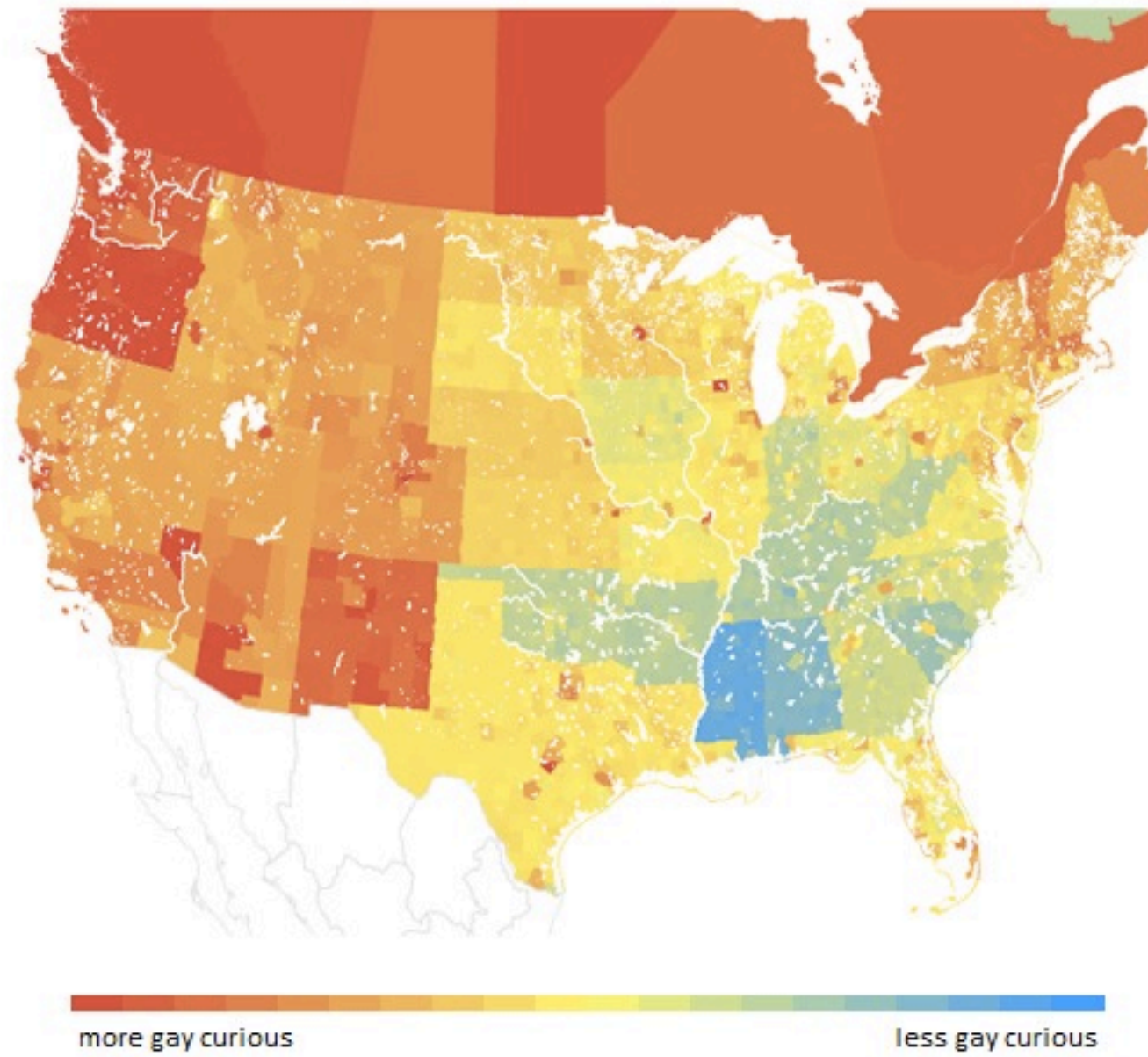


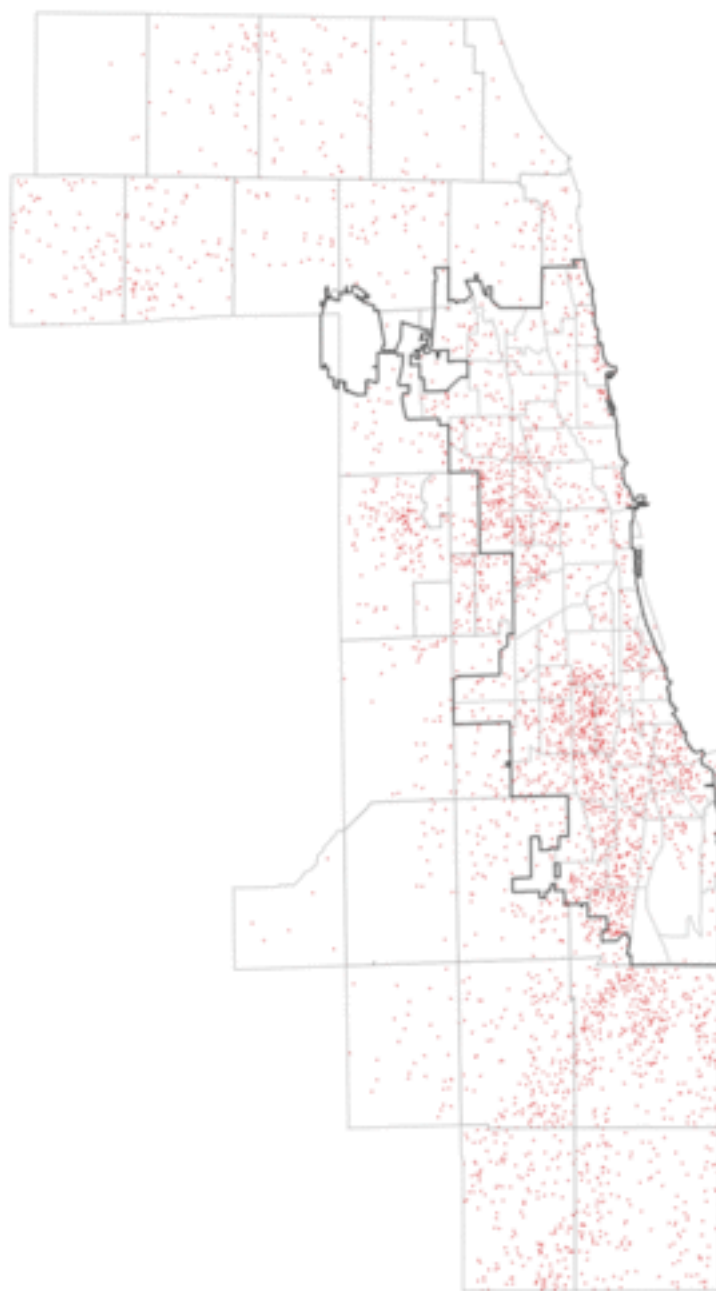
MAKING INTERESTING MAPS WITHOUT GIS SOFTWARE

Max Shron

Who's Gay Curious in the U.S. & Canada







OVERVIEW



Plotting library



Some math



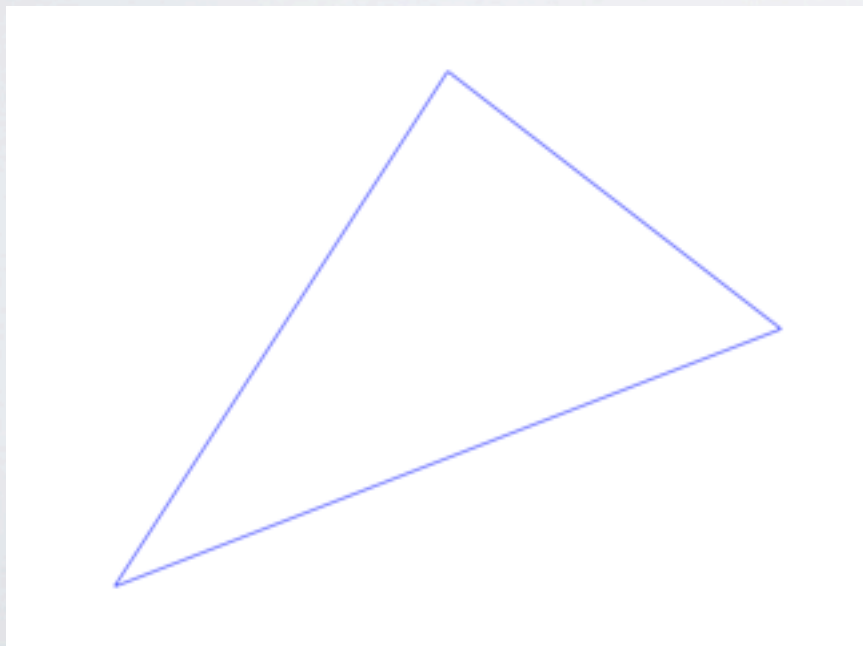
Formatting data



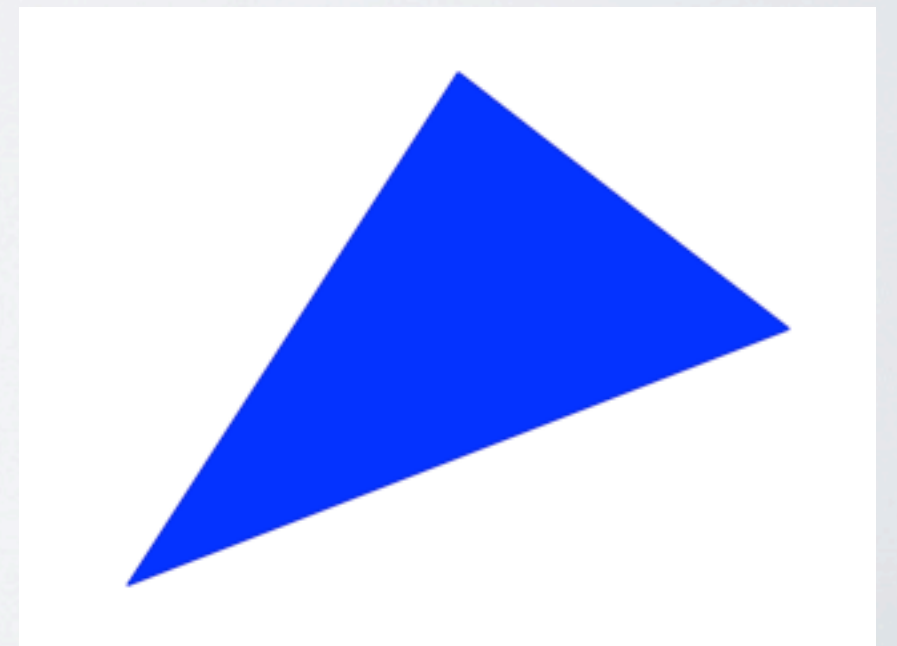
Getting creative

PLOTTING LIBRARY

x	y
10	-5
8	-6
⋮	⋮
10	-5



Lines



Polygons

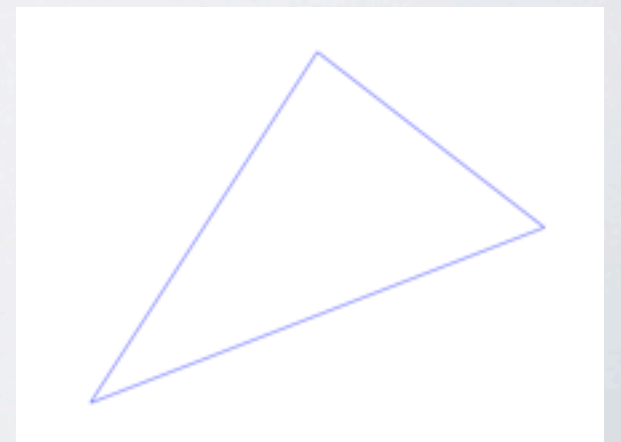
PLOTTING LIBRARY

```
>>> a  
array([[10, -5],  
       [ 8, -6],  
       [ 9, -4],  
       [10, -5]])
```


PLOTTING LIBRARY

```
>>> a  
array([[10, -5],  
       [ 8, -6],  
       [ 9, -4],  
       [10, -5]])
```

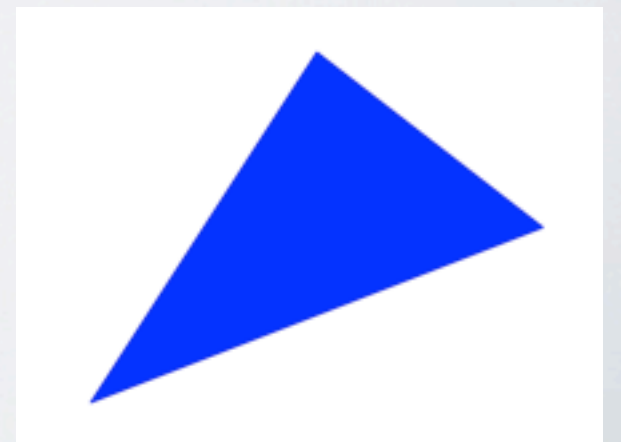
```
>>> plt.plot(a[:,0],a[:,1])
```



PLOTTING LIBRARY

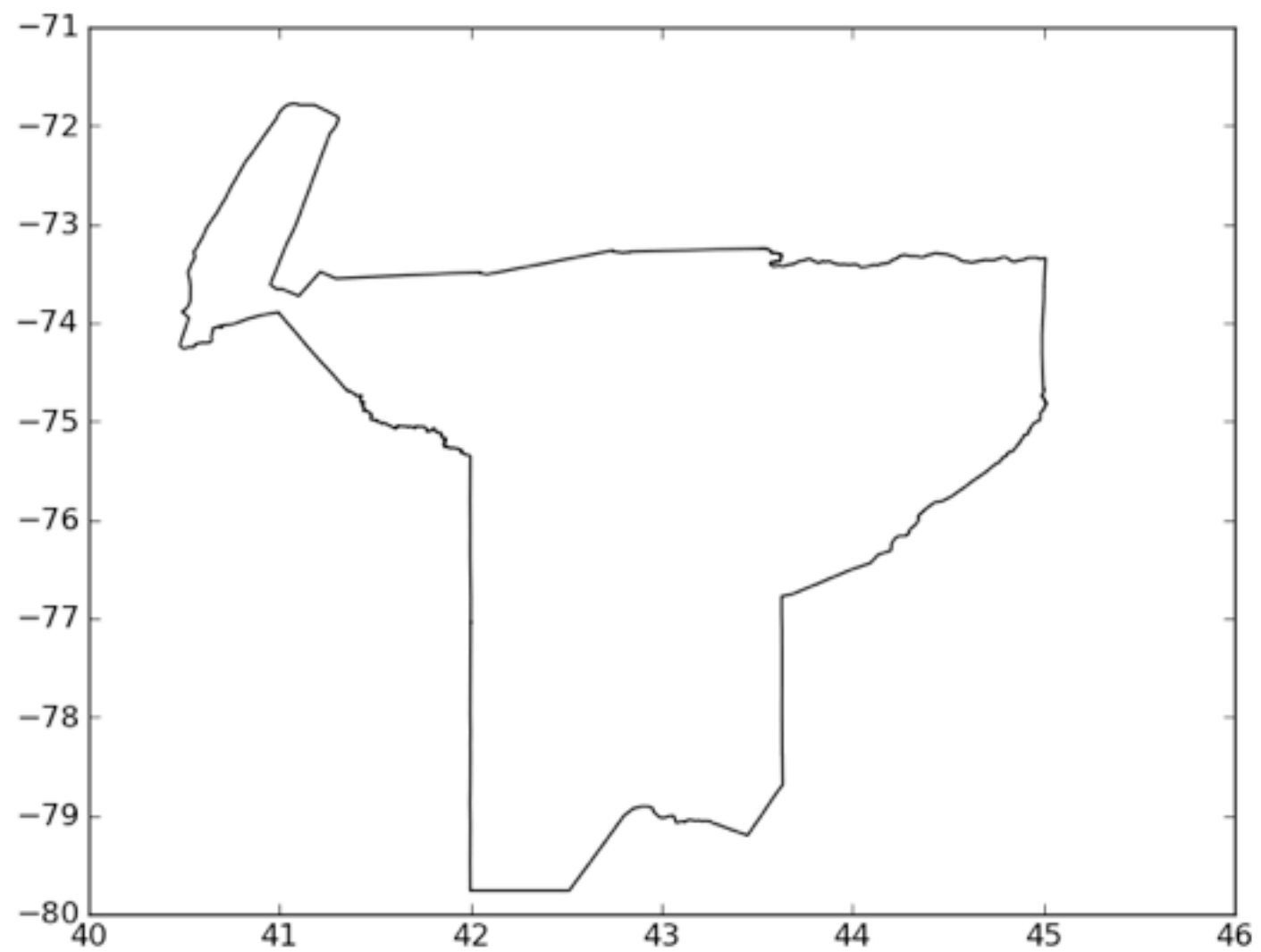
```
>>> a  
array([[10, -5],  
       [ 8, -6],  
       [ 9, -4],  
       [10, -5]])
```

```
>>> ax = plt.gca()  
>>> ax.add_patch(ma.patches.Polygon(a))
```

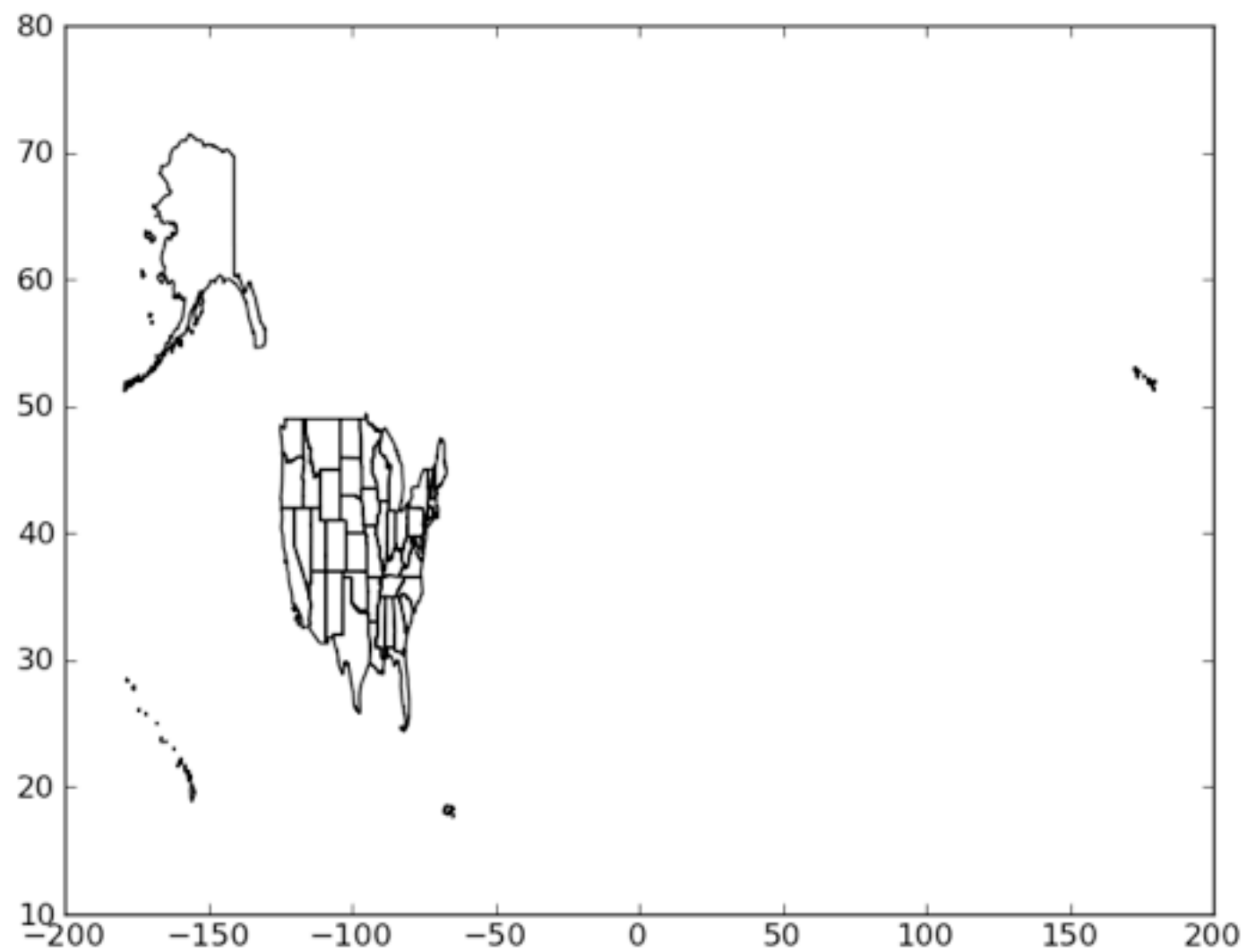


PLOTTING LIBRARY

PLOTTING LIBRARY

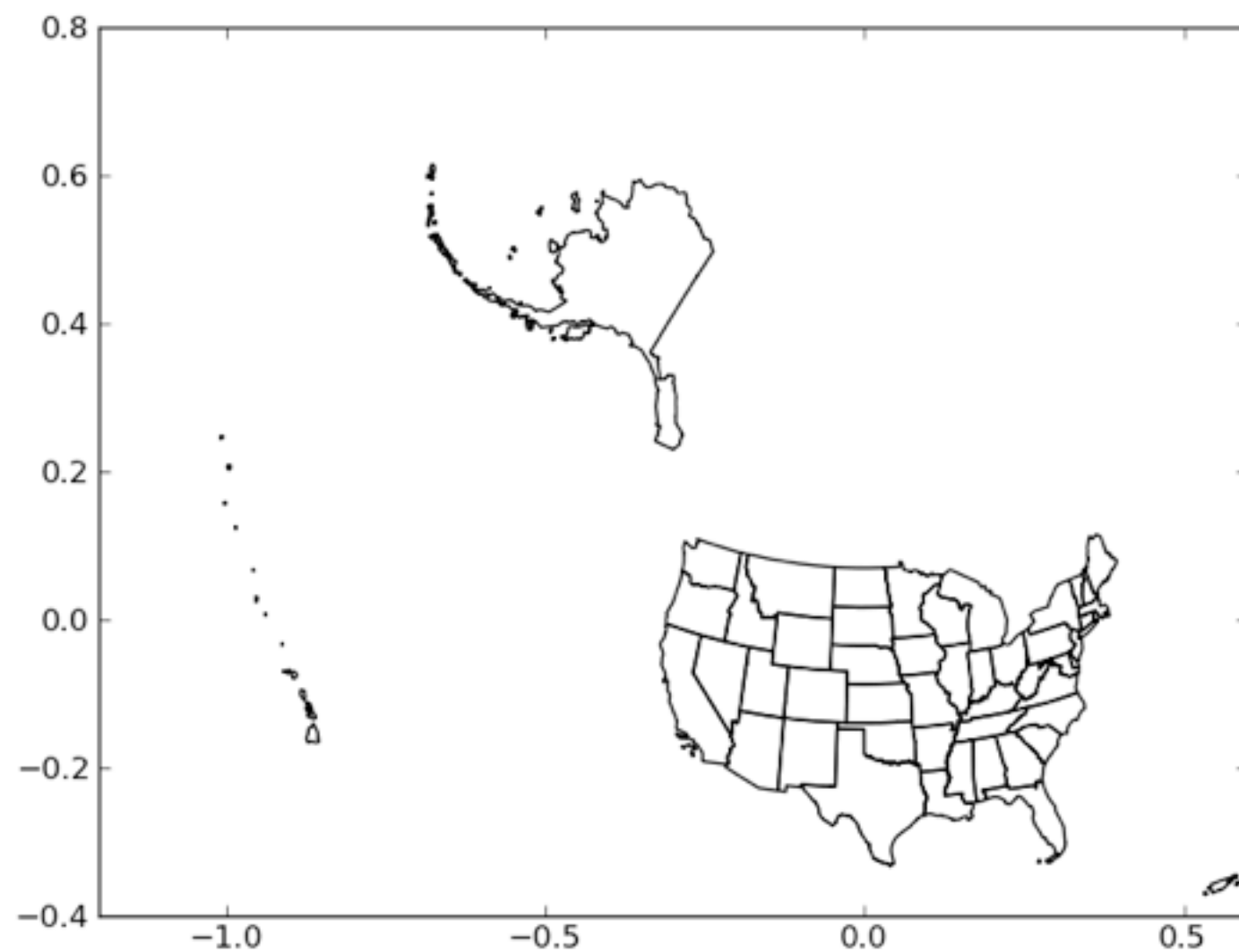


PLOTTING LIBRARY



MATH

$(\text{lon}, \text{lat}) \rightarrow (x, y)$



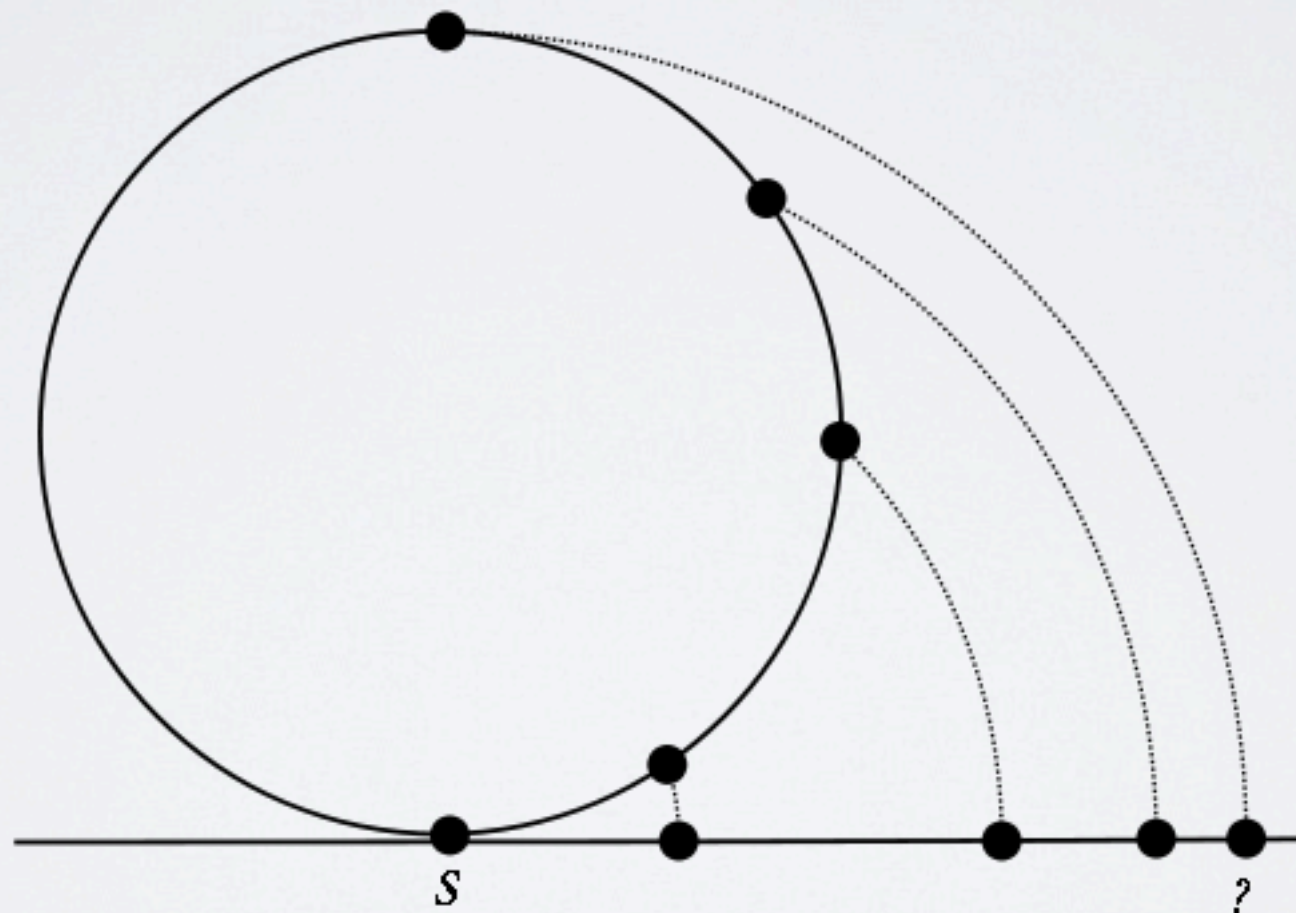
MATH

Lambert Azimuthal Equal-Area



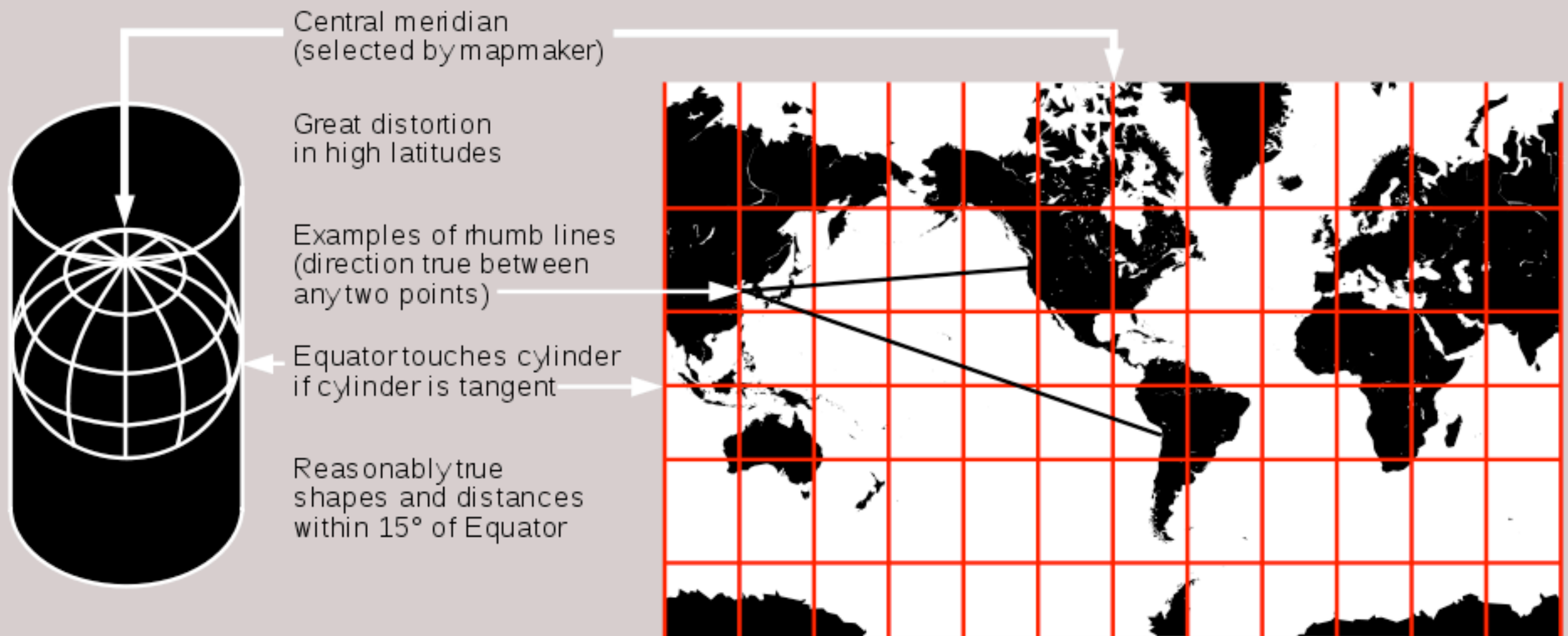
MATH

Lambert Azimuthal Equal-Area



MATH

Mercator



MATH

Dymaxion



MATH

RADICAL CARTOGRAPHY

ABOUT
PROJECTS
YUMMY
NEWS
RE:SOURCES
CONTRIBUTE
CONTACT

Projections are grouped by use, and ordered roughly chronologically by type.
A "standard" parallel/meridian is undistorted, and defines the scale printed on the map.
Projections with a pink background are especially useful or common.
Only those projections shown with diagrams are based on simple geometric constructions.
I have compiled a short list of [sources and links](#) for your health and happiness.

PROJECTION REFERENCE
Bill Rankin, 2006

(Almost) All the projections available in ArcGIS.

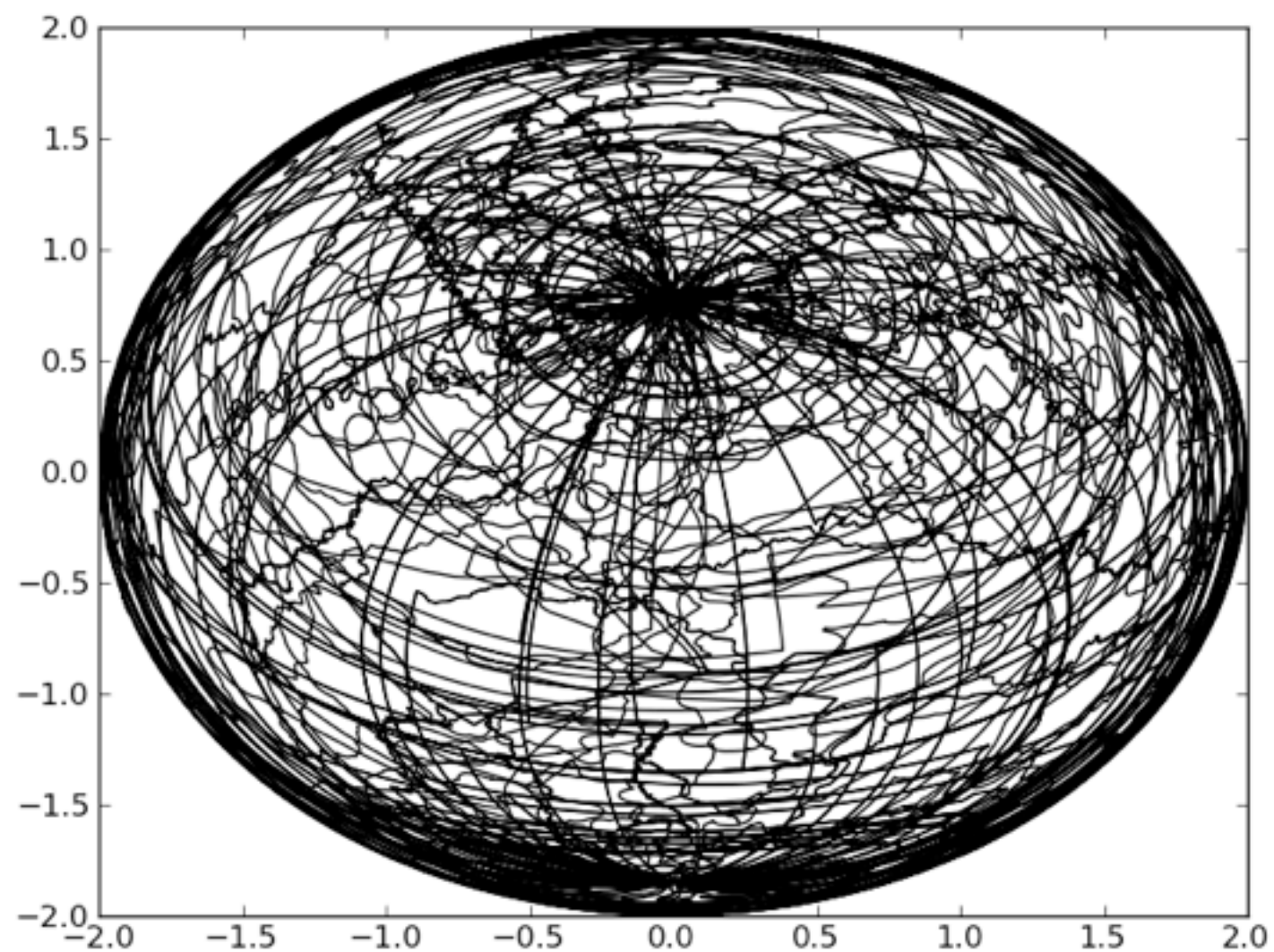
[link to this page](#)

Name	Author, Date	Example, with relevant parameters	Also known as / [Equivalent to]	Properties	Equal-Area?	Used by / [Applications]
Equidistant Cylindrical	attributed to Marinus of Tyre, c.100 CE	 standard parallels: 60° N/S, 30° N/S, 0°	Equirectangular [Equidistant Conic with standard parallels equidistant from the equator]	All meridians are standard, with same scale as the standard parallels No distortion along standard parallels		Mapquest (standard parallels 37.5° N/S) Yahoo Maps (standard parallels 51° N/S)
Plate Carrée (literally, "plane square")	known since antiquity renamed "carte plate carrée" by M. Armard P. d'Avezac-Macaya, 1863		Plane Chart [Equidistant Cylindrical with standard parallel at 0°]	All meridians are standard, with same scale as the equator No distortion along equator Lat/Lon lines make squares Boundary is a 2:1 rectangle		National Geographic's online MapMachine
Werner	based on Ptolemy's 2nd Projection, c.100 CE final form by		Cordiform ("heart-shaped") [Bonne with	All parallels are standard, with the same scale as the central meridian Parallels are concentric circles about the North Pole	Equal-Area	♥

click each heading to open/close
or [reset all](#) / [expand all](#)





MATH

Degrees \neq Radians



DATA

DATA

-  US Census - Tiger / Line
-  Open Street Map
-  USGS
-  mass.gov

DATA

Raw to useful - munging

```
>>> states =  
shpUtils.loadShapefile('tl_2009_us_state.shp')
```

(Thanks to Zachary Forest Johnson, indiemaps.com)

DATA

Raw to useful - munging

```
>>> states =  
shpUtils.loadShapefile('tl_2009_us_state.shp')  
>>> states[0]['shp_data']['parts'][0]['points']  
  
[{'x': -114.043916, 'y': 40.689281},  
 {'x': -114.043924, 'y': 40.685521},  
 ...]
```

(Thanks to Zachary Forest Johnson, indiemaps.com)

DATA

Raw to useful - munging

```
>>> states =  
shpUtils.loadShapefile('tl_2009_us_state.shp')  
>>> states[0]['shp_data']['parts'][0]['points']  
  
[{'x': -114.043916, 'y': 40.689281},  
 {'x': -114.043924, 'y': 40.685521},  
 ...]  
  
>>> states[0]['dbf_data']  
  
{..., 'NAME': 'American Samoa', ...}
```

(Thanks to Zachary Forest Johnson, indiemaps.com)

DATA

Raw to useful - munging

```
>>> pretty_states = make_dict('NAME', states)
```


DATA

Raw to useful - munging

```
>>> pretty_states = make_dict('NAME', states)
>>> pretty_states.items()[2]
('Massachusetts',
 [array([-72.642975, 42.032385],
       [-72.643134, 42.032395],
       [-72.643294, 42.032404],
       ...,
       [-72.64165 , 42.032296],
       [-72.642832, 42.032375],
       [-72.642975, 42.032385]])])
```

DATA

Shapes of two kinds

I) New York \rightarrow $\left[\begin{array}{|c|c|} \hline -89.6 & 37.95 \\ \hline -87.6 & 39.96 \\ \hline \vdots & \vdots \\ \hline -89.6 & 37.95 \\ \hline \end{array} \right. ,$
 \vdots
 $\begin{array}{|c|c|} \hline -90.5 & 36.56 \\ \hline -90.6 & 36.54 \\ \hline \vdots & \vdots \\ \hline -90.5 & 36.56 \\ \hline \end{array} \left. \right]$

DATA

Shapes of two kinds

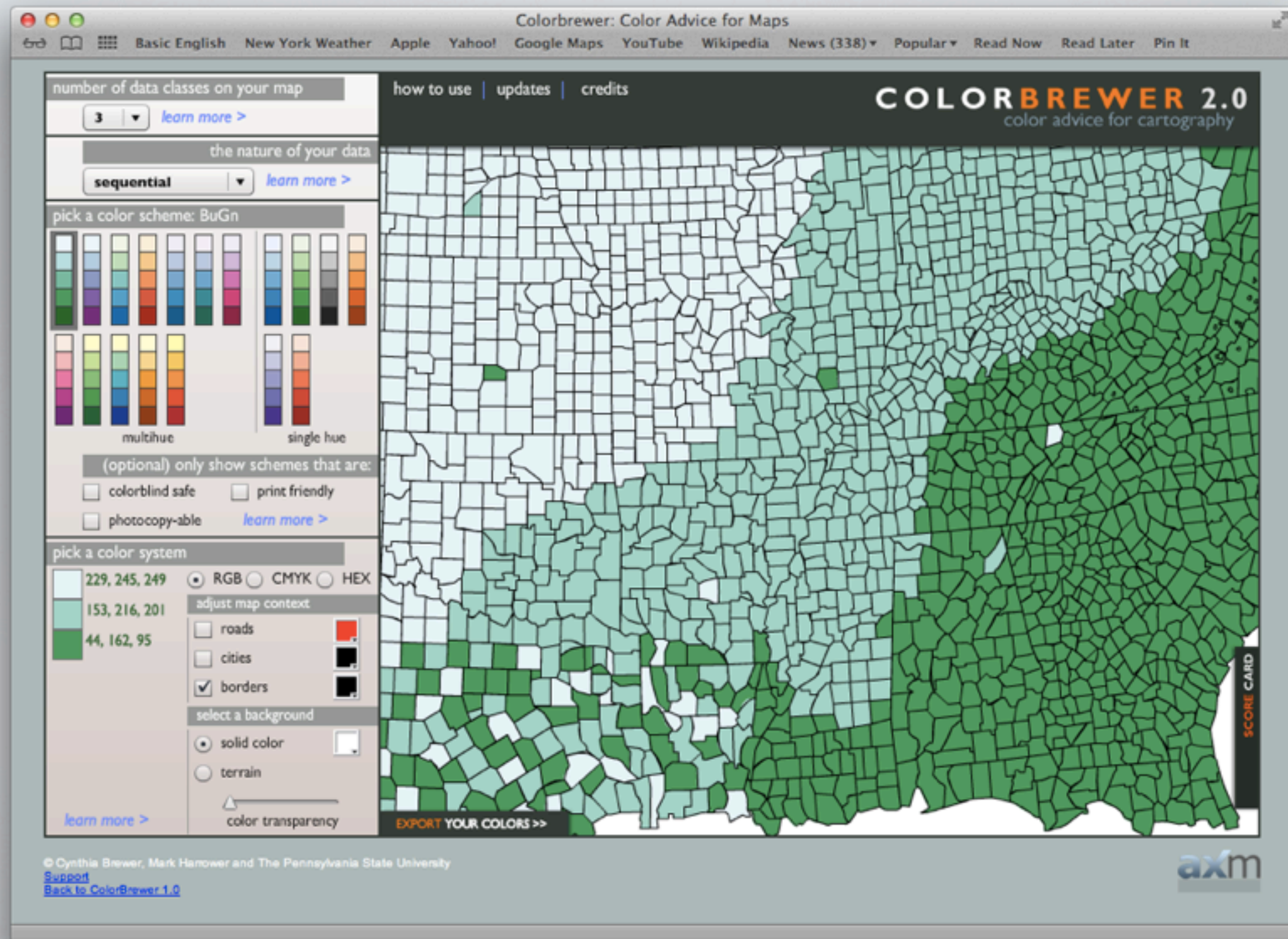
2) New York → 14.8
New Jersey → .5

or

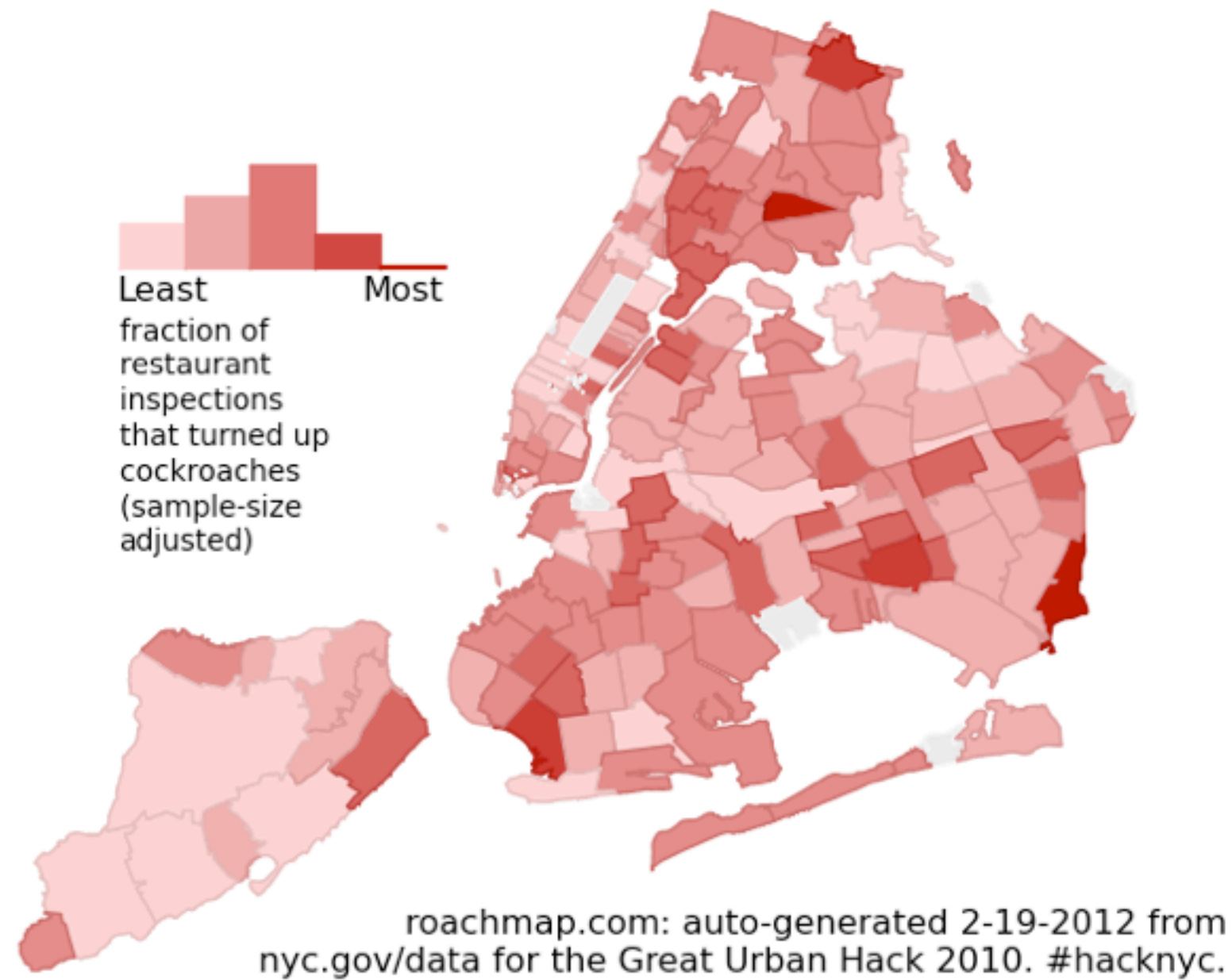
(New York, Florida) → .555

GETTING CREATIVE

GETTING CREATIVE



Where are the roaches in the past four weeks?





REVIEW

- Get the shapes as ID → list of $N \times 2$ (x,y) arrays
- Transform each array by a projection
- Create rules (e.g. for cockroach level to color)
- Draw lines, polygons by shape data, styled by rule
- Draw anything else you want on it (e.g. water, legend)

THANKS!

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Data Science Consultant

contact:

max@shron.net

[@mshron](#)

github.com/mshron

+ QuantumGIS

+ MapShaper