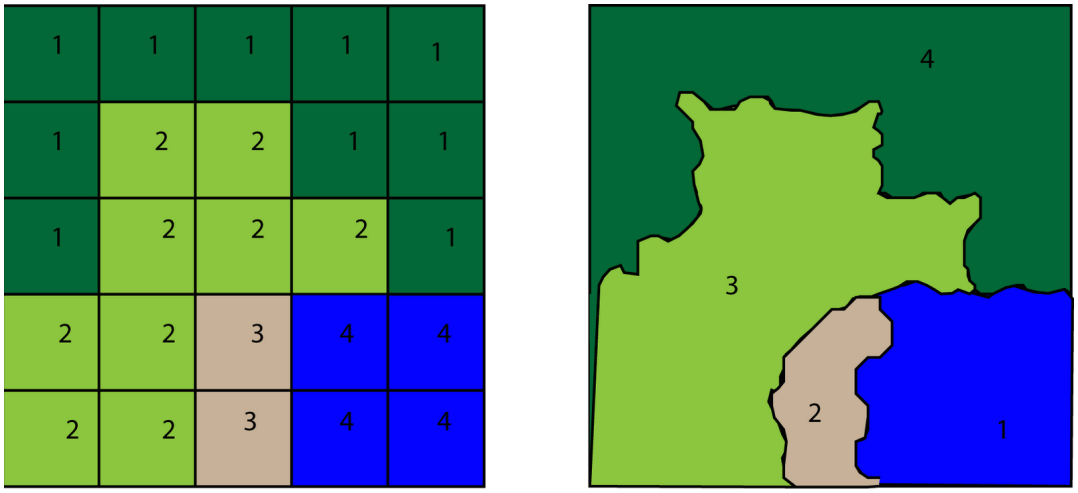


Figure: Raster images are pixels; vector images are mathematical representations

You will always find historical maps in raster format. The most common filetype for vector geographic data is the ESRI Shapefile, though there are other formats too (KML, GeoJSON, TopoJSON).

Image from the University of Connecticut libraries.

Thematic (or data) maps

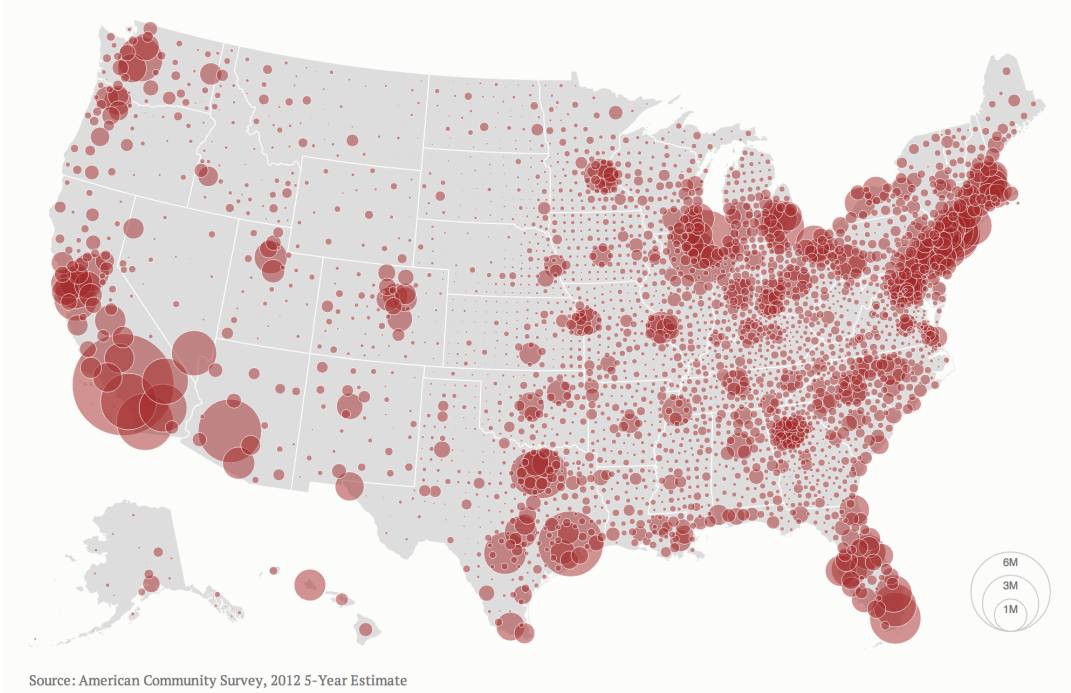


Figure: Mike Bostock's bubble map of U.S. population

A thematic map is a map in which geographic elements like rivers or political boundaries are subordinated to the display of data.

Common types of data map include the bubble map, which assigns the size of the bubble and perhaps its color to a variable, and the choropleth map, in which the geographic boundary itself is colored in.

The colors in these maps may be gradients or categorized; the values may be linear or logarithmic; there is much variation.

Aggregation maps

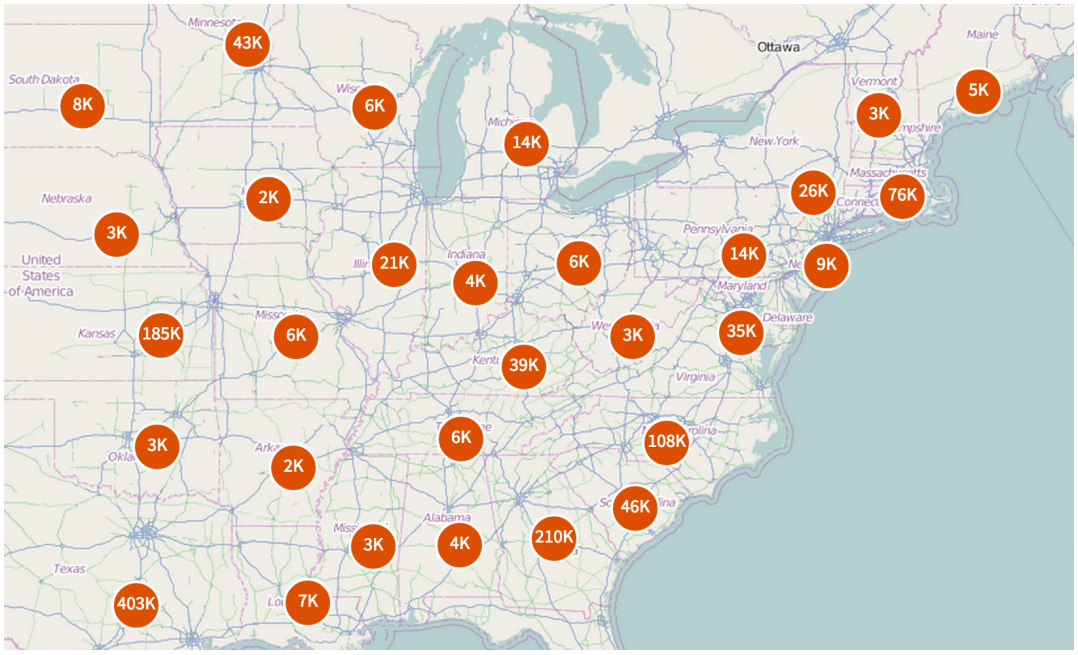


Figure: In this map of DPLA collections, each circle will disaggregate as the map is zoomed

With very large collections it is important that one have a way to browse them. Some JavaScript mapping libraries can automatically aggregate and disaggregate data points as the map is zoomed, permitting the user to browse in down to specific items.

Other ways of aggregating data include heat maps, though they do not usually have an included browse feature.

Animated maps

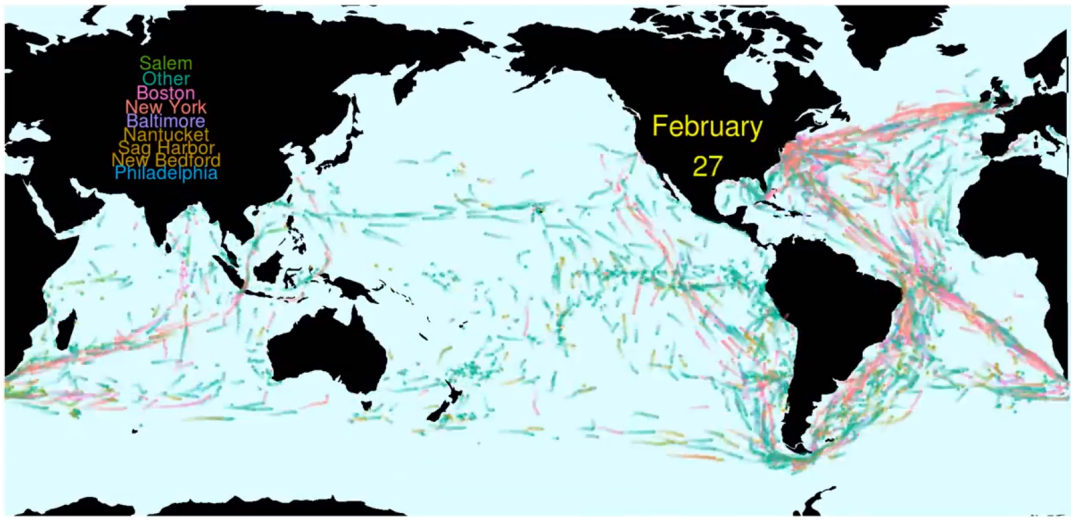


Figure: Ben Schmidt's "A Year of Early American Shipping"

Animation is not a trick or a bit of eye-candy. The eye is good at detecting motion and difference, and animation is a key technique for showing change over time.

Animated maps are hundreds or thousands of maps stitched together.

Schmidt's map is available on YouTube: `https://www.youtube.com/watch?v=WVnuWXk8w4g&list=UUn_ubXB3-cOXF3pwPyqaVgQ`.

Interactive maps vs static maps

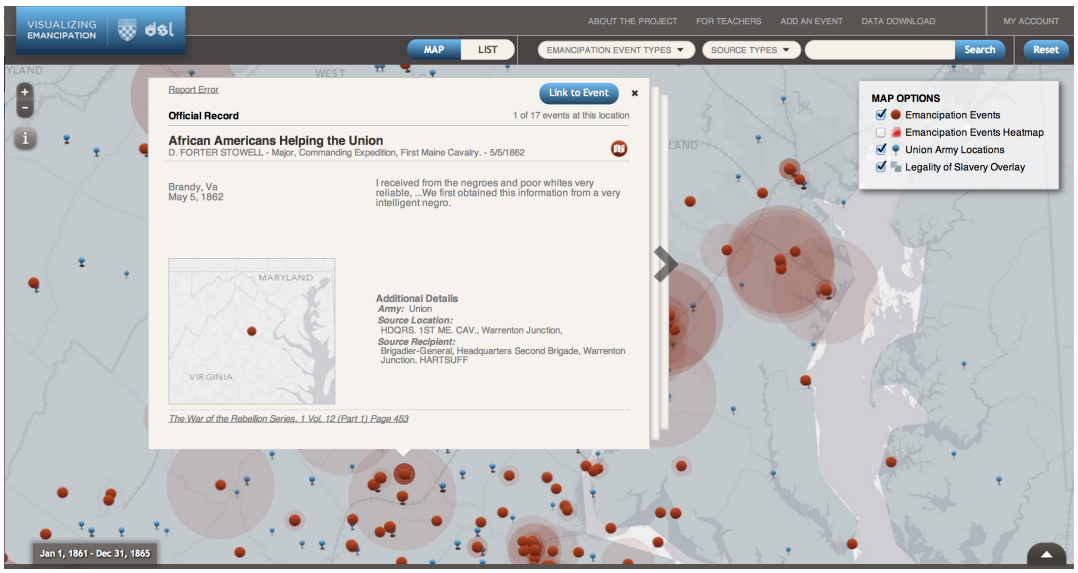


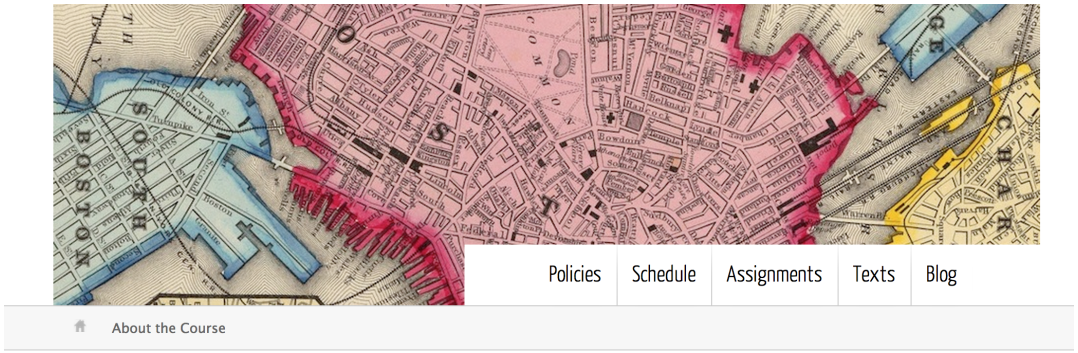
Figure: A record from Visualizing Emancipation

Maps which are made for the web can be made interactive in any number of ways. Panning and zooming is a common function. Another common option is to select which kinds of data are displayed. And interactive maps may permit the user to show change over time by controlling the date.

Some interactive maps are intended for data exploration; others for presentation.

Interactive maps are *hard*. They also often communicate less, because you cannot rely on the user to find the argument. In most cases you are better off building the one or two static maps that make your argument, unless you can justify the work to build an interactive map.

Deep mapping



About the Course

In the world of Google Maps and GPS-enabled mobile phones, the question "Where Am I?" may seem easily answered. If I asked you where you are, you'd probably pull out your smartphone and open its maps app. The app would identify the city in which you are standing, your street address, and likely all the buildings around you; Google Maps could even list your precise latitude and longitude. Other apps could help you find a nearby restaurant, theater, or favorite store. You phone can give you directions to just about any other place you wish to

Understanding Space through Building Deep Maps

HONR 3310-04 – Honors Seminar

Figure: Ryan Cordell's syllabus for a class on deep mapping

Deep mapping is not so much a technique as a goal. It seeks not merely to represent place but to explain space: to combine geography with every other conceivable form of human expression.

A scholarly deep map might contain narrative accounts, pictures, soundscapes, data, documents, graffiti, and the like.

Where to get data for mapping

By data I mean any source that is amenable to computation (in this case, mapping).

Prepackaged data

- NHGIS
- David Rumsey map collection
- Large libraries (BPL, NYPL)
- Government agencies (e.g., Massachusetts state library insurance maps)

Look for tabular data (CSV if you're lucky; Excel if you're not) and shapefiles. Look for a way to join the data.

Traditional historical sources

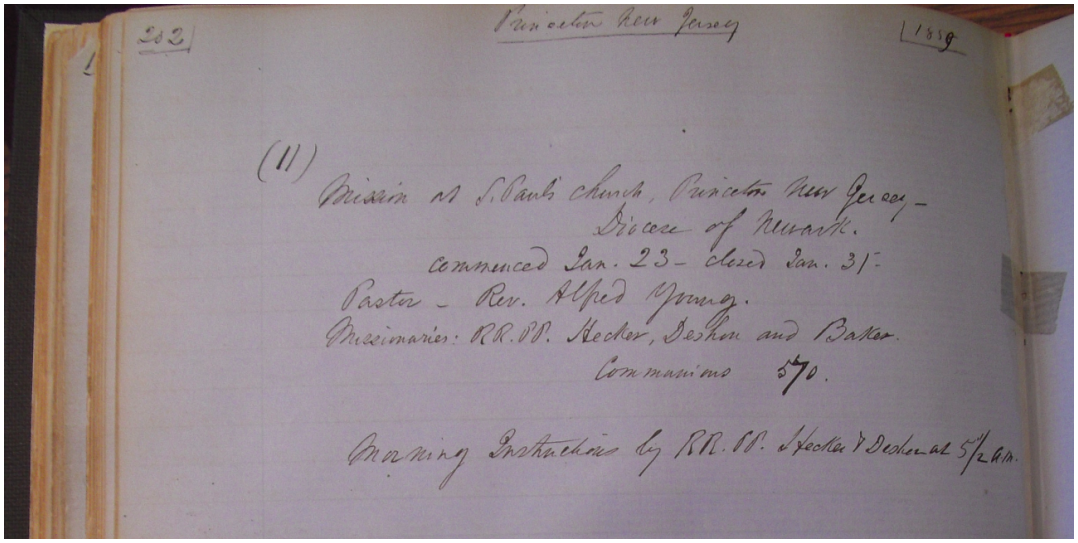


Figure: A page from the Paulist mission chronicles

Any historical source that mentions places is potential data, as long as you are willing to do the work.

80/20 rule for historical mapping

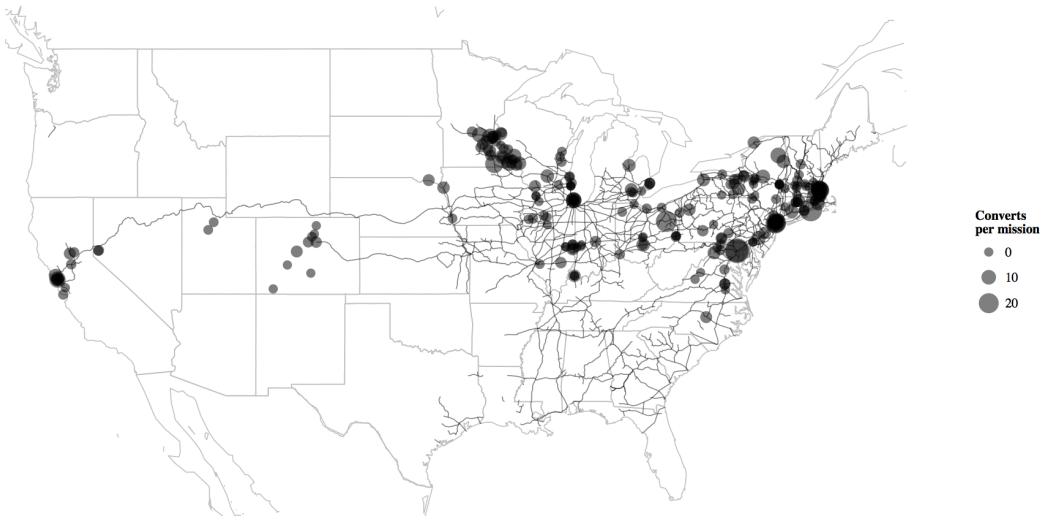


Figure: 80 percent of your time is spent gathering data; 20 percent is spent doing analysis

This is a good thing, because it means we are spending time doing historical work more than operating levers and knobs. But it also means that the biggest gains come from sharing data, as in the railroad data that Will Thomas shared which answered one of my problems.

A bad map

http://lincolnmullen.com/projects/sex-ratios/

Don't be afraid of telling lies with maps. Be afraid of failing to communicate the truth.

Sample data

http://lincolnmullen.com/files/sample-spatial-data.zip