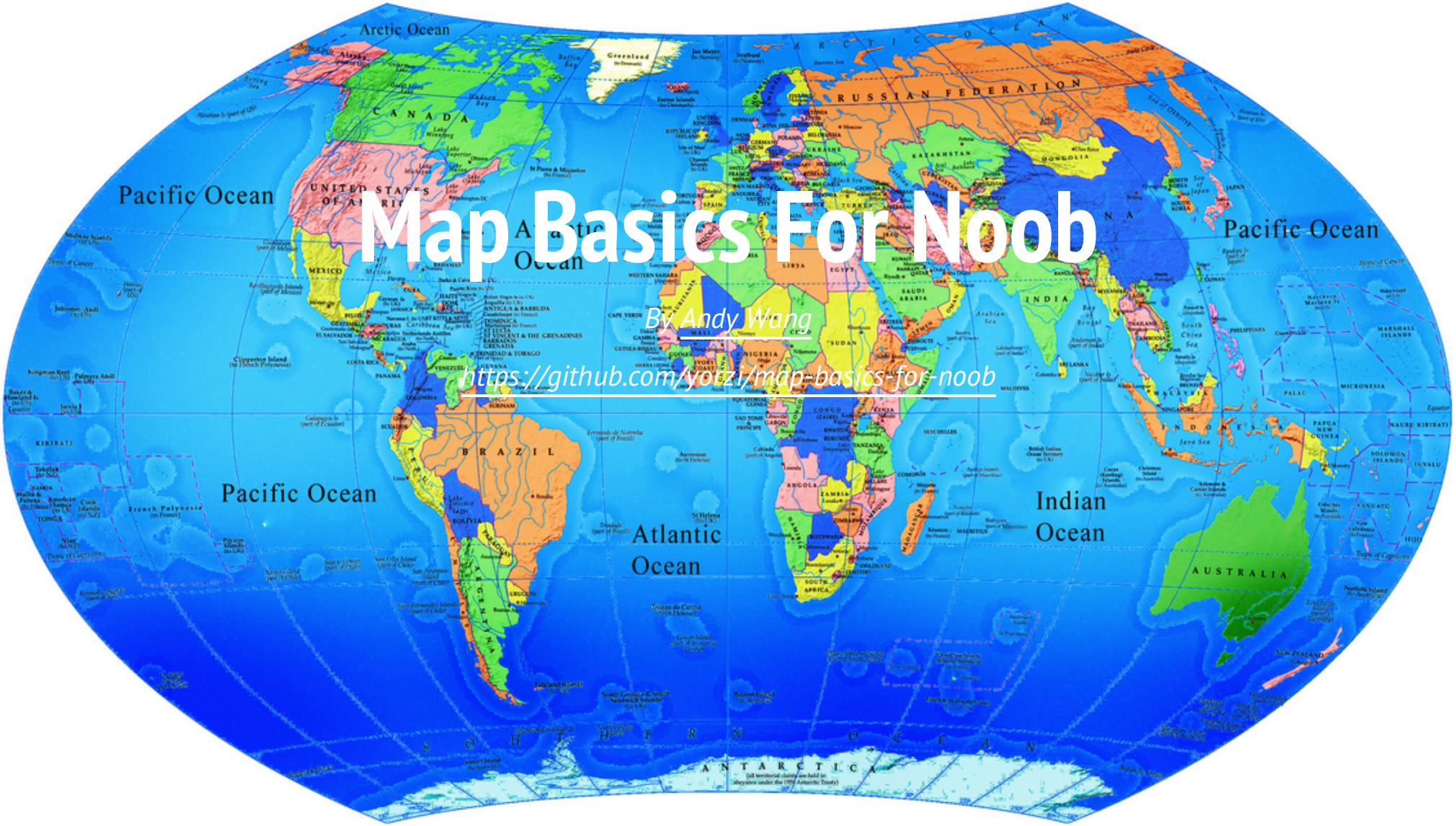


Map Basics For Noob

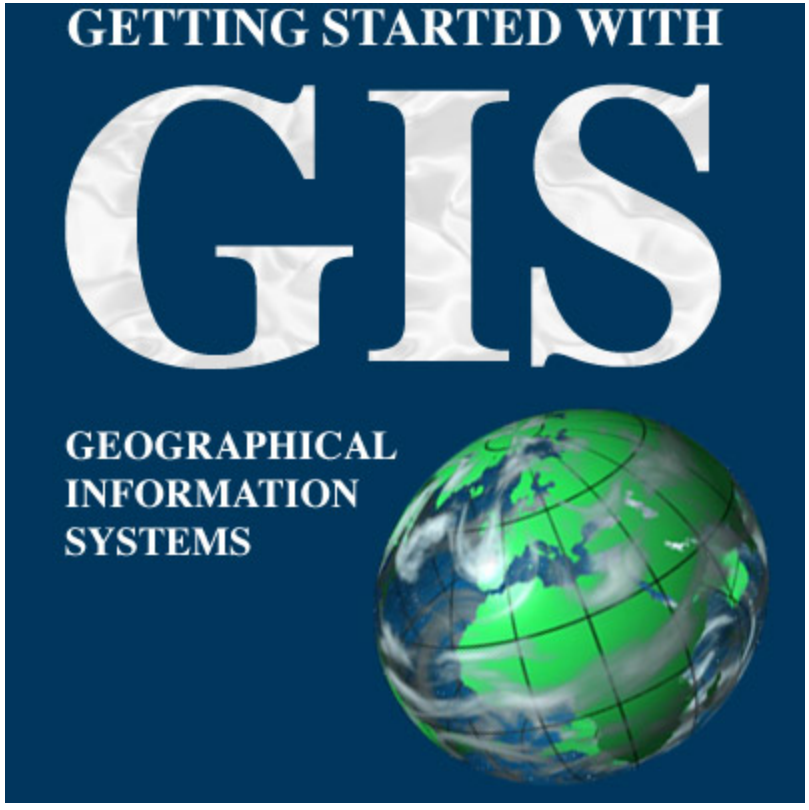
By Andy Wang

https://github.com/yorzi/map-basics-for-noob

Newbie?

Core Concepts

1. GIS
2. Map projections
3. Coordinate systems
4. Zoom levels
5. Layers
6. Spatial databases



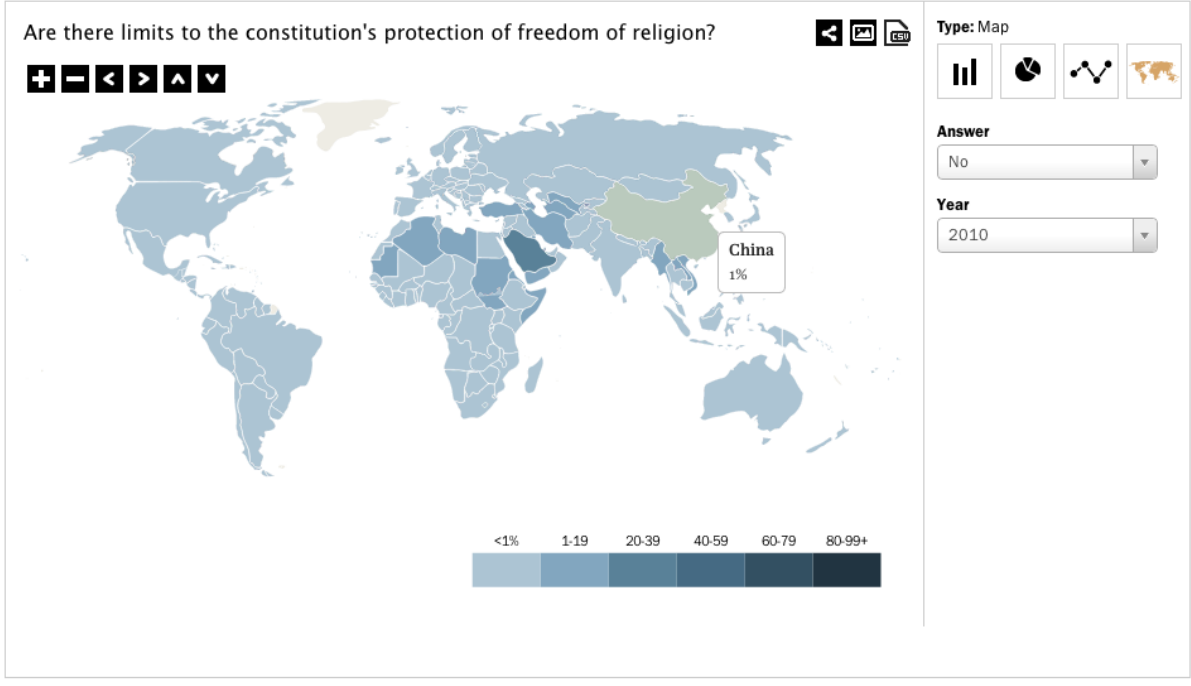
1. Geographic Information System

“GIS refers to any system dealing with the recording, analysis, or display of data that is related to a location.”

http://www.esri.com/what-is-gis

http://www.uwyo.edu/smtc/edparc/_docs/_arcview_tips/basicgisconcepts.pdf

Sample project:



http://globalreligiousfutures.org/

2. Map projections

“Projections refer to the method used for representing a three-dimensional object like the Earth on a two-dimensional surface like a sheet of paper or a computer screen.”

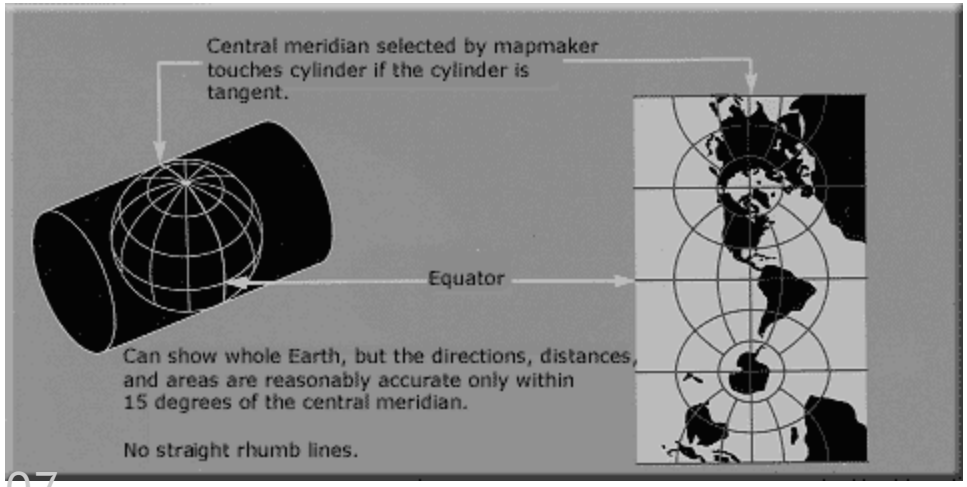
https://github.com/mbostock/d3/wiki/Geo-Projections

http://en.wikipedia.org/wiki/Map_projection

http://www.jasondavies.com/maps/transition/

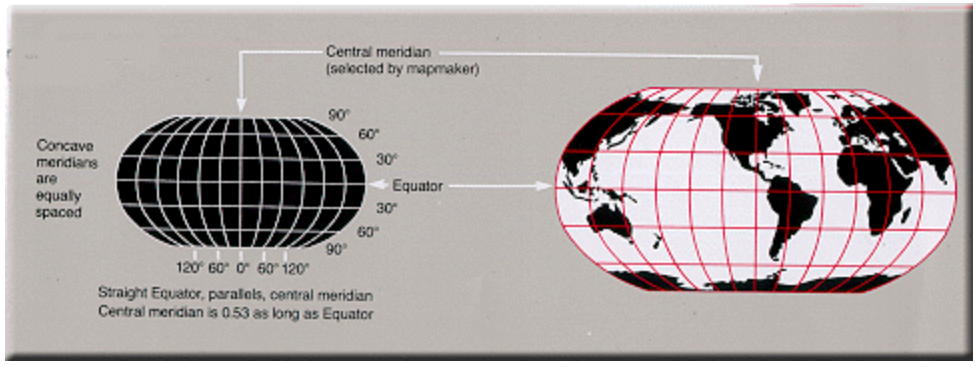
Mercator projection

“A transverse Mercator projection is mathematically the same as a standard Mercator, but oriented around a different axis.”



Robinson projection

“adopted by National Geographic Magazine in 1988 but abandoned by them in about 1997 for the Winkel Tripel.”

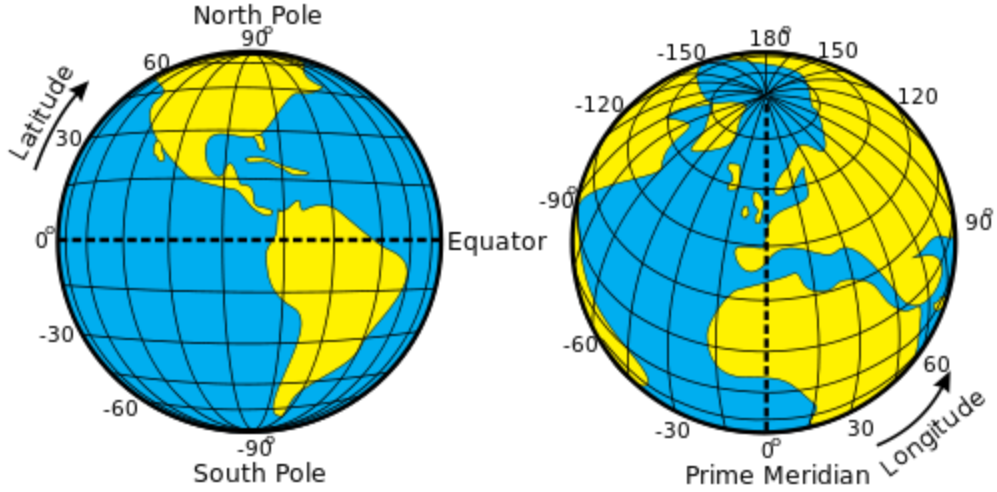


3. Coordinate systems

Projections refer to the method used for representing a three-dimensional object like the Earth on a two-dimensional surface like a sheet of paper or a computer screen.

http://en.wikipedia.org/wiki/Geographic_coordinate_system

Latitude and Longitude of the Earth



4. Zoom levels

“A zoom level is a predefined scale at which a map is rendered. OpenStreetMap, Google Maps, and most other online maps zoom levels are scaled such that the entire world fills a 256x256 pixel tile at zoom level 0, and doubles in width & height at each subsequent zoom level.”

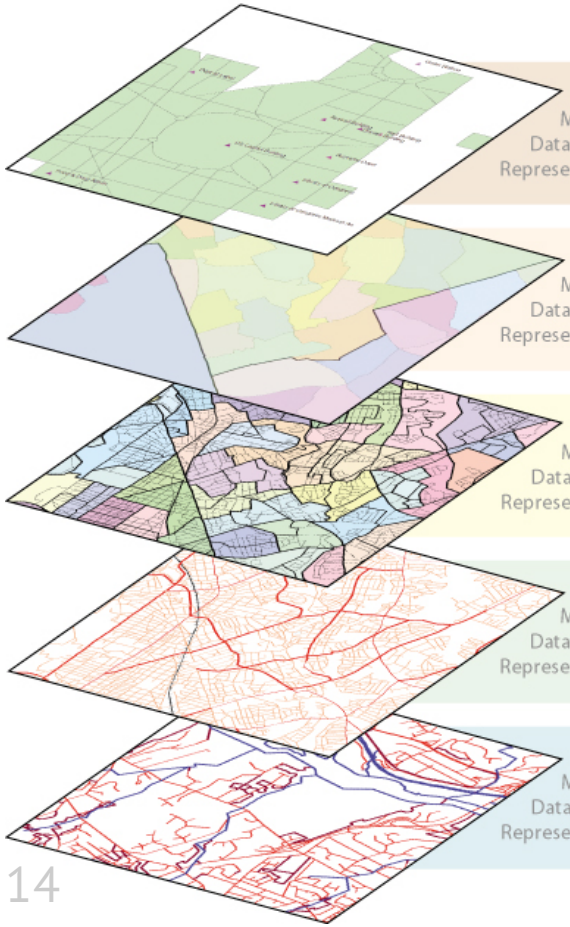
http://wiki.openstreetmap.org/wiki/Zoom_levels

Level	Degree	Area	m / pixel	~Scale
0	360	whole world	156,412	1:500 Mio
1	180		78,206	1:250 Mio
2	90		39,103	1:150 Mio
3	45		19,551	1:70 Mio
4	22.5		9,776	1:35 Mio
5	11.25		4,888	1:15 Mio
6	5.625		2,444	1:10 Mio
7	2.813		1,222	1:4 Mio
8	1.406		610.984	1:2 Mio
9	0.703	wide area	305.492	1:1 Mio
10	0.352		152.746	1:500,000
11	0.176	area	76.373	1:250,000
12	0.088		38.187	1:150,000
13	0.044	village or town	19.093	1:70,000
14	0.022	largest editable area on the applet	9.547	1:35,000
15	0.011		4.773	1:15,000
16	0.005	small road	2.387	1:8,000
17	0.003		1.193	1:4,000
18	0.001		0.596	1:2,000

5. Layers

“Data on different themes are stored in separate “layers”. As each layer is geo-referenced layers from different sources can easily be integrated using location. Layer can be used to build up complex models of the real world from widely disparate sources.”

see some layer related charts.



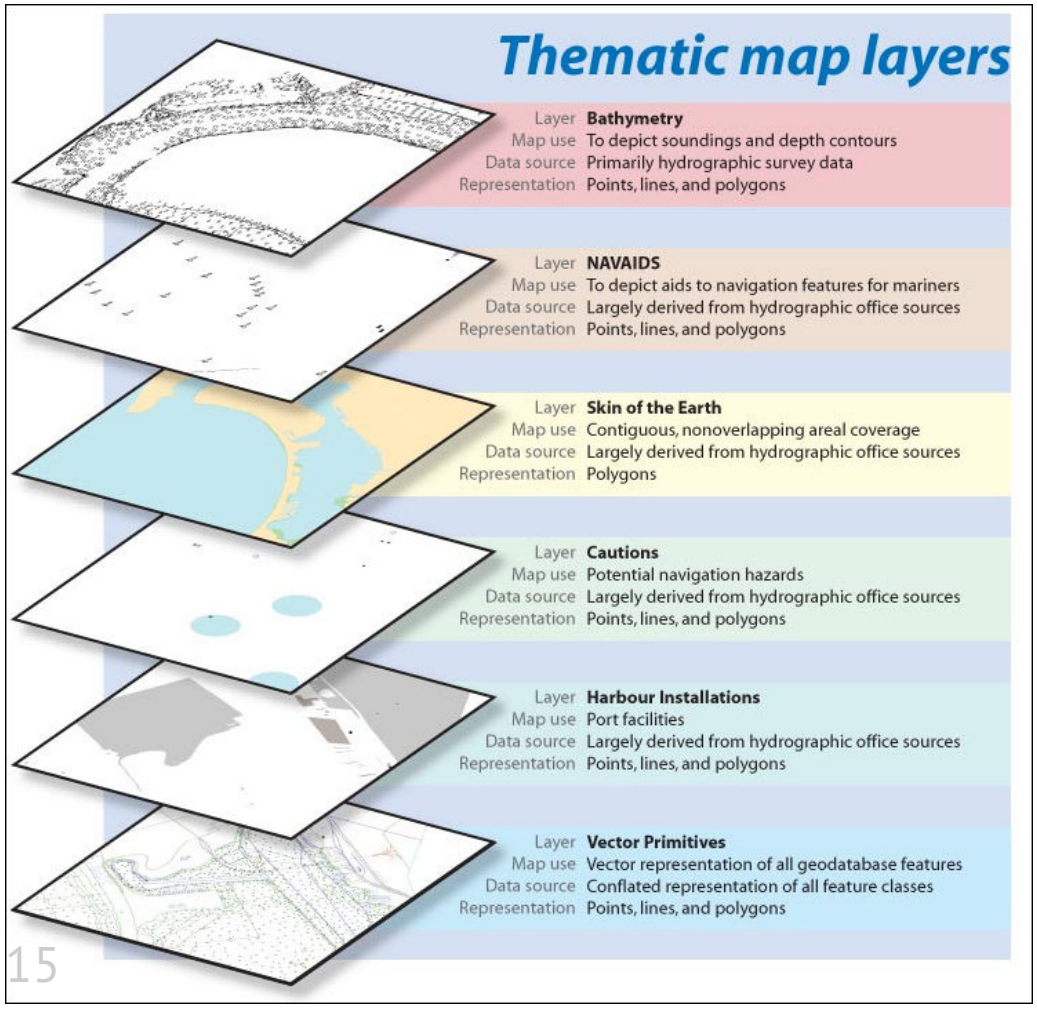
Layer **Points of interest**
Map use Background map with point and polygon landmarks
Data source Largely derived from other government sources
Representation Points and polygons

Layer **Other Administrative Units**
Map use To depict local, regional, state and federal districts
Data source Derived from census administrative units
Representation Polygons

Layer **Census administrative units**
Map use To delineate census units such as blocks and tracts
Data source Compiled with local government input
Representation Polygons

Layer **Streets and Addresses**
Map use Street network analysis and address location
Data source Largely derived from other government sources
Representation Lines for streets, tables for addresses

Layer **Census boundaries**
Map use Linework from which other census features are generated
Data source Compiled and partially derived from government sources
Representation Lines for water, railroads, transmission, and other


Thematic map layers
Layer Bathymetry
Map use To depict soundings and depth contours
Data source Primarily hydrographic survey data
Representation Points, lines, and polygons
Layer NAVAIDS
Map use To depict aids to navigation features for mariners
Data source Largely derived from hydrographic office sources
Representation Points, lines, and polygons
Layer Skin of the Earth
Map use Contiguous, nonoverlapping areal coverage
Data source Largely derived from hydrographic office sources
Representation Polygons
Layer Cautions
Map use Potential navigation hazards
Data source Largely derived from hydrographic office sources
Representation Points, lines, and polygons
Layer Harbour Installations
Map use Port facilities
Data source Largely derived from hydrographic office sources
Representation Points, lines, and polygons
Layer Vector Primitives
Map use Vector representation of all geodatabase features
Data source Conflated representation of all feature classes
Representation Points, lines, and polygons

6. Spatial databases

“A spatial database is a database that is optimized to store and query data that is related to objects in space, including points, lines and polygons.”

http://en.wikipedia.org/wiki/Spatial_database

http://www.spatial.cs.umn.edu/Book/slides/ch1revised.ppt

Postgres + Postgis

connect to postgres `psql -h localhost`

create database `CREATE DATABASE mydatabase;`

switch to your database `\connect mydatabase`

add postgis extension `CREATE EXTENSION postgis;`

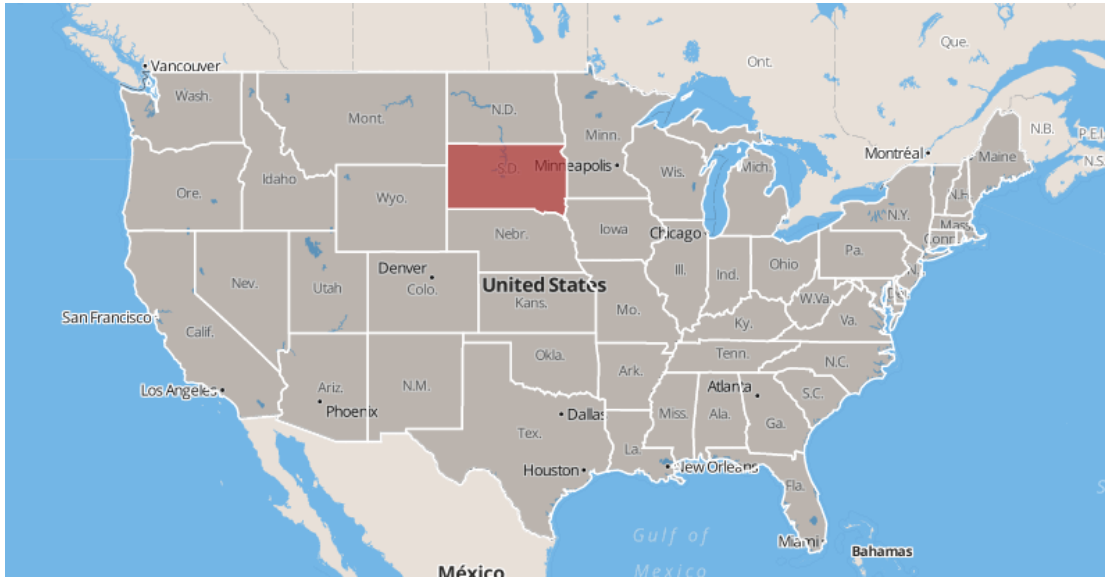
https://gist.github.com/yorzi/4345022

Quick Show-offs

Mapbox/TileJson + Wax + OpenLayer

http://mapbox.com/wax/connector-ol.html

Mapbox + D3



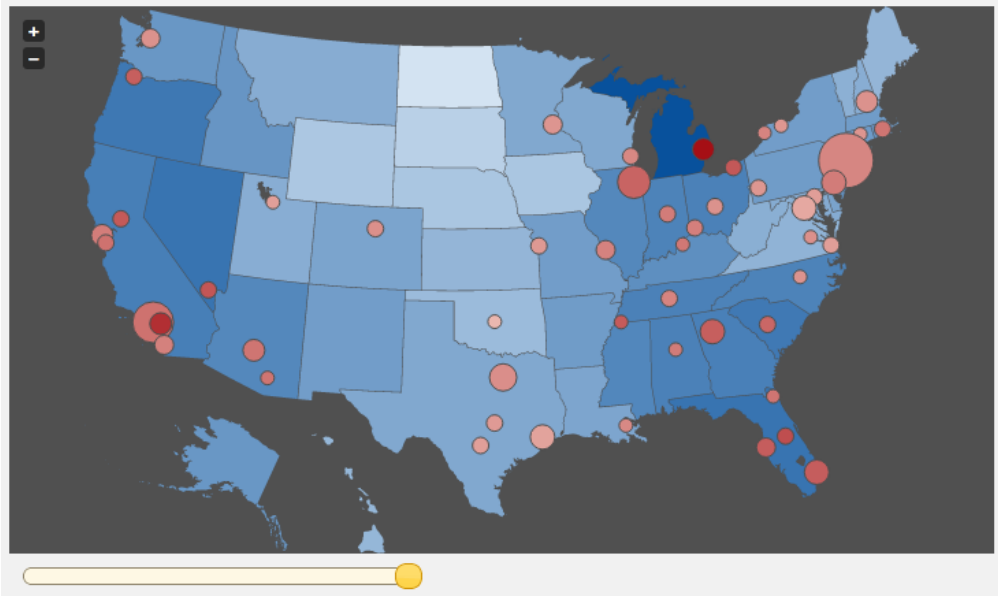
https://gist.github.com/yorzi/5433125

D3 + SVG

```
var length = 300;
var width = 350;

var svg = d3.select('body').append('svg')
    .attr('width', width))
    .attr('height', height);
var group = svg.append('g');

var NYPath = "M7.0371 120.844l-0.6373 11.9674 ... -1.0232
0.1923z";

var ny = group.append('path')
    .attr('d', NYPath)
    .style('fill', 'grey')
    .style('stroke', 'black')
    .style('stroke-width', 1);
```

http://www.schneidy.com/Tutorials/MapsTutorial.html

jVectorMap



http://jvectormap.com/examples/usa-unemployment/

Resources on Maps

http://mapbox.com/mapbox.js/api/v1.0.0/

http://mapbox.com/wax/

http://modestmaps.com/

http://leafletjs.com/

http://jvectormap.com/tutorials/getting-started/

https://github.com/mapbox/tilestream

http://openlayers.org/

Resources on GIS

http://www.esri.com/

http://lib.stanford.edu/gis/

http://www.gislounge.com/gis-essentials/

Thank You!