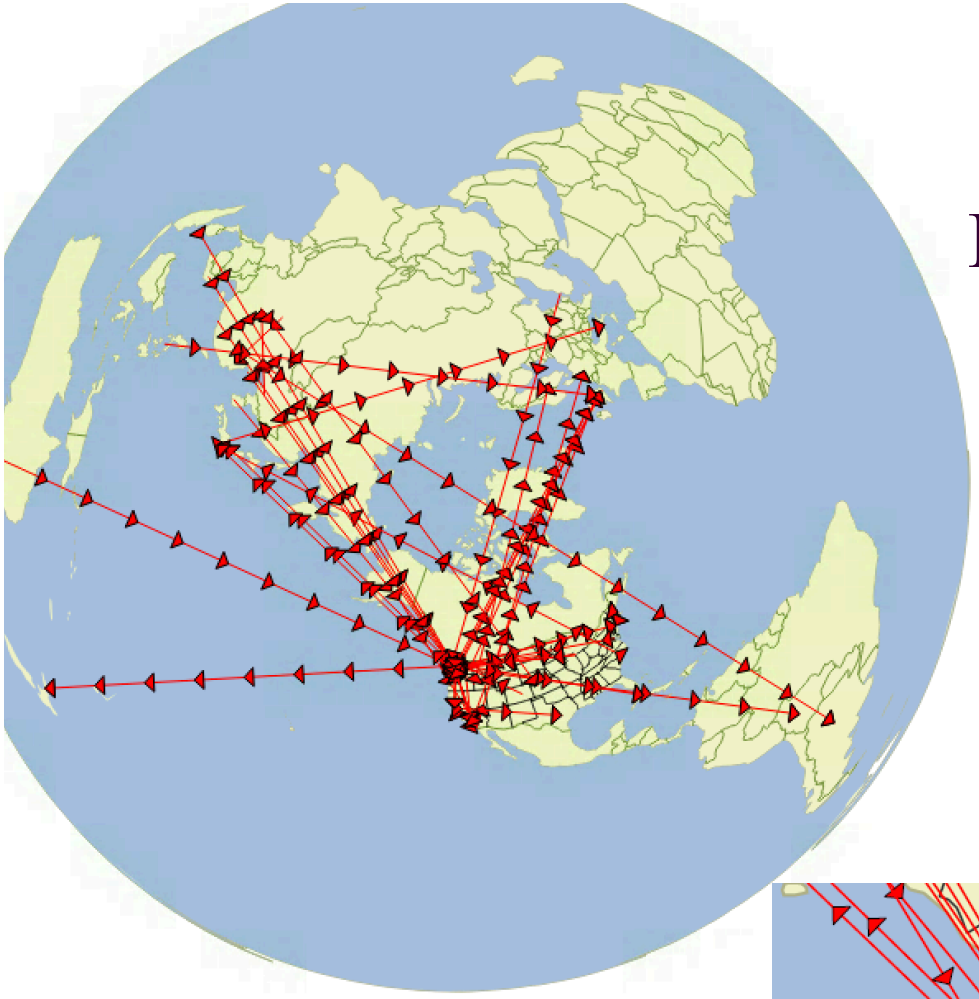
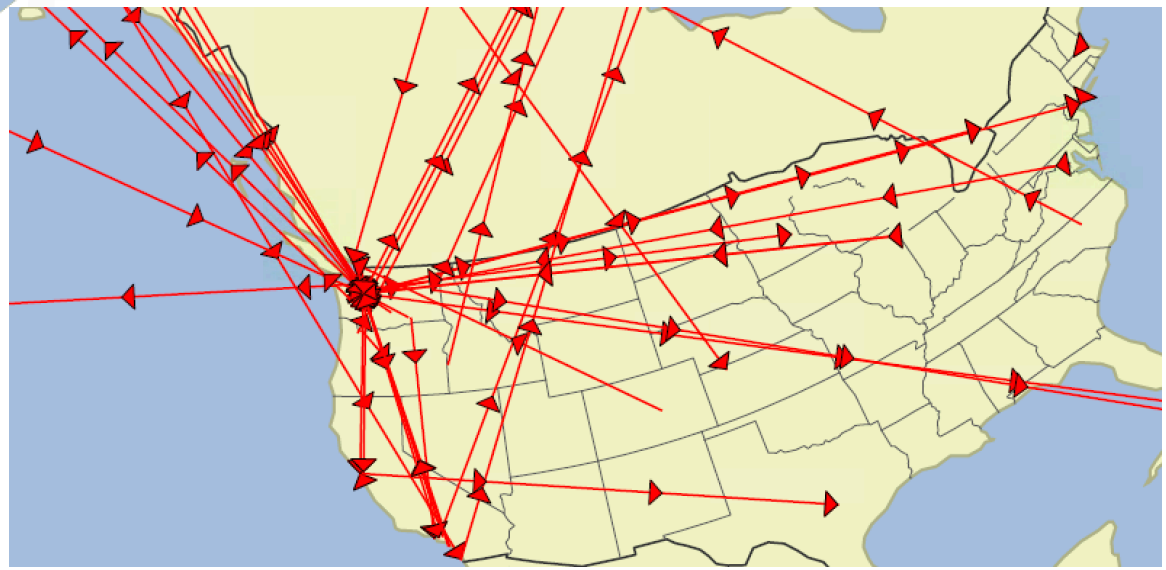


Lines

from where you are from

to where you might be

…in 10 years.



Geography 360
Autumn 2016
September 30th

Today

1. Questions that have come up?
2. Reminders: First tutorial. Readings and Slides.
3. What was involved in
   ‘mapping class geographies’?
4. What are some other things GIS can do?
5. Can we just define GIS, please?

What was involved in making these maps?

1. ‘Georeferenced’ your survey responses
   (here, this involved turning place names into geometric coordinates)
2. Loaded them into a GIS and plotted flow maps

But there are many possible ‘workflows’ to do this.

- All involve making choices and engaging tradeoffs.
- Often, resulting ambiguity is hidden in the outputs.

What sorts of decisions and assumptions did I make here, then?

What was involved in making these maps?

- I had to **choose how to 'model'** the diverse geographical concepts you offered me in human language as digital GIS data. I chose to turn everything into 'points.'
  (I could have chosen areas or more complex geometrical concepts.)
- I thus had to **choose a 'geocoder'** to turn your language into (x,y) coordinates.
  (All geocoders have strengths and weaknesses, unevenness, and you might view these as adding implicit biases to your results.)
- I **decided to 'clean' your input data**, which involved a significant amount of interpretation, even loss.
  (below, you will see some of your inputs that I had to modify…)

What was involved in making these maps?

- I had to **choose how to output the results**. I chose to use a series of 'flow maps' to show how your answers connected. (If I had chosen to not use arrows, but to plot dots where each person was born, that would have been a different map exploring different issues.)

- I had to **choose a variety of cartographic details**, beginning with my custom 'polar' projection, rotated to Seattle's longitude, usually viewed with the whole surface of the earth as the 'extent' of the map. A long list of cartographic choices made influenced the patterns you perceived.

- ***Other maps are always possible!*** Always wonder:
  - How different are the possible maps I could make with this (or with related) data?
  - How different are the stories that readers will get out of those other maps?

How?

Canvas

Data Files (CSVs, like a spreadsheet)

Where from?	Where born?	Where in ten years?
Honolulu, Hawaii	San Francisco, CA	Minneapolis, Minnesota
Kennewick, WA	Redmond, WA	Bellevue, Washington
Lacey Washington	Mazamitla, Jalisco, Mexico	Sorry. I don't have answe
Bellevue, Washington	Portland, OR	Possitano, Italy
Seattle, WA	I was born in Seattle, WA	Japan
Singapore	Washington, DC	In Seattle, Washington
Laguna Nigel, CA	Hong Kong	Seattle, Washington
Federal Way, WA	Overlake Hospital, Bellevue Washington	Seattle, Washington
Anchorage, Alaska	Bremerton, Washington	Possitano, Italy
I am from Vietnam	Yokosuka, Japan	Honolulu, Hawaii

Mathematica
(to run code I wrote)

Web requests
(like using your web browser,
but as if it were being run by a program I wrote)

Nominatum API
(website that searches OpenStreetMap to turn place names into geometries for maps)

Data stores / Files (GeoJSON, CSV, Shapefiles)

https://nominatim.openstreetmap.org/search.php?q=Paris&format=json&polygon_geojson=1&limit=1


```
[{"place_id":"127732055","licence":"Data © OpenStreetMap contributors, ODbL 1.0. http:\/\/www.openstreetmap.org
\/copyright","osm_type":"relation","osm_id":"7444","boundingbox":
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France, France","class":"place","type":"city","importance":0.97893459932191,"icon":"https:\/\/nominatim.openstreetmap.org\/images\/mapic
\/poi_place_city.p.20.png","geojson":{"type":"Polygon","coordinates":[[[2.224122,48.854199],[2.224158,48.854615],[2.224257,48.855241],
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[2.225689,48.859437],[2.225761,48.8597272],[2.2264045,48.8609577],[2.226905,48.8617931],[2.2272919,48.8625733],[2.2279465,48.8643329],
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```


QGIS
(like ArcGIS, but free & open source)

MAPS!

Not Found (and initially excluded from maps)

- Oregom
- EdinburghÂ
- Disneyland, LA or _____
- Greater Seattle Area
- I was born in Los Angeles.
- I was born in ____, lived in ____, various parts of ____ and now am in _____

Note: 24% of your initial submissions were *not found* by Nominatum!

Found wrong place due to lack of context

- W -> “Western, Kenya” (probably meant “West Seattle”)
- Washington
- Mars -> “Mars, Le Vigan, Gard, Occitanie, France métropolitaine, 30120, France
- Scandinavia -> “Scandinavia, Waupaca County, Wisconsin, United States of America”
- San Fransico -> “San Fransico, Tanti, Departamento Punilla, Cba., 5155, Argentina”

Lines

from where you were born

...to where you are from.

Before Cleaning

After Cleanin

The difference between the two maps:

‘Cleaning’ the data!

Found misleading place due to scale mismatch

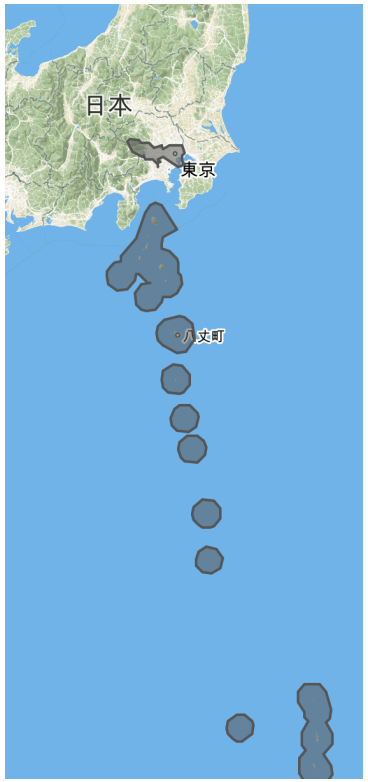
- "I am from Olympia, WA" -> "Cut-through path from Shelbourne Wy SE to 30th Way SE, Olympia, Thurston County, Washington, 98501, United States of America"
- Singapore -> "Singapore, Central Singapore Community Development Council, Singapore"
- New York -> City or State?
- U.S -> "U.S., State Highway 55, Langlade, Wolf River, Langlade County, Wisconsin"
- China (Very large. Doesn't fit into a pinpoint.)
- Philippines (See right)
- Tokyo, Japan (See right)

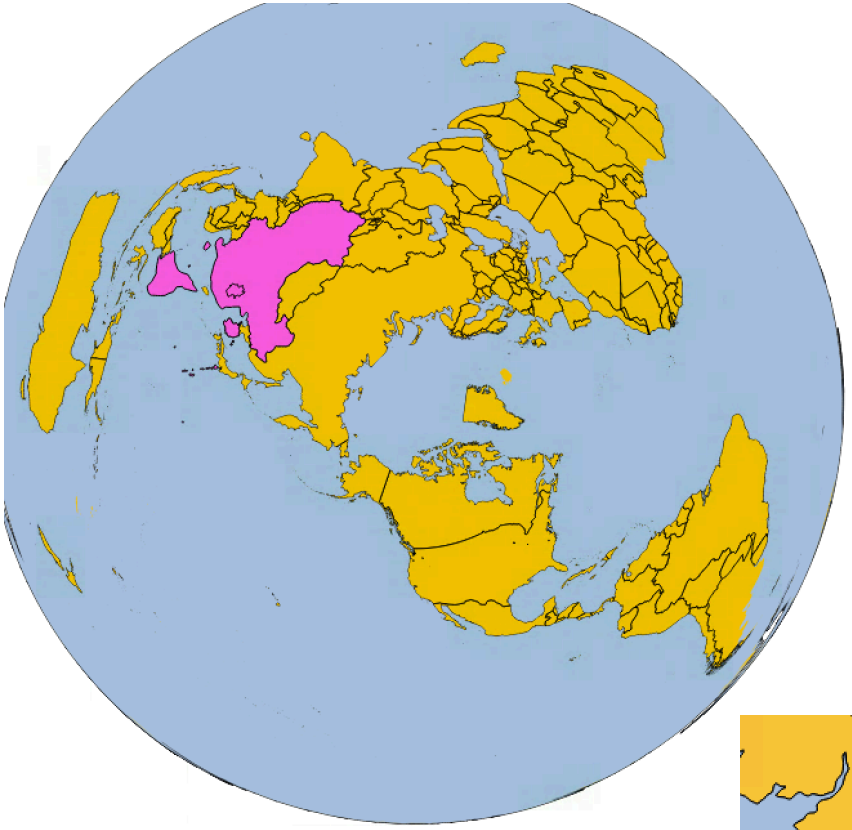
Yet… Many things worked:

- "Overlake Hospital, Bellevue Washington"

And this person had offered interpretation appropriate to the methods I ended up choosing:

"Anywhere in the pacific NW
(you can just use Seattle as a place on the map)"





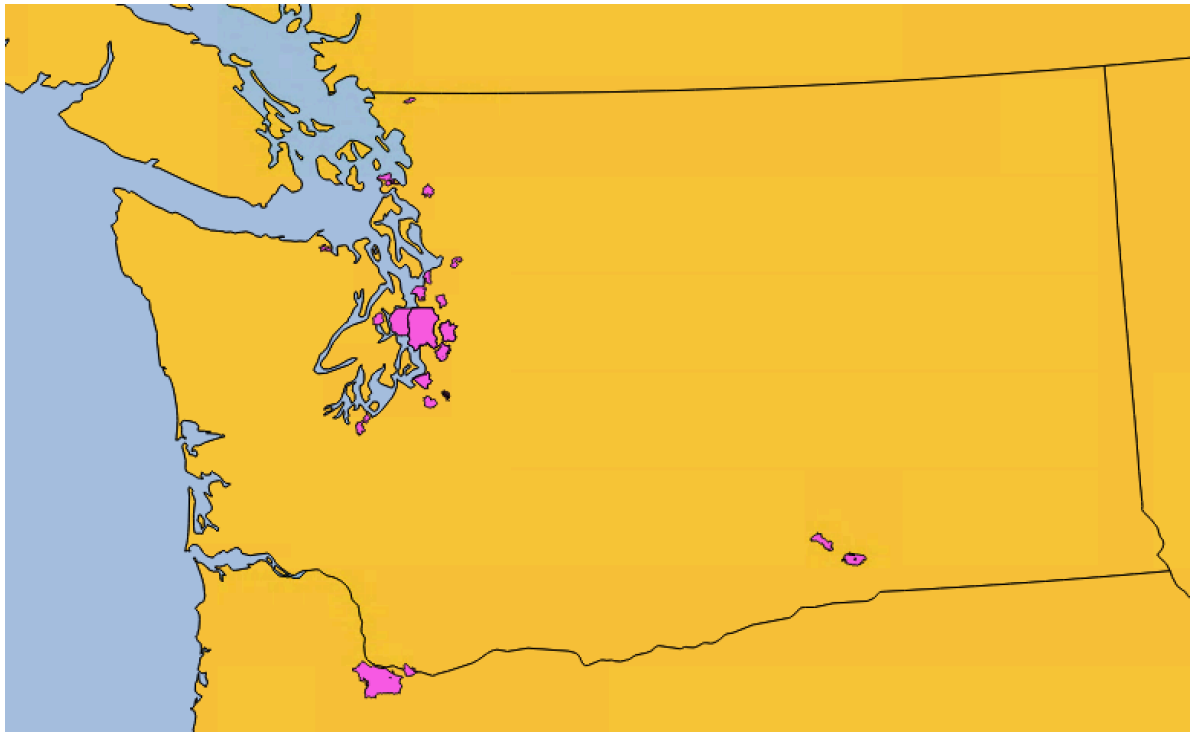
From ‘polygons’ to ‘points’:

Here’s a bit of the ambiguity in ‘where from’ that was eliminated in previous slides.

My method chose the ‘center’ of each of these territories to draw the arrows to/from.

Can you give an example of a type of data or analysis in which this might a good idea?

What about a case in which it could be a bad idea?



How?

Canvas

Data Files
(CSVs, like a spreadsheet)

Mathematica
(to run code I wrote)

Web requests
(like using your web browser,
but as if it were being run by a program I wrote)

Nominatum API
(website that searches OpenStreetMap to turn place names into geometries for maps)

- Reducing rich language that means different things to different people to single meanings.
  - (What dataset/map does Nominatum use? What are the implicit assumptions underlying that data?)
- Reducing your geographical imaginaries to points, lines, and polygons.
- Discarding data which does not fit a particular scheme or geocoding dataset.

Data stores / Files
(GeoJSON, CSV, Shapefiles)

Reducing polygons to points.

QGIS
(like ArcGIS, but
free & open source)

Technical choices…

are never just technical.

- Representing movement and aspirations by lines.
- Emphasizing certain stories over others because of cartographic choices (projection, scale, symbolization, etc.)

MAPS!

Some things you will learn in 360

- How spatial data are captured, stored, retrieved, analyzed & displayed in a GIS.
- Basic principles of cartography.
- GIS software skills.
- GIS applications in a variety of contexts.
- Critical thinking (important to innovation or change!)
  - What assumptions are implicitly being made here?
  - What are the consequences?
  - How could this work / my work / my classmate's work have been done differently? What might happen? etc.

What are some other things GIS can do?

- Enable digital management and mapping of spatial data.

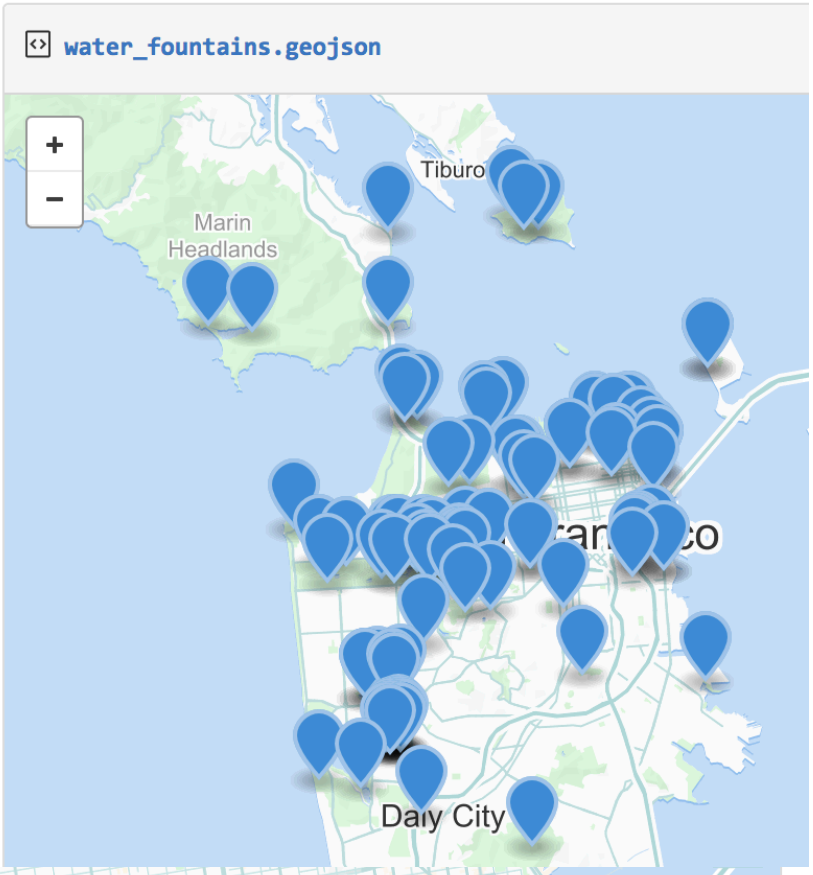
What are some other things GIS can do?

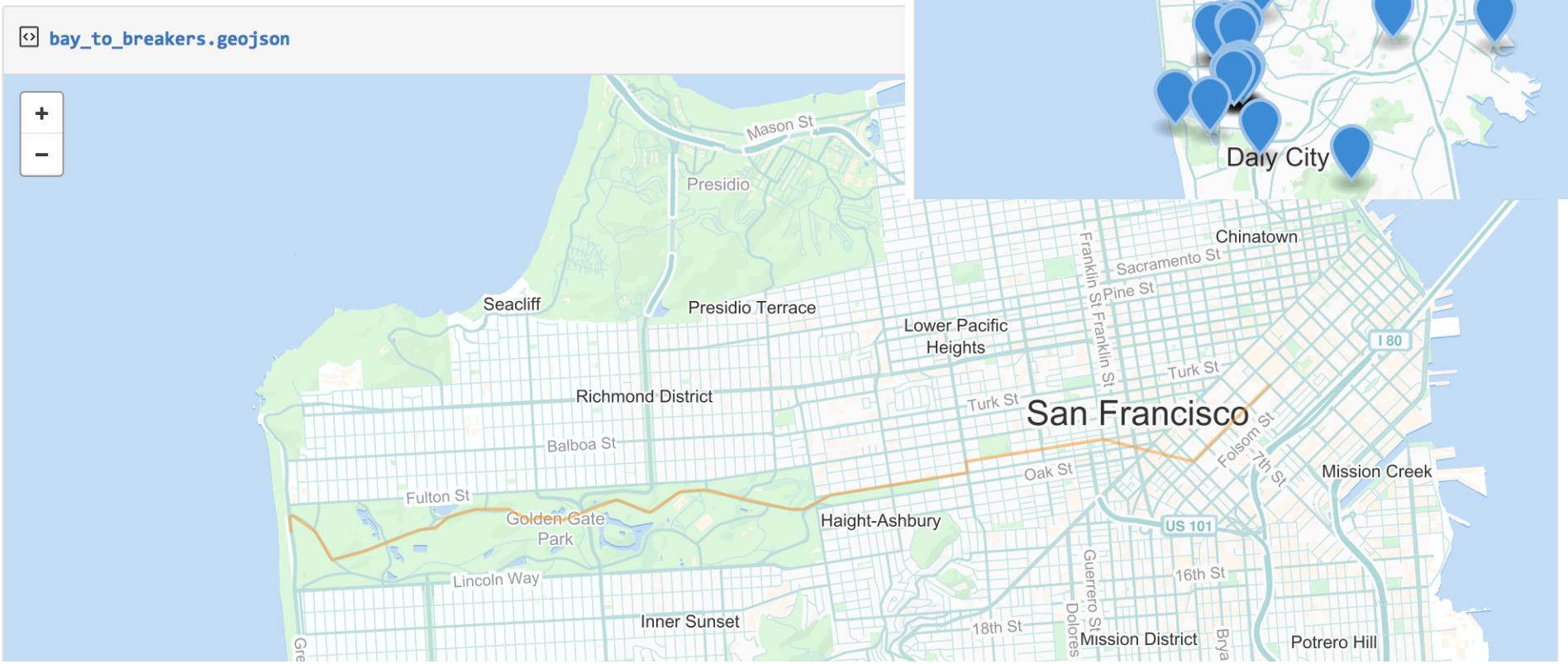
- Enable digital management and mapping of spatial data.
- Provide answers to spatial queries
  - Where are the places that both have lots of wind and can’t be seen from houses?

Another spatial query:

Where are the water fountains that are accessible to the ‘Bay to Breakers’ footrace in San Francisco?

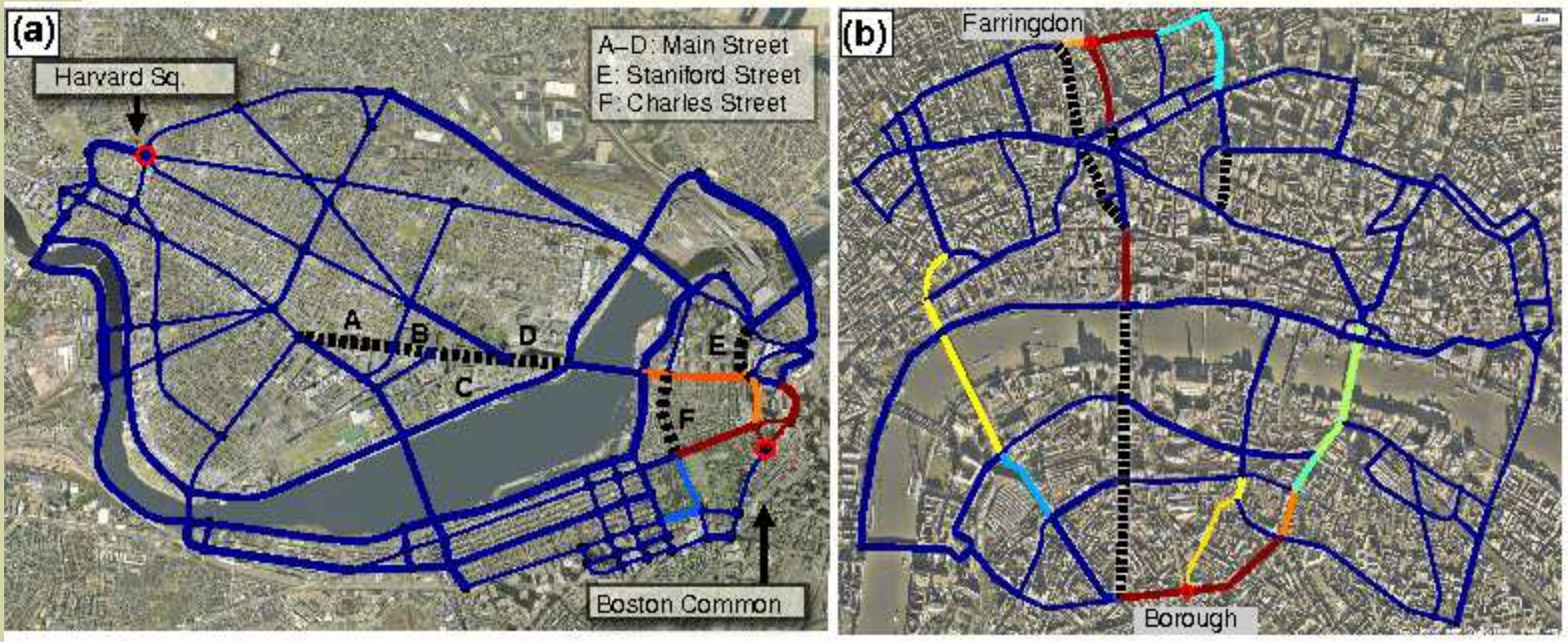
Halfway down this page, an interactive GIS tool to explore answers:
https://www.mapbox.com/blog/turf-gis-for-web-maps/





What are some other things GIS can do?

- Enable digital management and mapping of spatial data.
- Provide answers to spatial queries
  - Where are the places that both have lots of wind and can't be seen from houses?
- Enable complex spatial modeling
  - Will commute times go down (or up?) if we add this road?



"…Black dotted lines denote links whose removal reduces the travel time, i.e., allowing drivers to use these streets in fact creates additional congestion."

"This counter-intuitive phenomenon is called 'Braess's paradox.'"

(Youn, Jeong and Gastner, 2008)

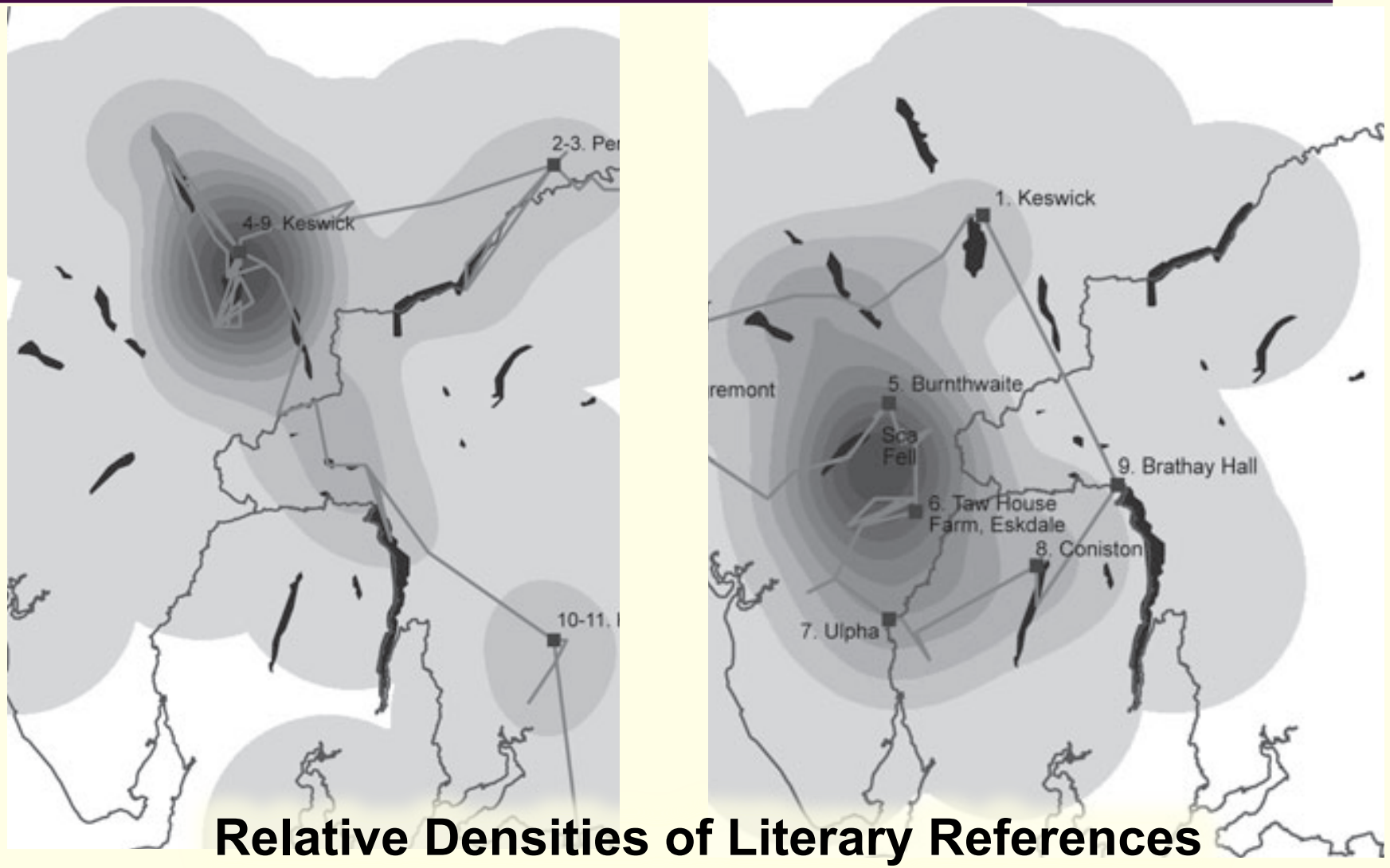
more on this later…!

What are some other things GIS can do?

- Enable digital management and mapping of spatial data.
- Provide answers to spatial queries
  - Where are the places that both have lots of wind and can't be seen from houses?
- Enable complex spatial modeling
  - Will commute times go down (or up?) if we add this road?
- Gather other or provide new perspectives…

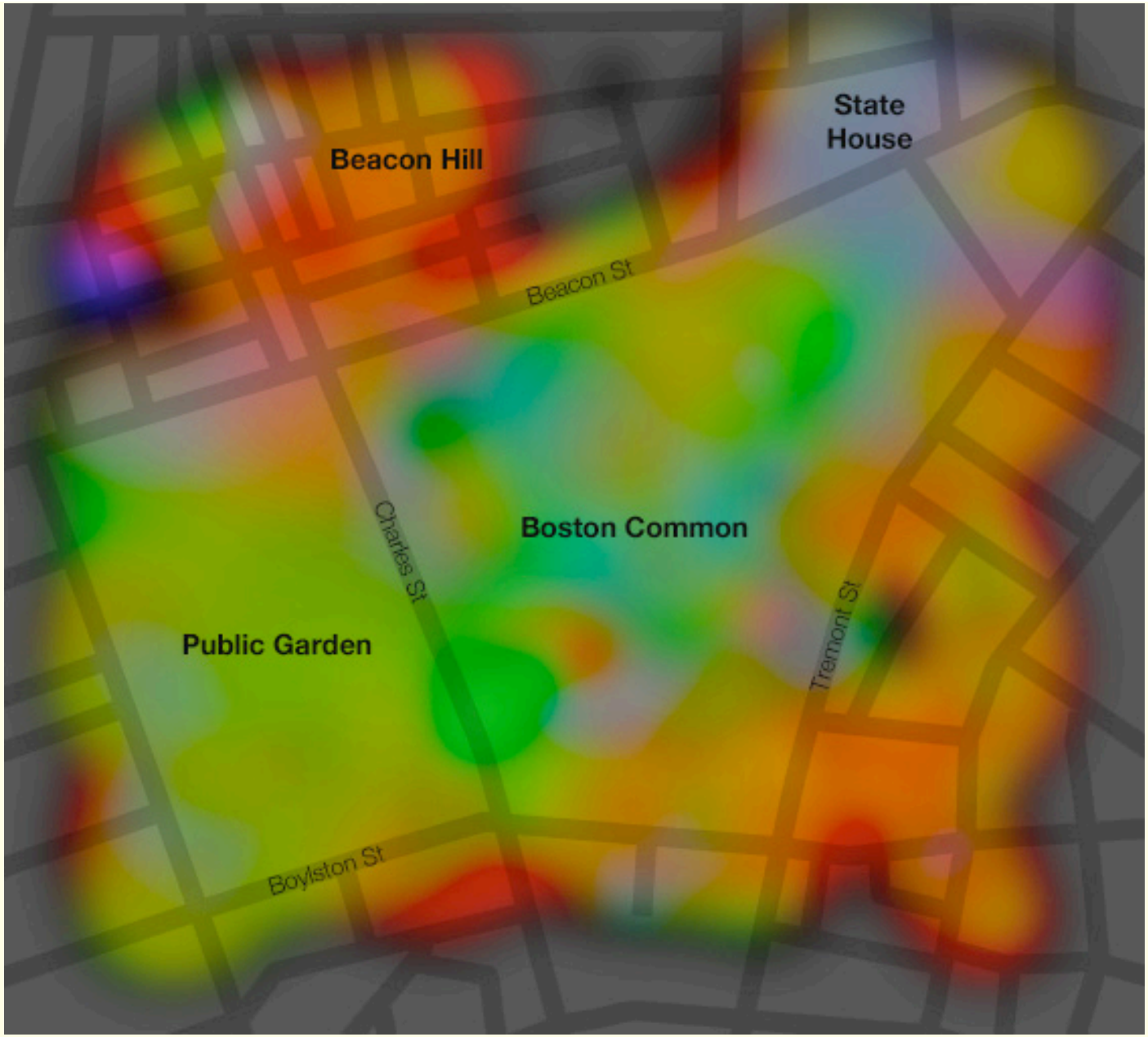
Literary GIS?

Two tours of the English Lake District:
Gray's poetry (1769) vs. Coleridge (1802)



Relative Densities of Literary References

Cooper and Gregory 2010



http://www.cartogrammar.com/blog/flickr-as-a-paintbrush/

How does what the cameras of many people focus on differ from what a single camera (e.g., Google streetview or a satellite) reports?

Can we just define GIS, please?

- There are different definitions of GIS within different areas and disciplines.
- All definitions of GIS understand *spatial data* to play a central role.
- And thus, GIS is not only a map:
  - With a GIS, you know more about a place than you can show in any number of given maps.
  - GIS involves a *database* that is linked to the visualizations (often maps) and *spatial analysis* techniques that you can run on the data to produce different results/data.

Definition 1: A GIS is a tool[box]

"*a powerful set of tools for storing and retrieving at will, transforming and displaying spatial data from the real world…*"

(Burrough, 1986, p. 6).

"*automated systems for the capture, storage, retrieval, analysis, and display of spatial data*." (Clarke, 1995, p. 13).

Definition 2:
A GIS is an information system

"*An information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-referenced data, as well as a set of operations for working with the data*" (Star and Estes, 1990, p. 2).

Definition 3:
GIS is actually a type of 'science'

- Geographic Information Science is mainly research *about* GIS, not just *with* GIS.
- About GIS = Exploring different ways we might represent geography with computers, manipulate geographical data, visualize it, and involve society in the process.
- With GIS = applications to real world research questions.

Where Did GIS Come From?

- Has intellectual origins in multiple overlapping disciplines/fields, including geography, cartography, urban planning, environmental science, computer science and mathematics.
- Also has origins in the needs and processes of many kinds of social activities, from resource management, to the study of populations, to issues of war and peace, among others.
- Note: A lot of the intellectual and practical foundations of understanding geography quantitatively and computationally were actually worked out here at UW Geography around 1960!
  (Read about the 'space cadets' for more…)