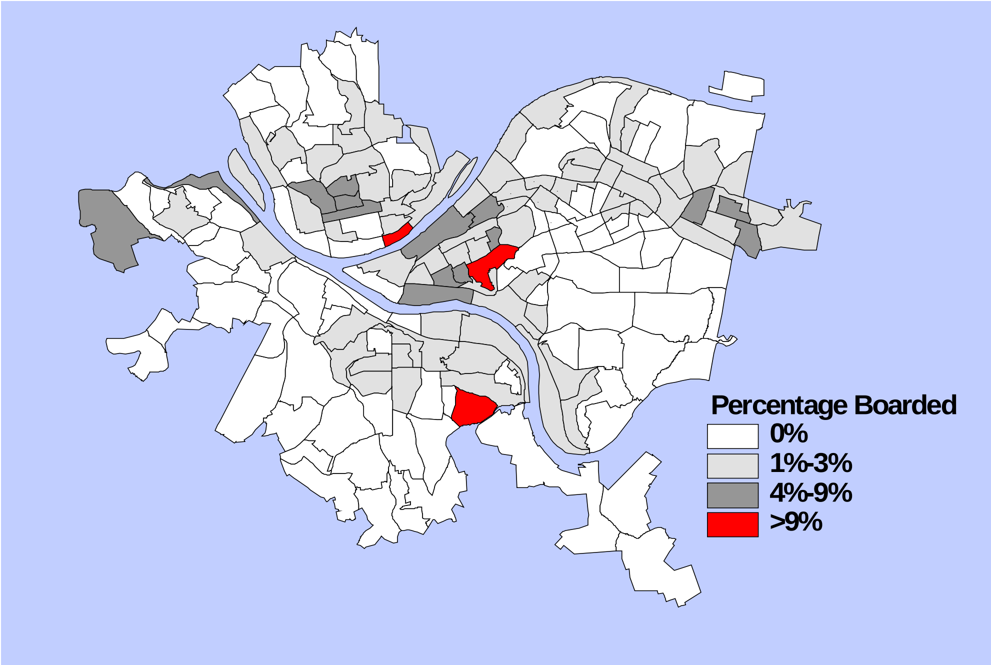
GIS Lecture 2

Map Design

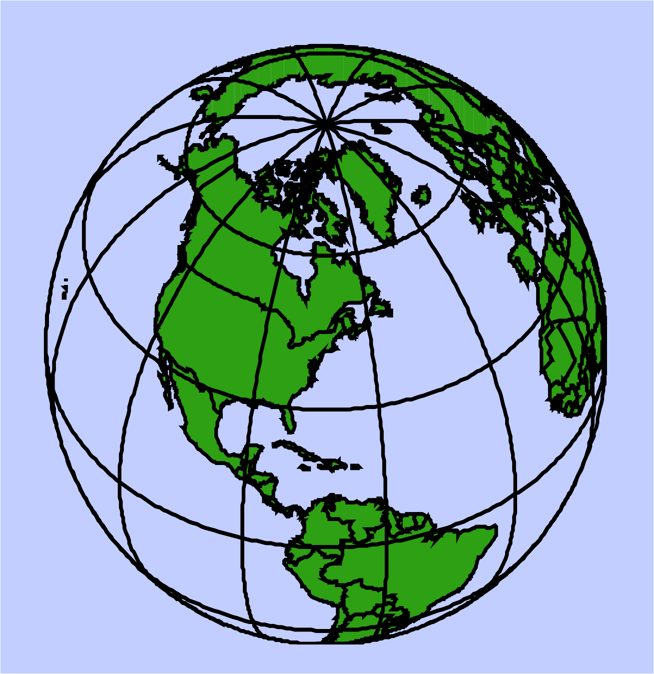


Outline

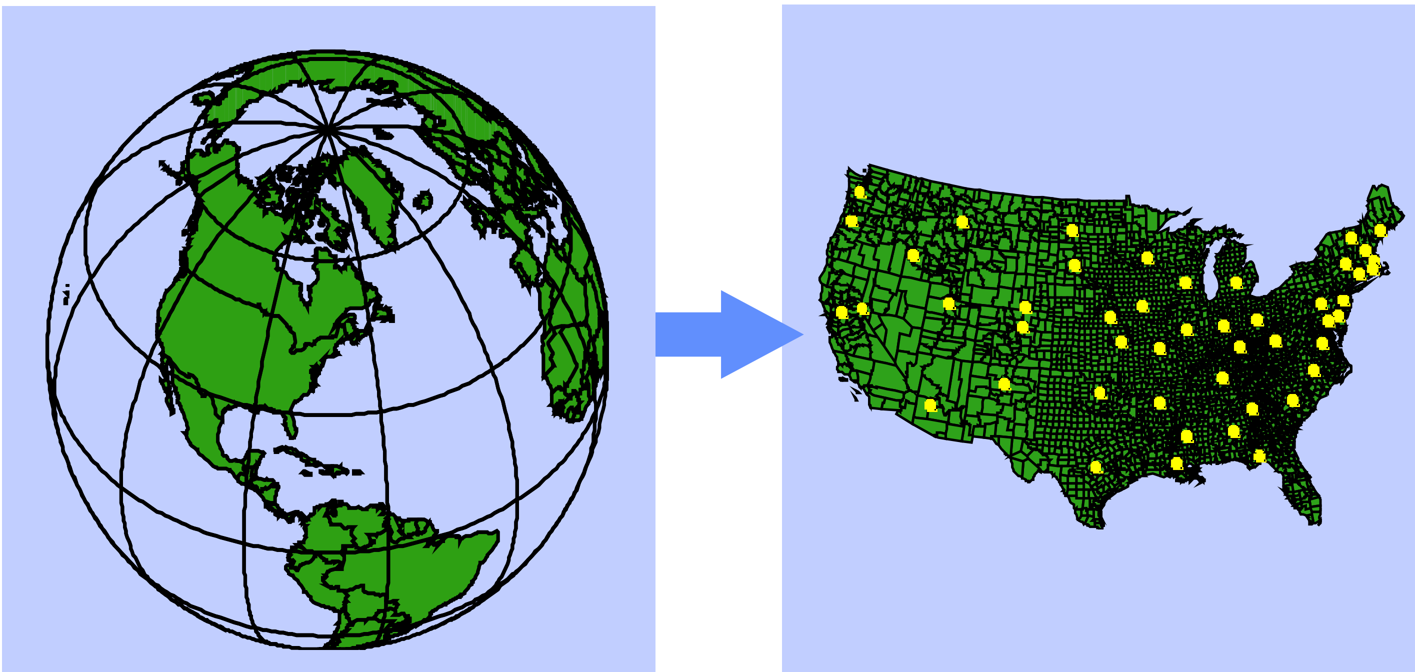
- Vector GIS
- Graphic Elements
- Colors
- Graphical Hierarchy
- Choropleth Maps
- Map Layers
- Scale Thresholds
- Hyperlinks

Vector GIS

Graphic Features on the World



GIS Map

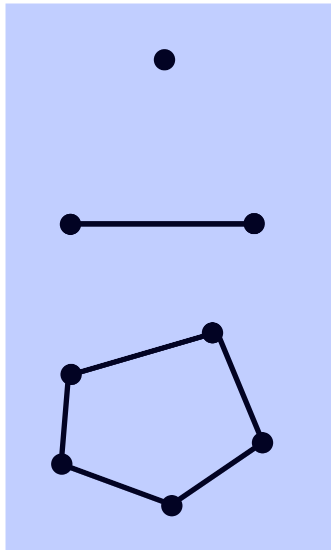


Vector GIS

Points

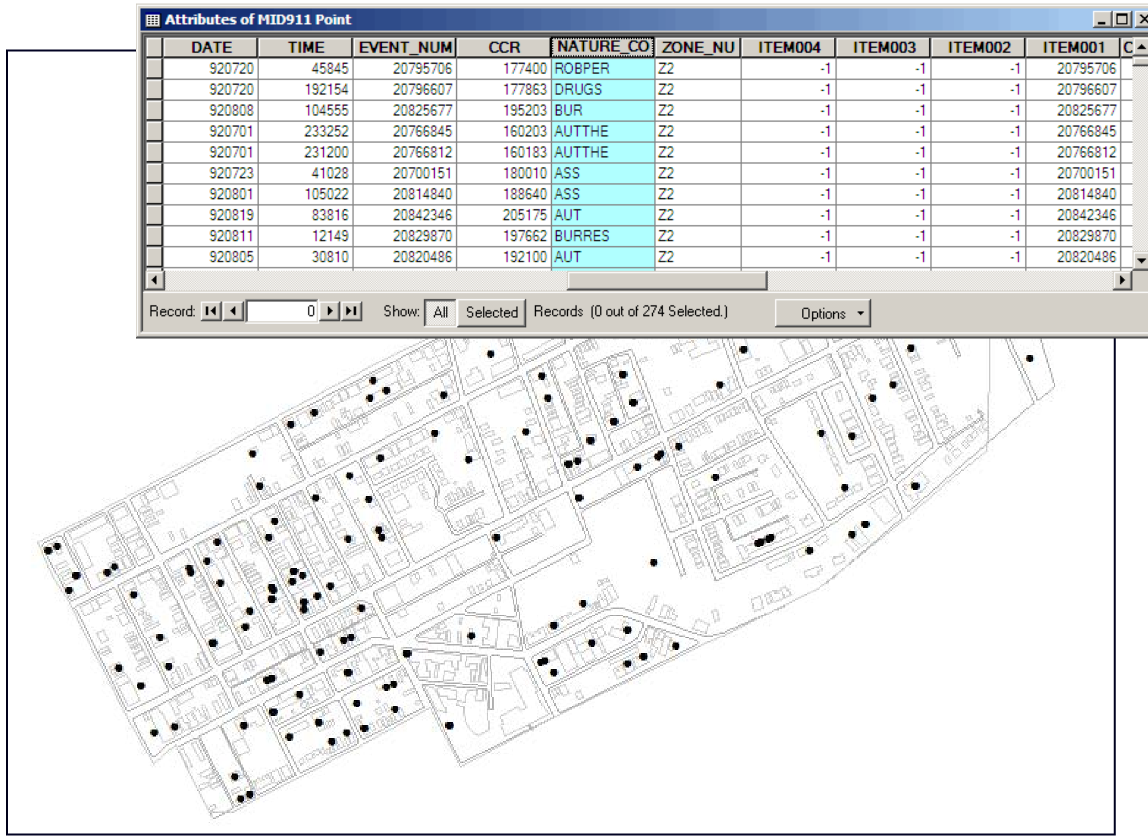
Lines

Polygons



Points

Data Attached to Points



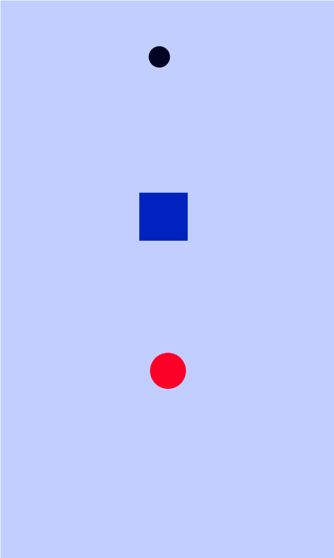
Attributes of MID911 Point

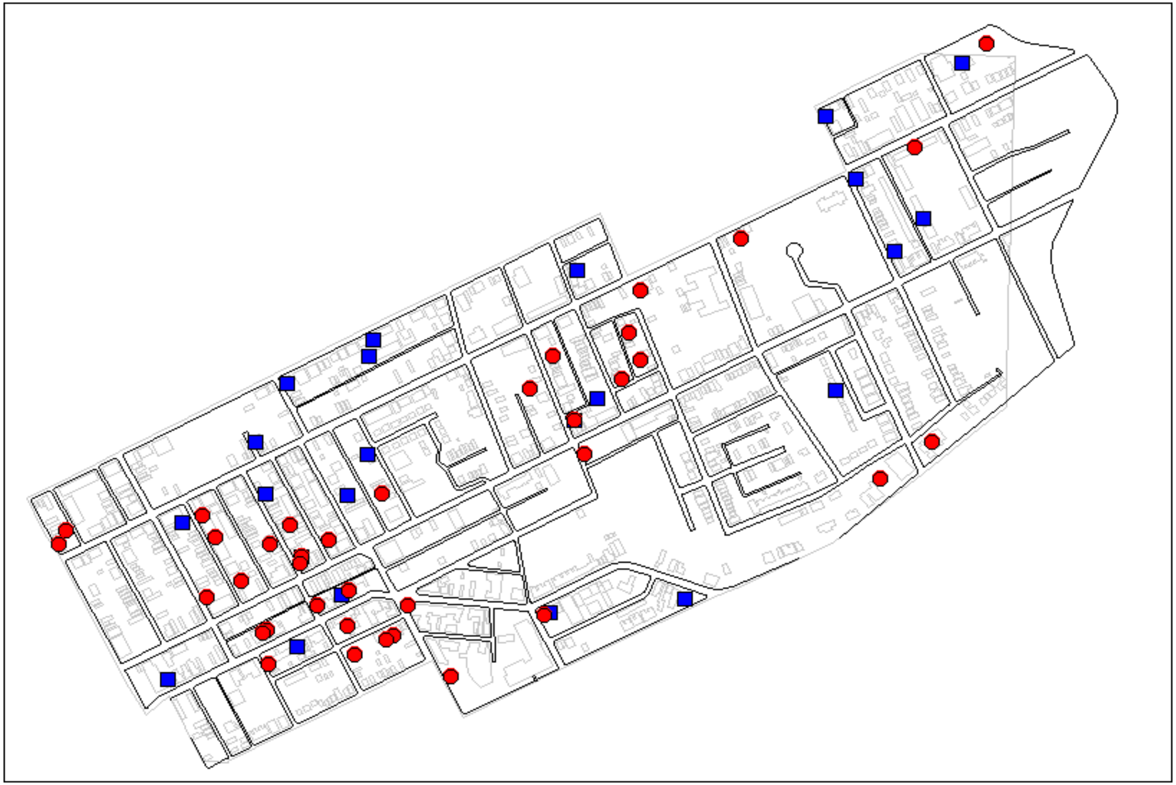
DATE	TIME	EVENT_NUM	CCR	NATURE_CO	ZONE_NU	ITEM004	ITEM003	ITEM002	ITEM001	C
920720	45845	20795706	177400	ROBPER	Z2	-1	-1	-1	20795706	
920720	192154	20796607	177863	DRUGS	Z2	-1	-1	-1	20796607	
920808	104555	20825677	195203	BUR	Z2	-1	-1	-1	20825677	
920701	233252	20766845	160203	AUTTHE	Z2	-1	-1	-1	20766845	
920701	231200	20766812	160183	AUTTHE	Z2	-1	-1	-1	20766812	
920723	41028	20700151	180010	ASS	Z2	-1	-1	-1	20700151	
920801	105022	20814840	188640	ASS	Z2	-1	-1	-1	20814840	
920819	83816	20842346	205175	AUT	Z2	-1	-1	-1	20842346	
920811	12149	20829870	197662	BURRES	Z2	-1	-1	-1	20829870	
920805	30810	20820486	192100	AUT	Z2	-1	-1	-1	20820486	

Record: 0 Show: All Selected Records (0 out of 274 Selected.) Options

Points

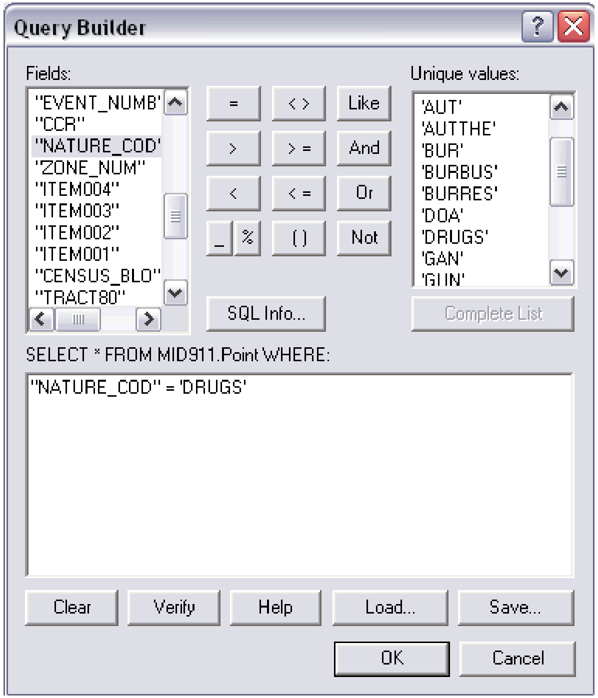
Same data displayed as two different points



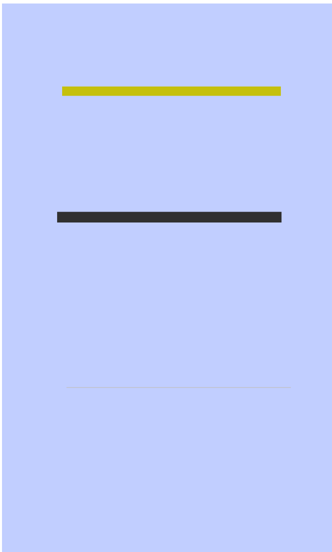


Queries and Restrictions

- Restricts the features to a specific subset



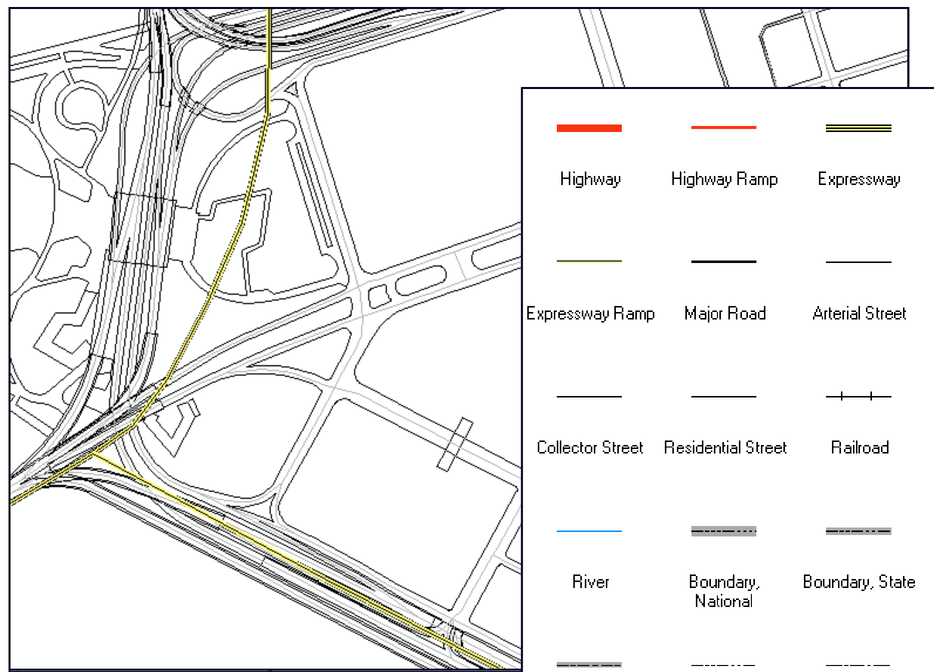
Lines



Roads

Conditions, Major Streets

Curbs



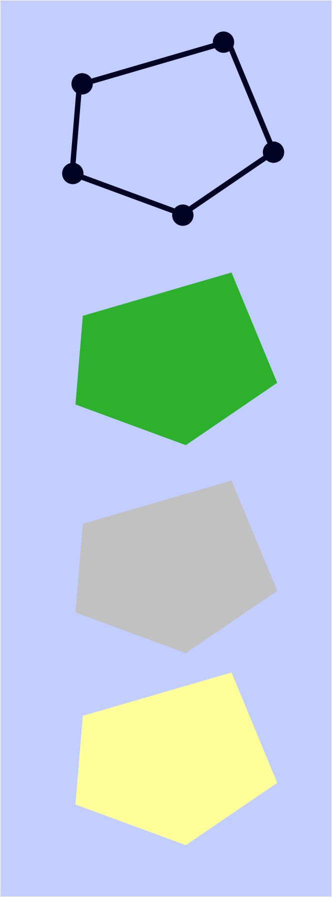
Polygons

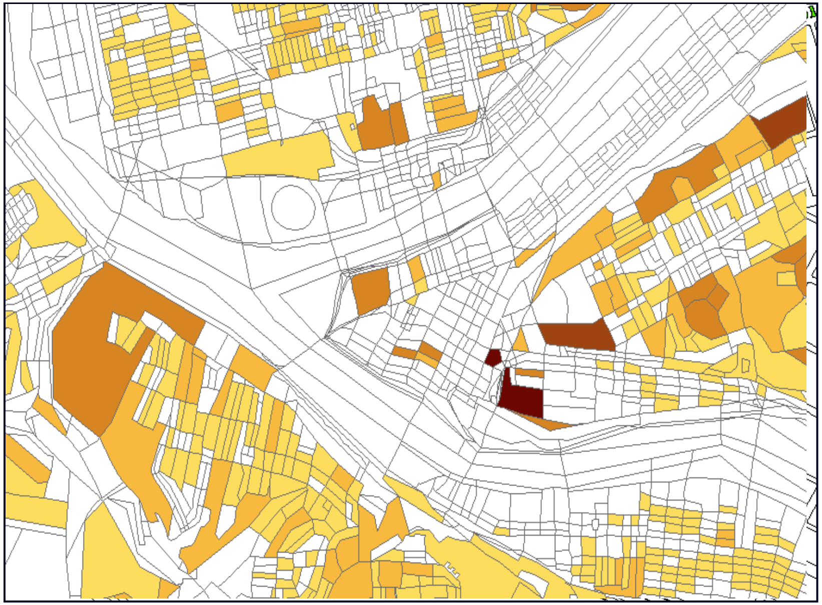
Polygons

Green Spaces

Buildings

Census Tracts or Blocks





Graphic Elements

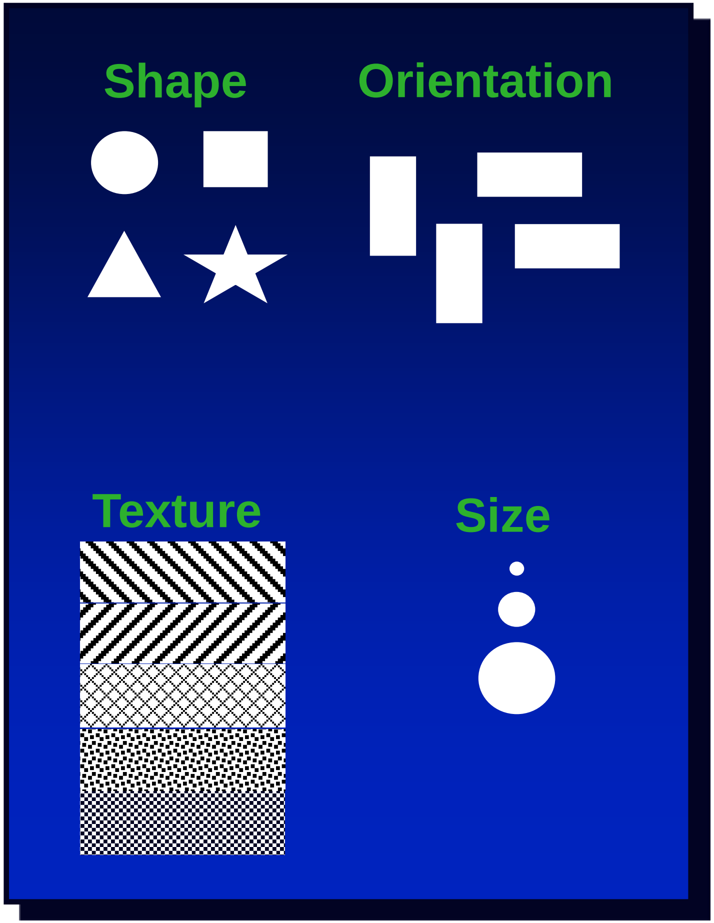
Jacques Bertin

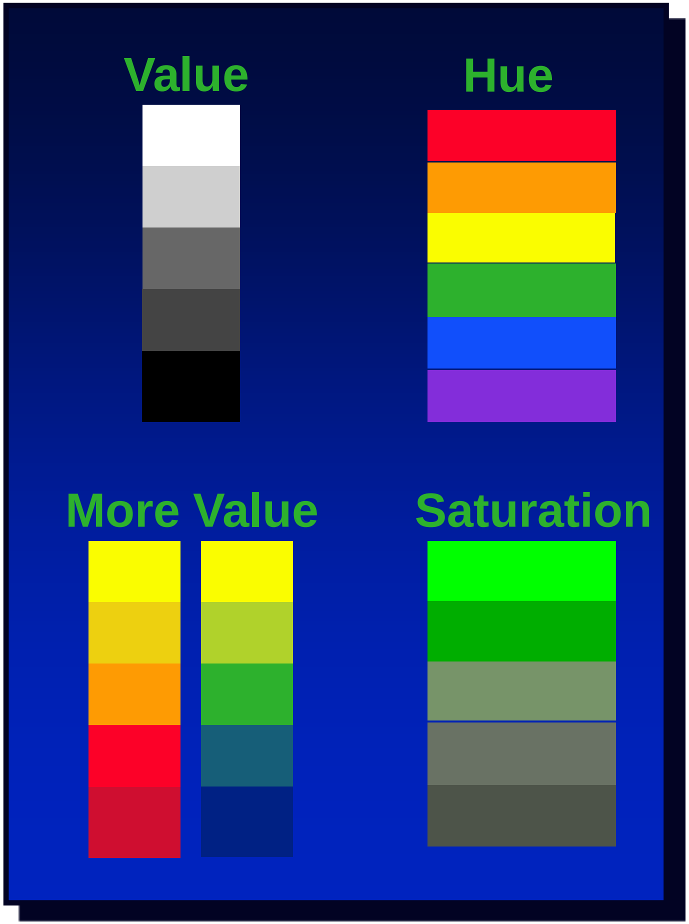
Visualization Information

“What should be printed to facilitate “communication”, that is, to tell others what we know without a loss of information”

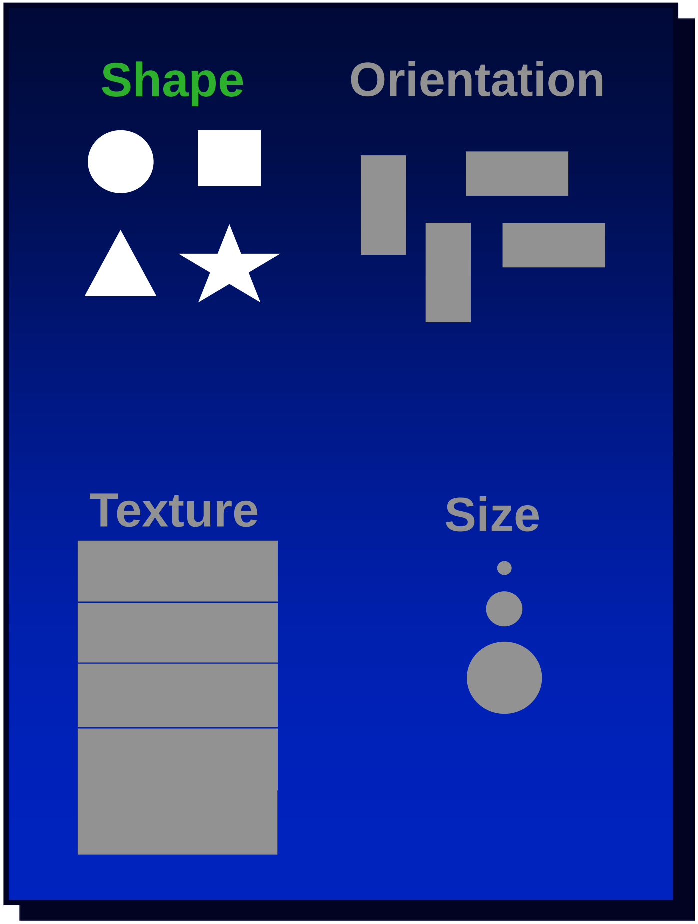
-Jacques Bertin, Paris, February 1983

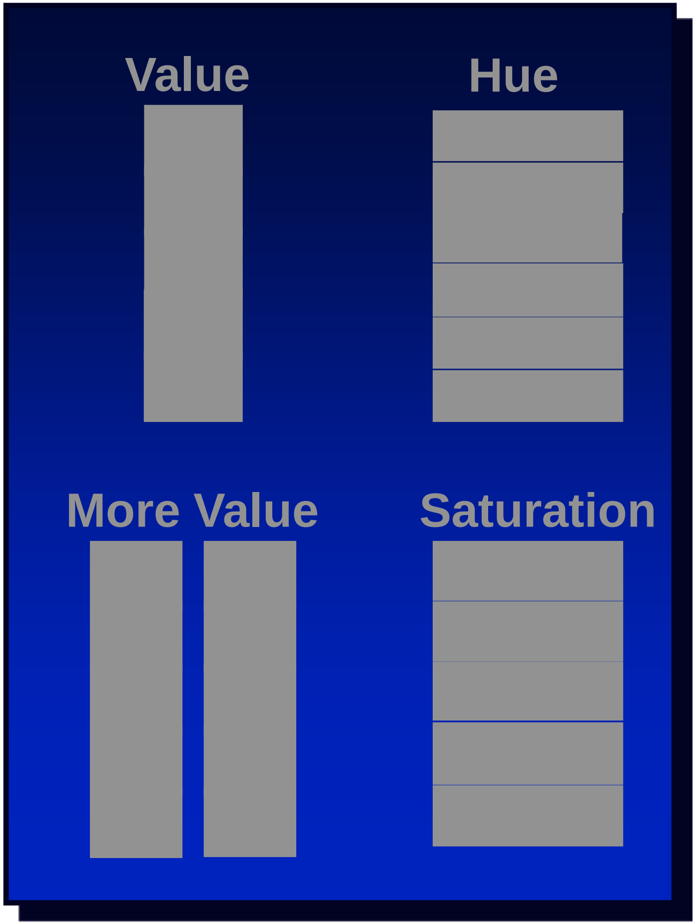
Bertin’s Graphic Variables



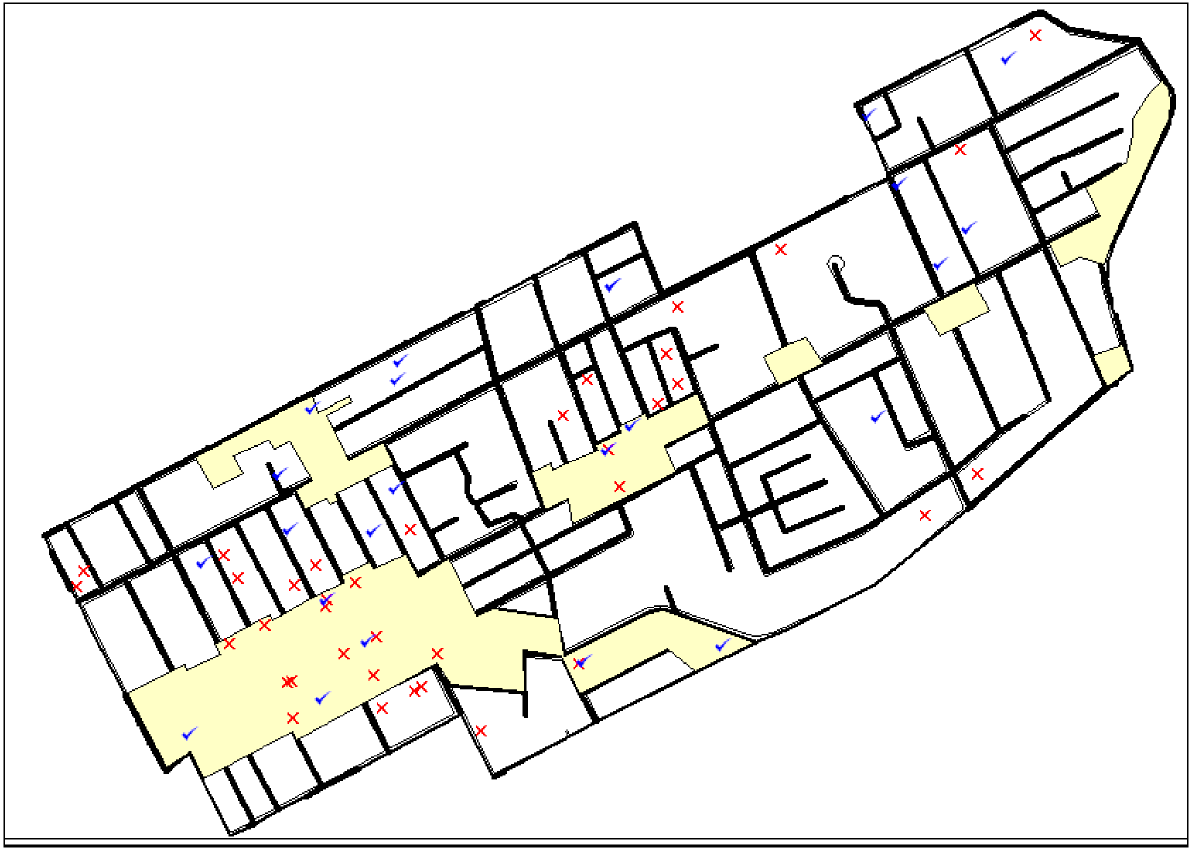


Point Symbols

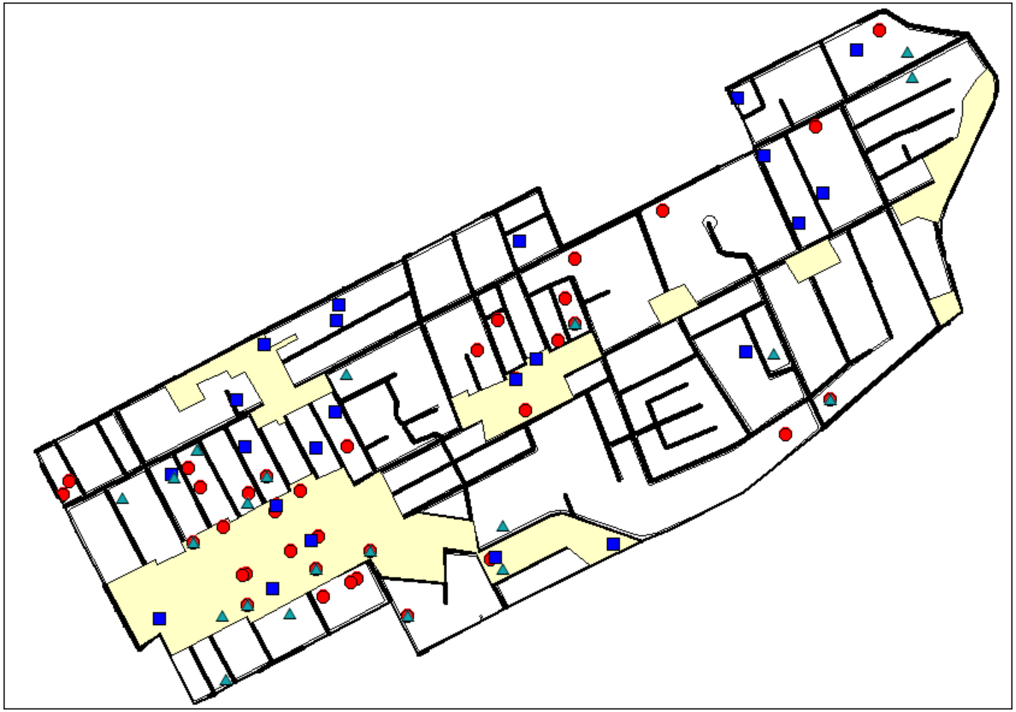




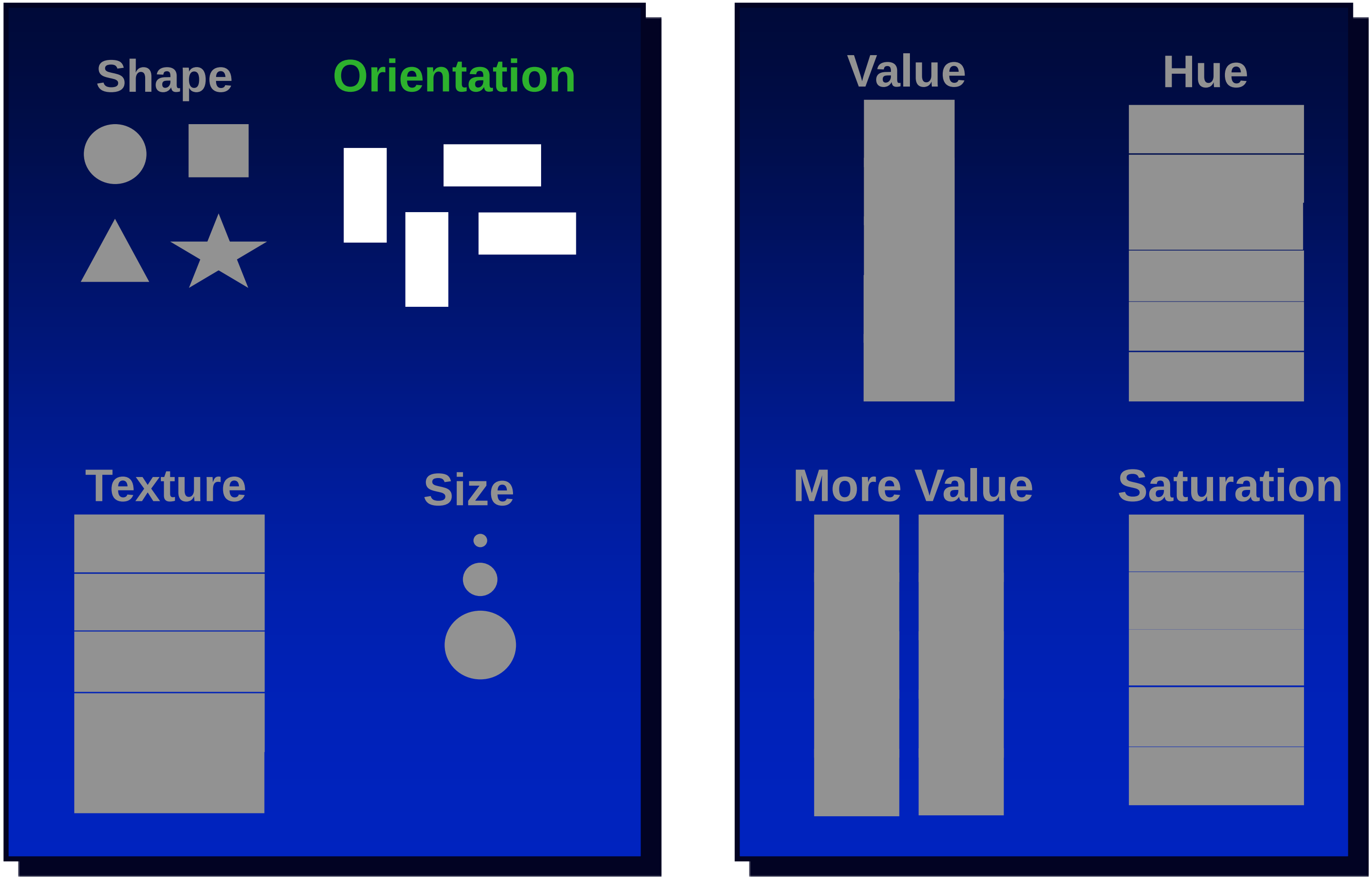
Use Solid Point Markers



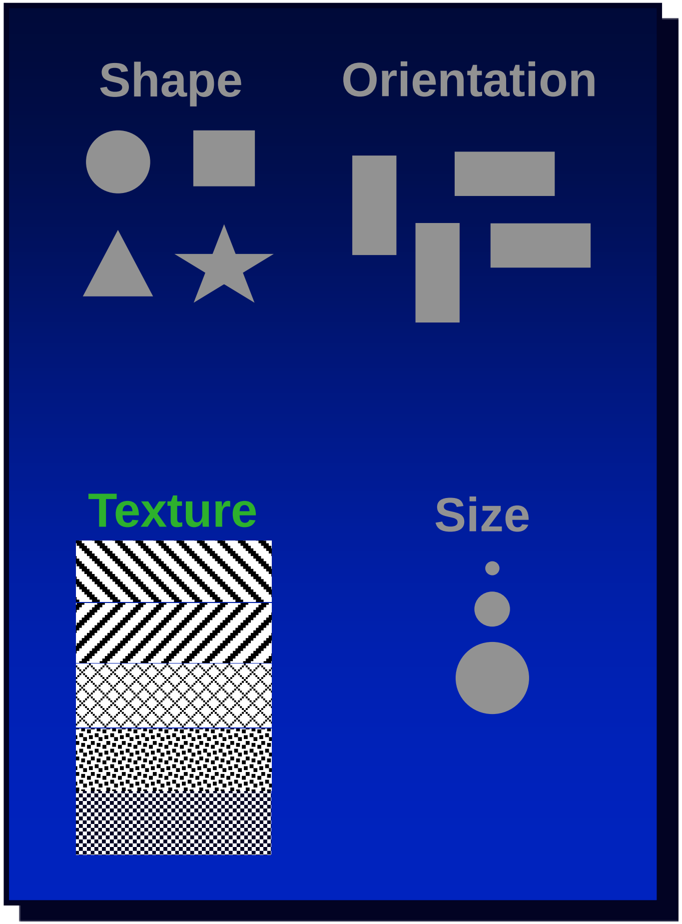
Use Three to Seven Categories Max.

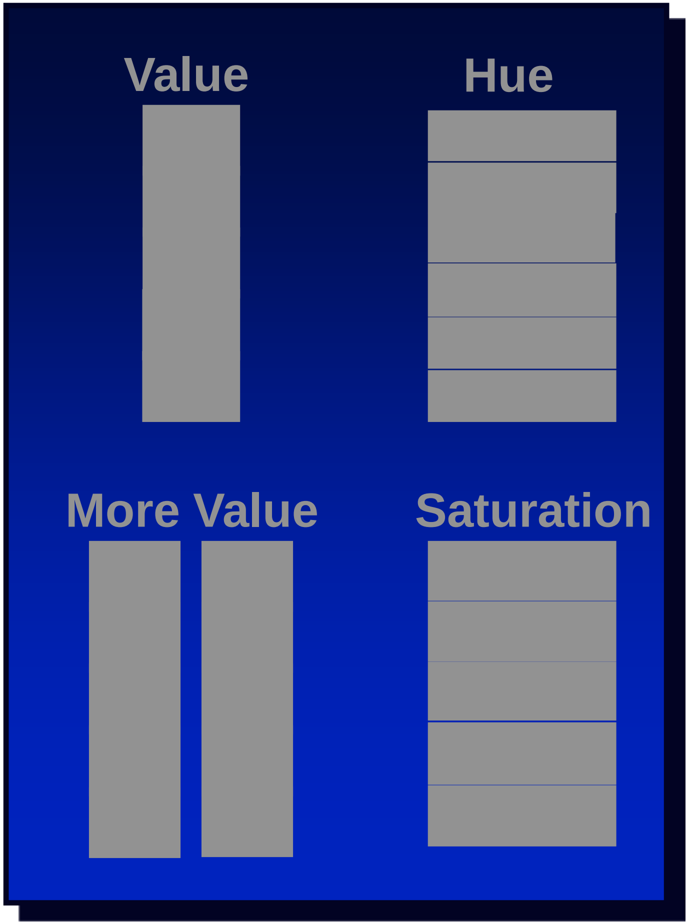


Orientation



Polygon Symbols





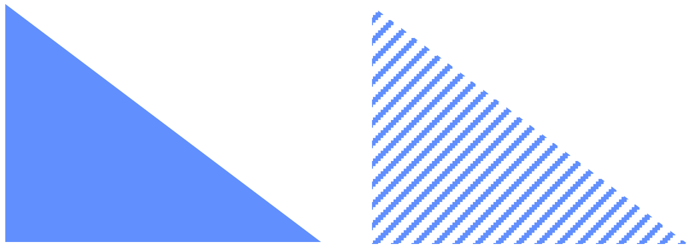
Texture

- Black and White Prints
- Polygons
- Large Areas

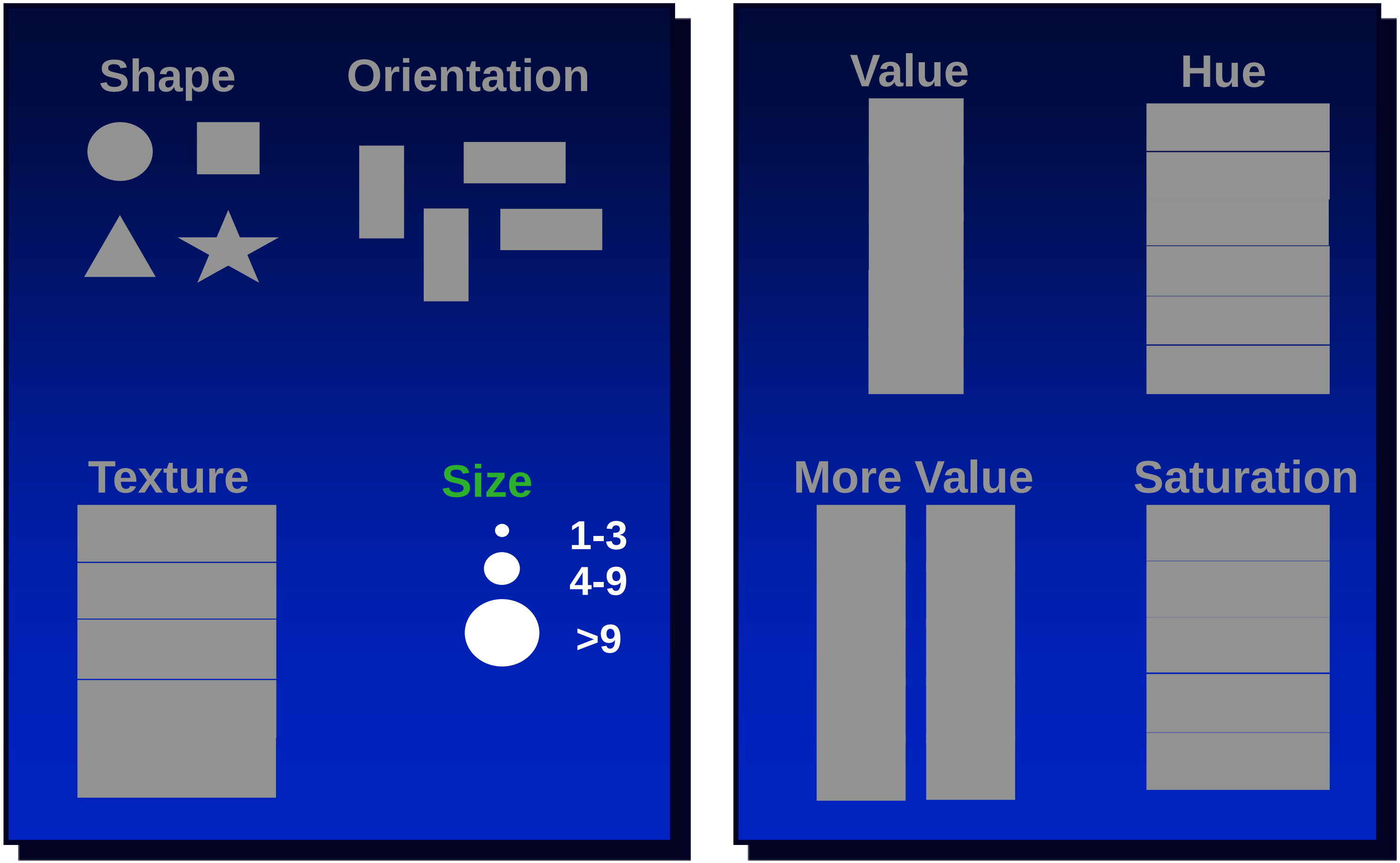
Texture

Brings object to the front (figure)

- **long wavelength hues**
- **coarse texture**



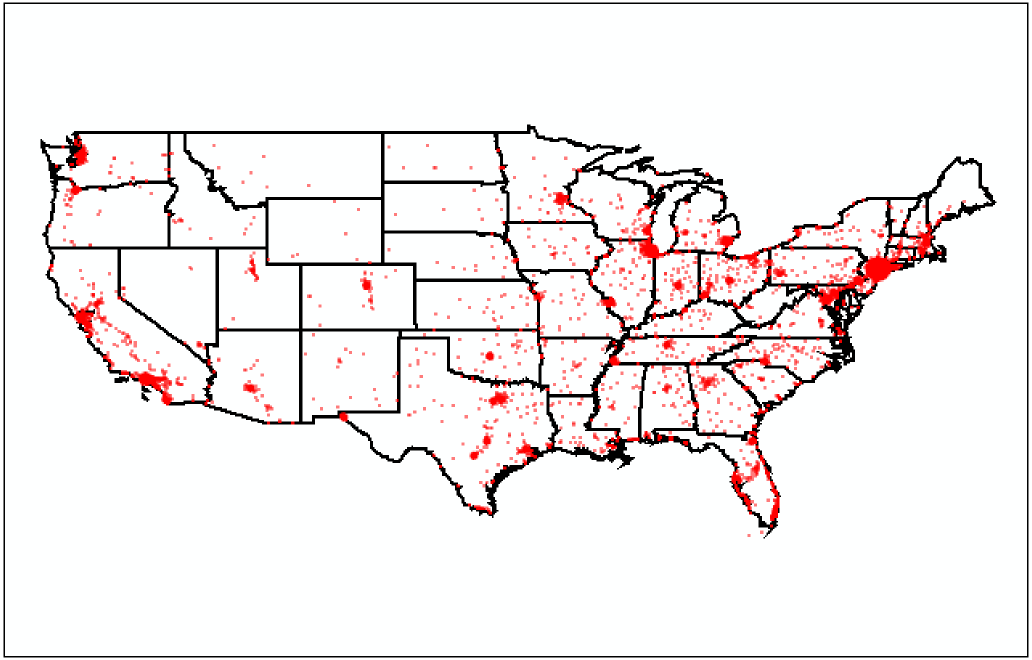
Size – Point Symbols



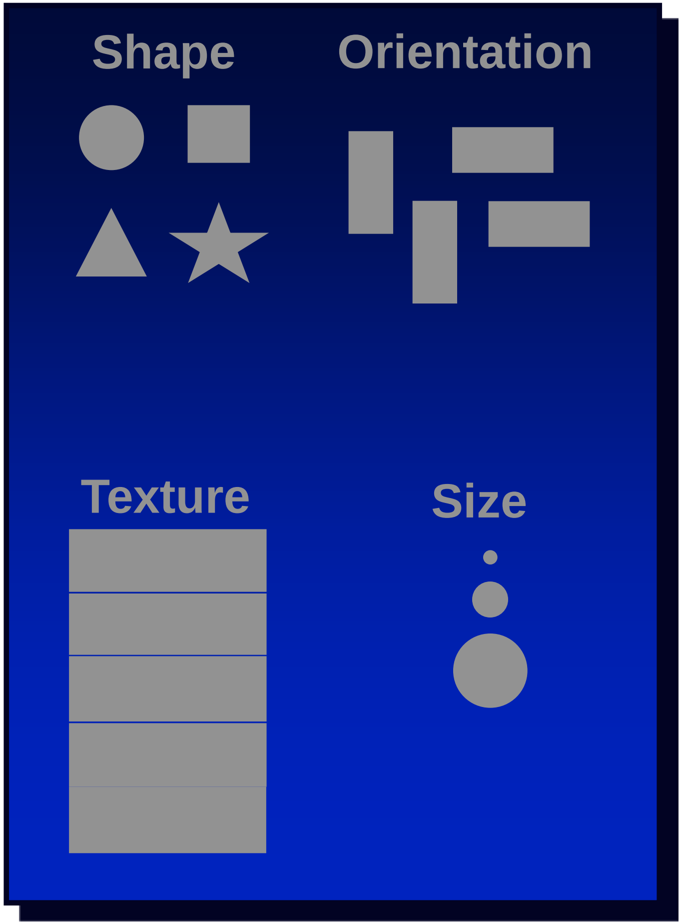
Size

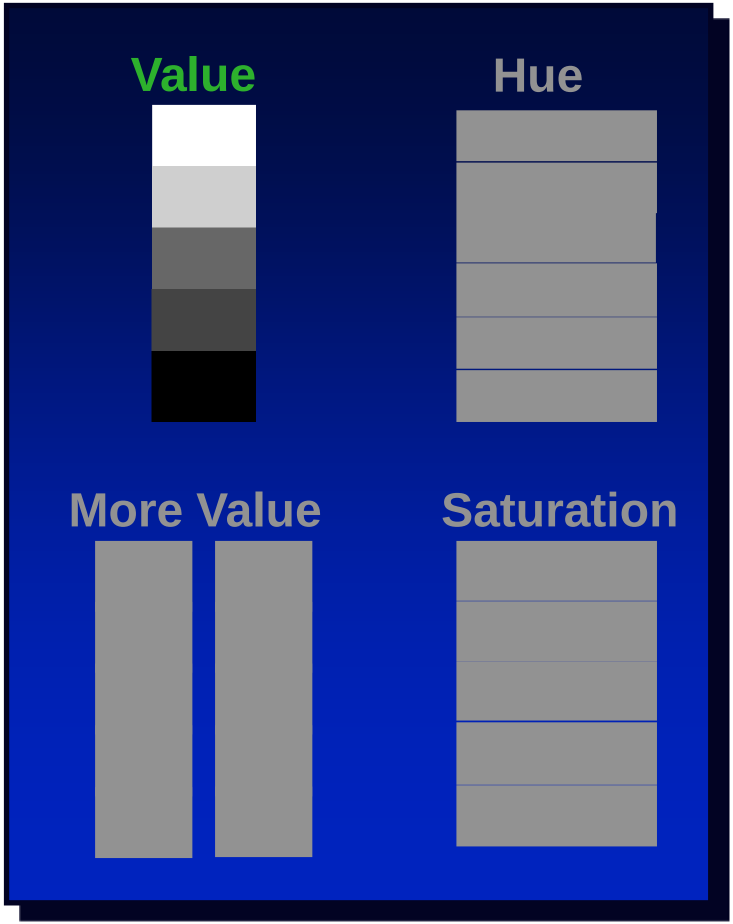
Graduated Symbols

Show Size or Amount



Values


Shape
Orientation
Texture
Size


Value
Hue
More Value
Saturation

Values

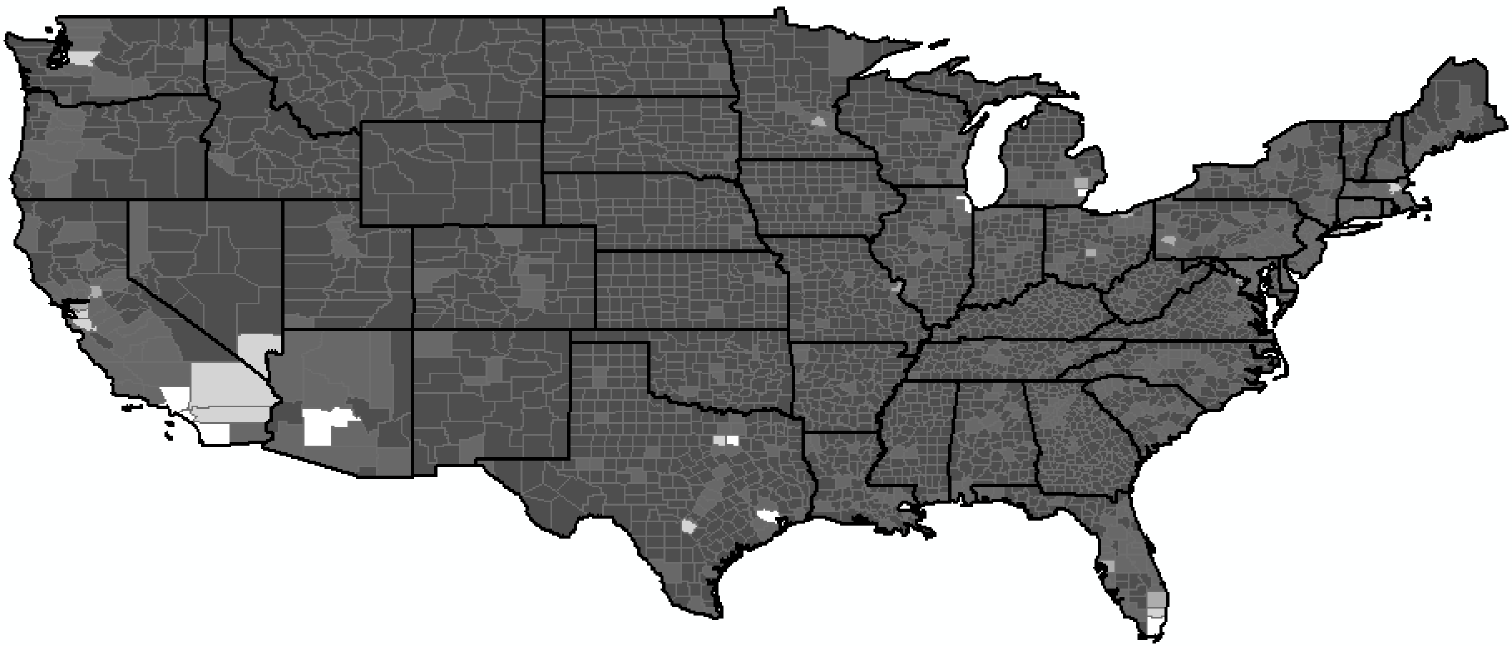
Increase/Decrease Contrast

The greater the difference in value between an object and its background, the greater the contrast.

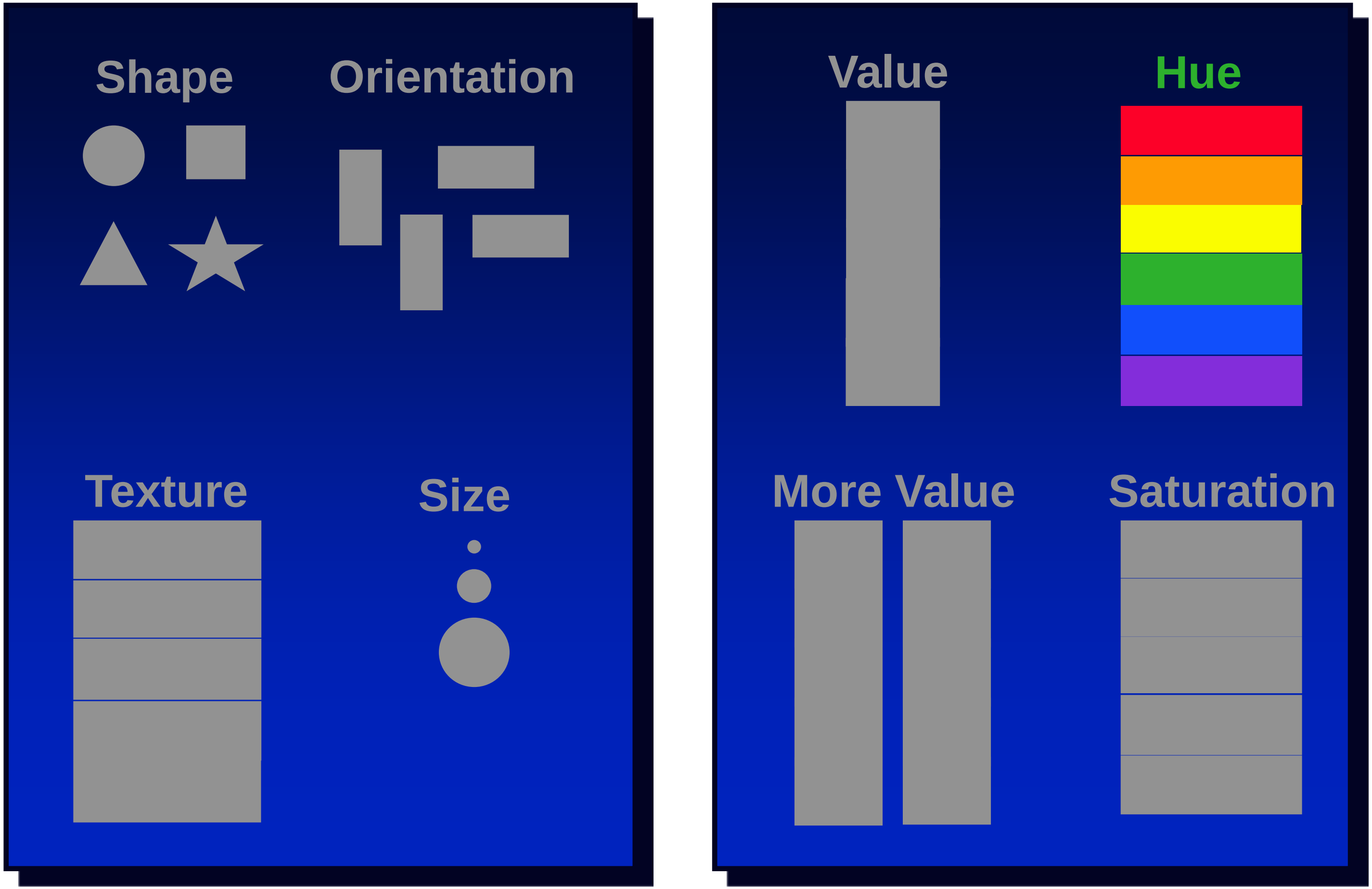
Values

By creating a pattern of dark to light values, even when the objects are equal in shape and size, it leads the eye in the direction of dark to light

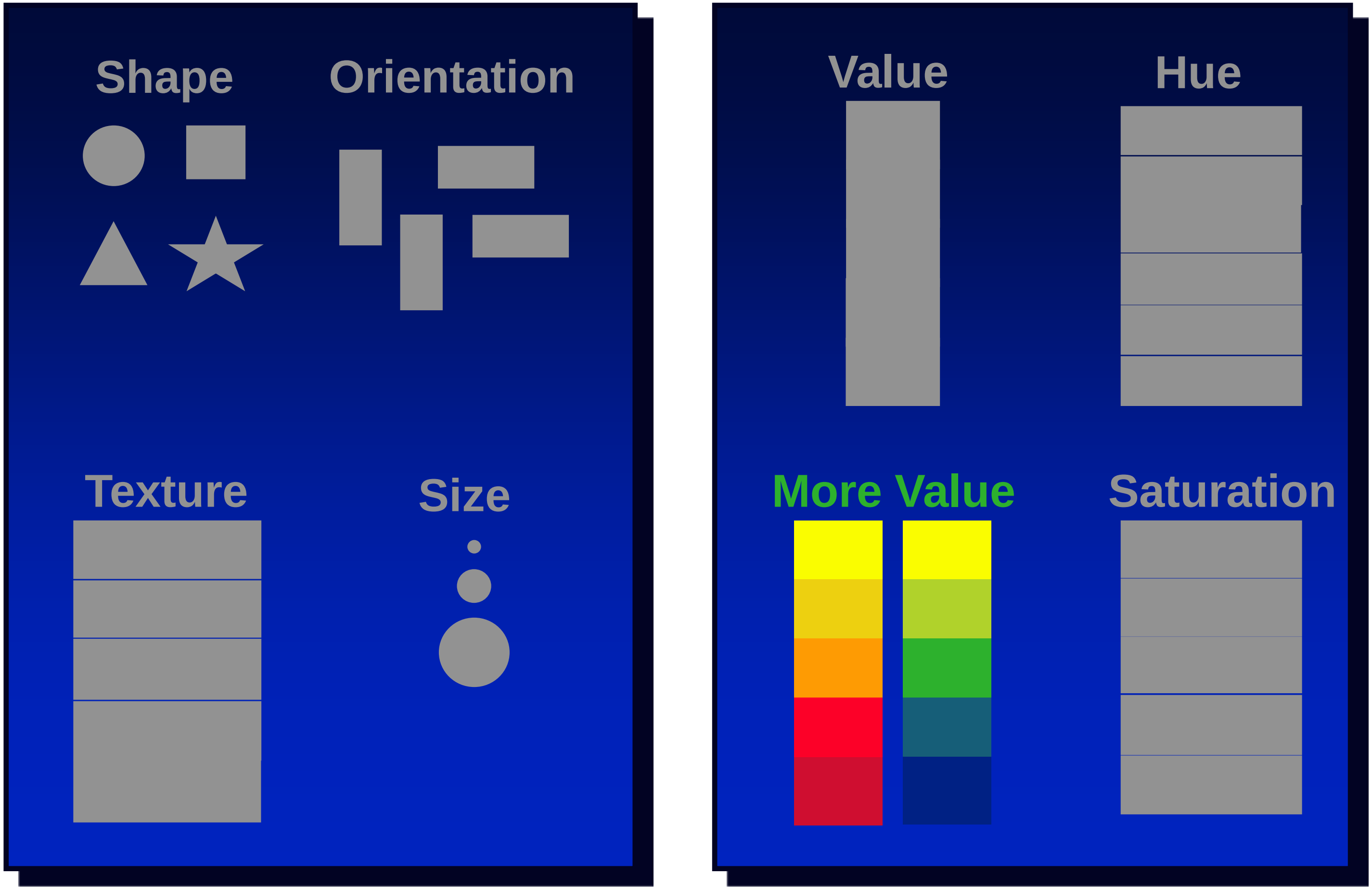
Values



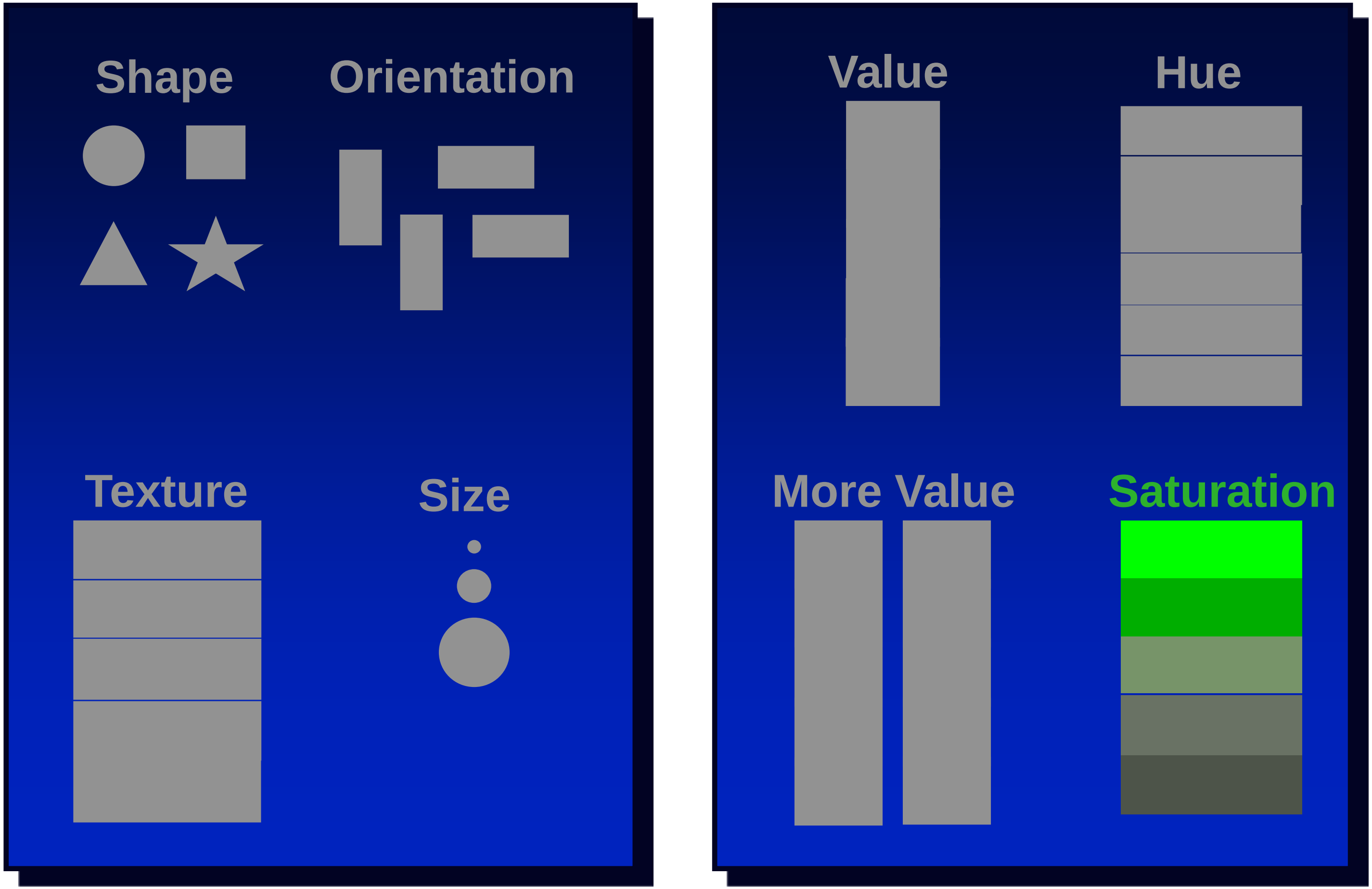
Color Hues


Shape
Orientation
Texture
Size
Value
Hue
More Value
Saturation

Color Values

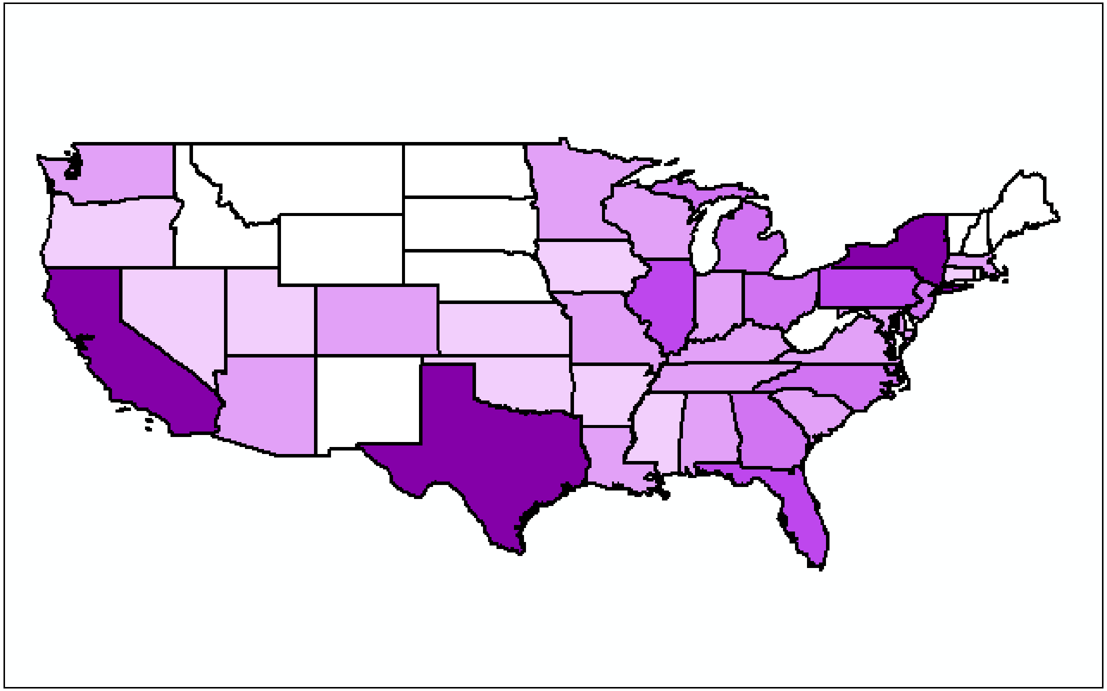


Saturation


Shape
Orientation
Texture
Size
Value
Hue
More Value
Saturation

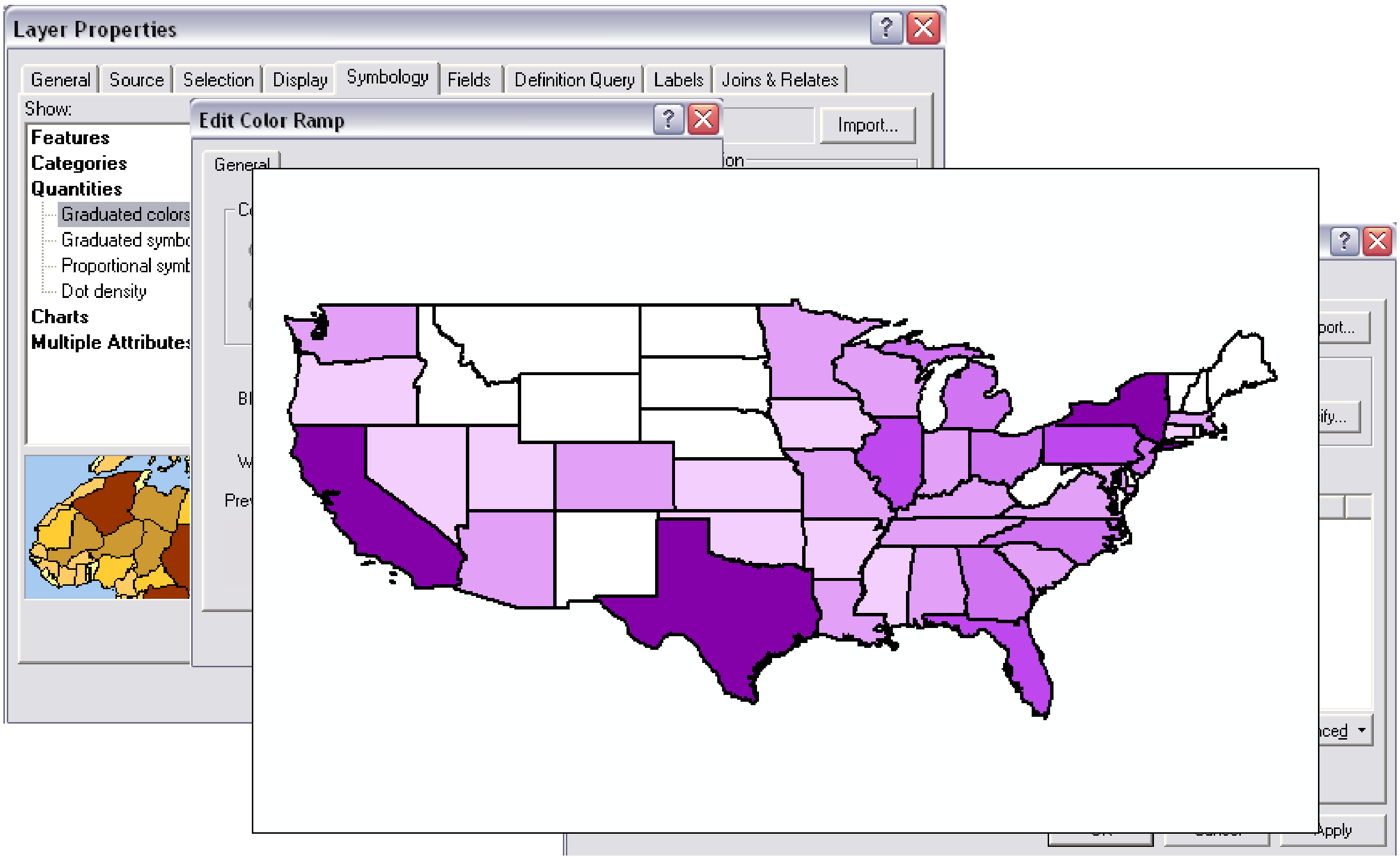
Saturation

You can change the saturation of a hue by adding black (shadow) or white (light). The amount of saturation gives us our shades and tints.



Saturation

Customize the Properties…of a layer



Color

Color Hues and Values

Each of individual color is a hue

Colors have meaning (i.e. cool colors, warm colors, political meanings)

-Cool colors calming

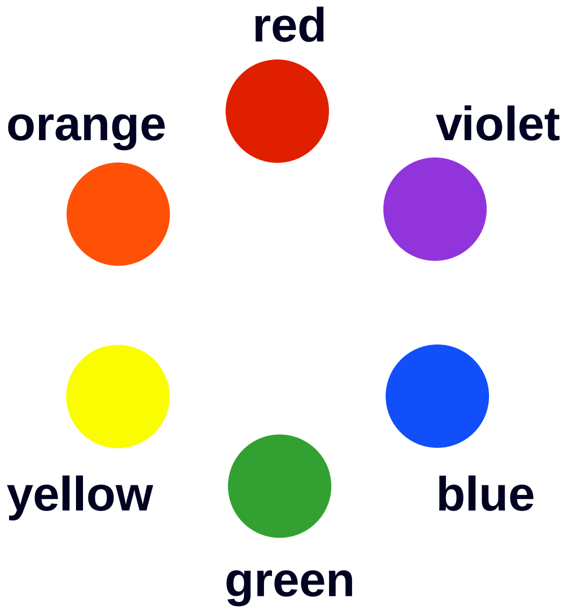
-Warm colors exciting

-Cool colors appear smaller than warm colors and
they visually recede on the page so red can visually overpower and stand out over blue even if used in equal amounts.

[www.colormatters.com]

[www.colorbrewer.org]

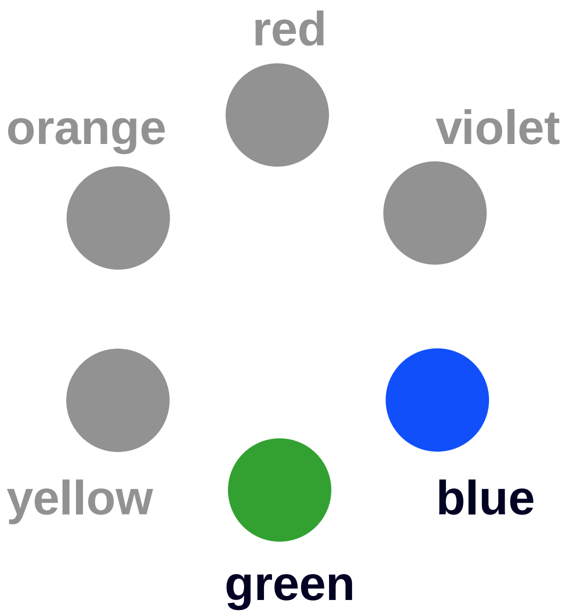
Color Wheel



Color Wheel

Harmony

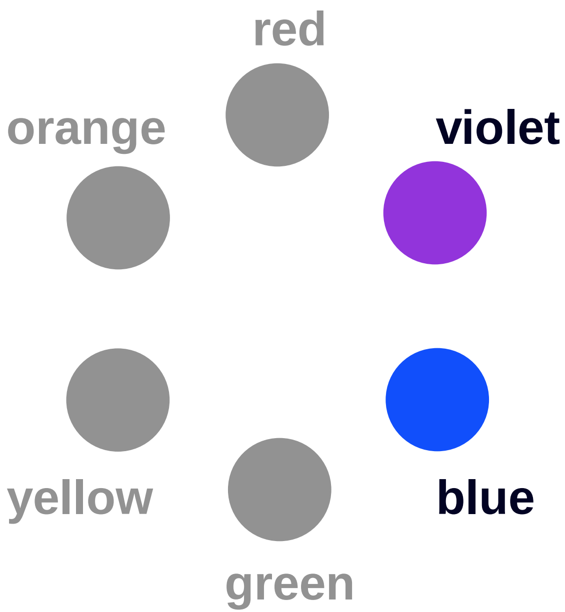
- two adjacent hues



Color Wheel

Harmony

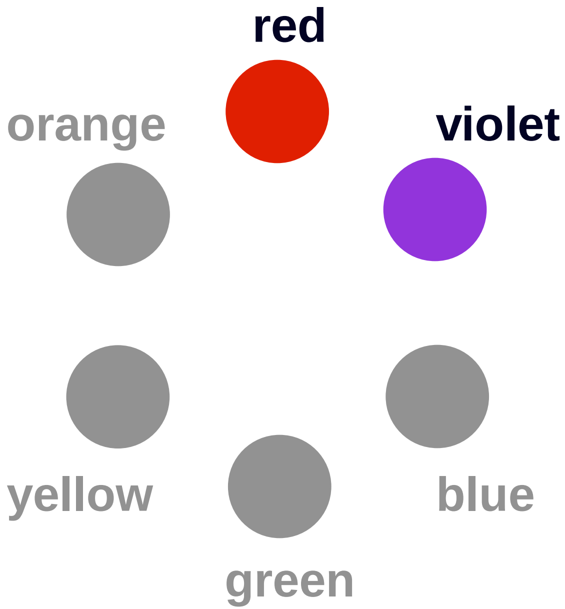
- two adjacent hues



Color Wheel

Harmony

- two adjacent hues



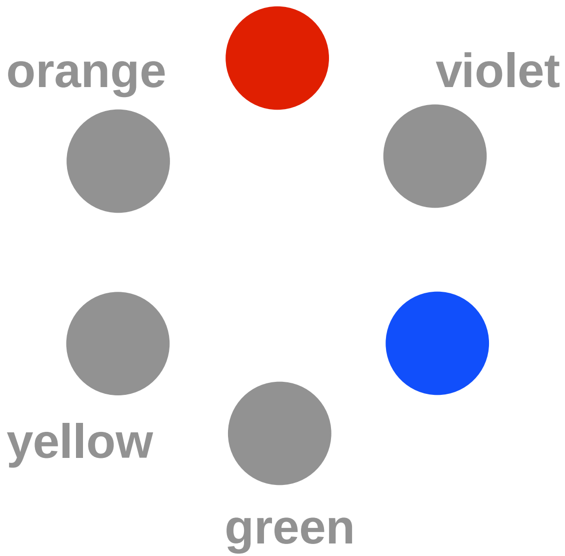
Color Wheel

Harmony

- two adjacent hues

Contrast

- two hues with
  one hue skipped
  in between



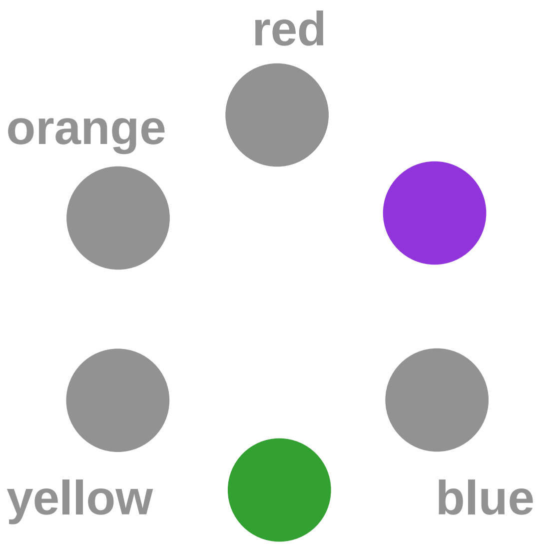
Color Wheel

Harmony

- two adjacent hues

Contrast

- two hues with one hue skipped in between



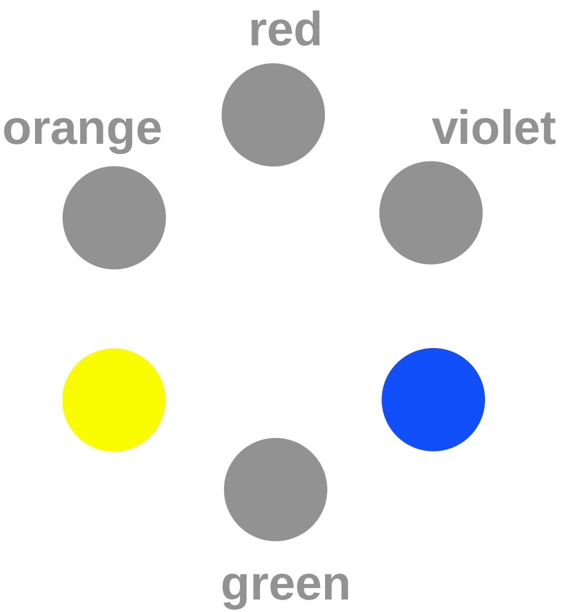
Color Wheel

Harmony

- two adjacent hues

Contrast

- two hues with one hue skipped in between



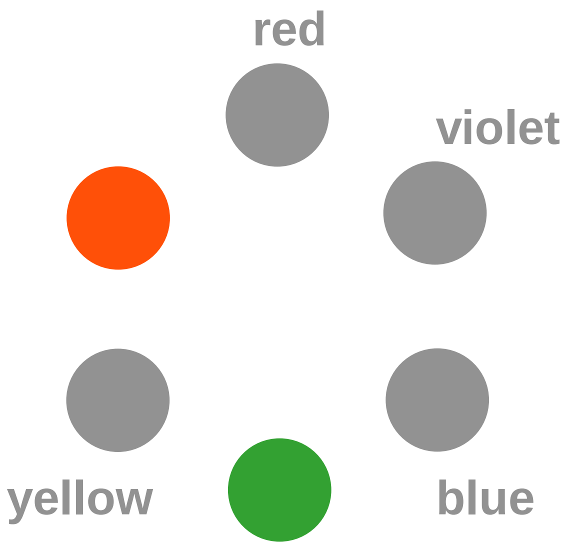
Color Wheel

Harmony

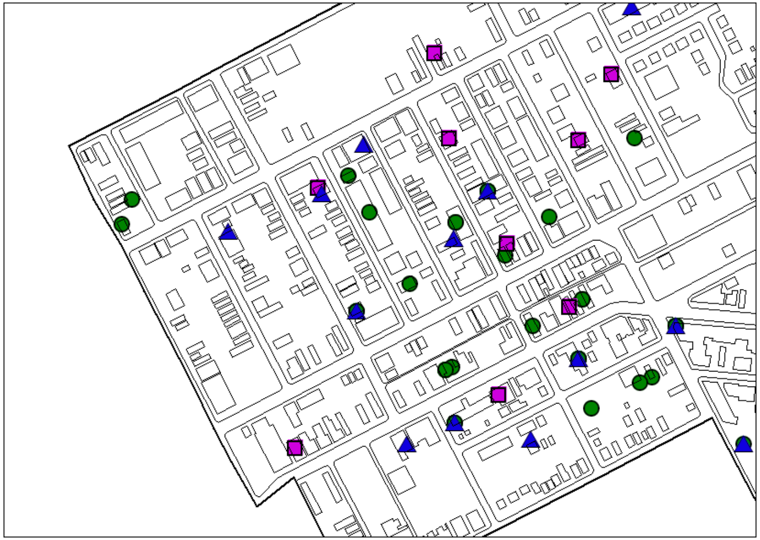
- two adjacent hues

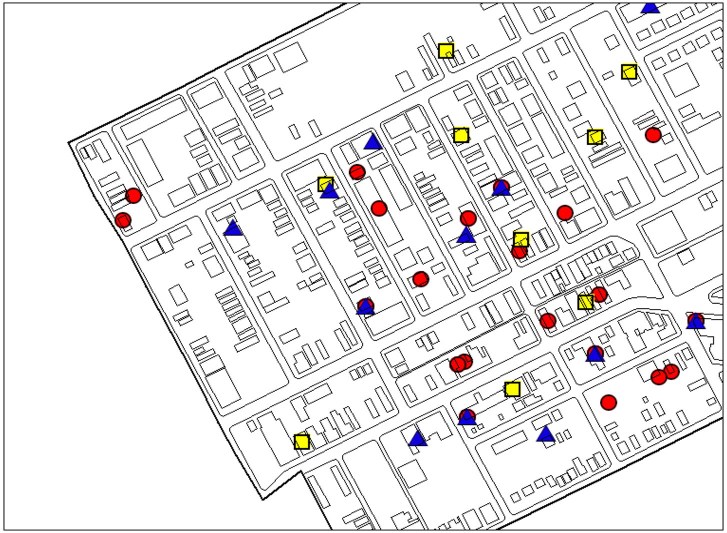
Contrast

- two hues with one hue skipped in between



Non-Contrasting vs. Contrasting





Color Wheel

Harmony

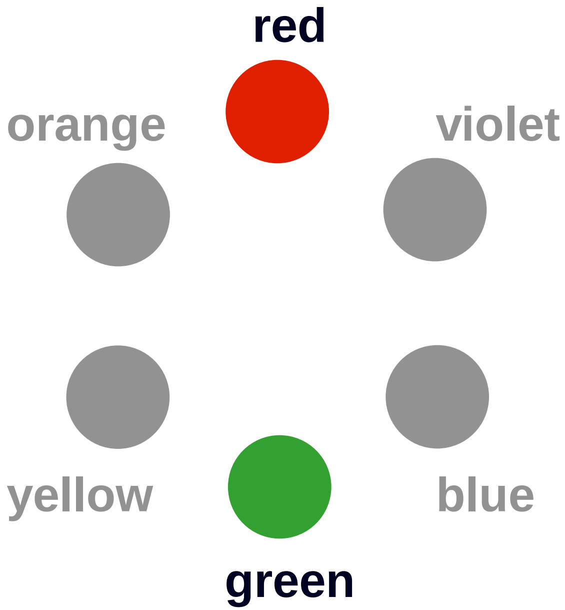
- two adjacent hues

Contrast

- two hues with one hue skipped in between

Clash

- **Opposites**



Color Wheel Review

Harmony

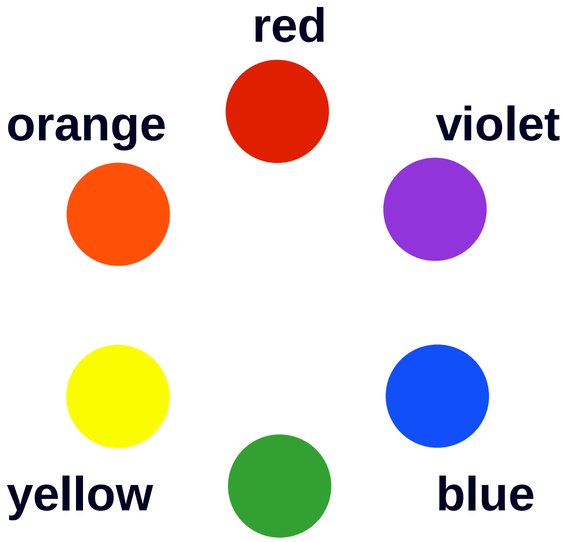
- two adjacent hues

Contrast

- two hues with
  one hue skipped
  in between

Clash

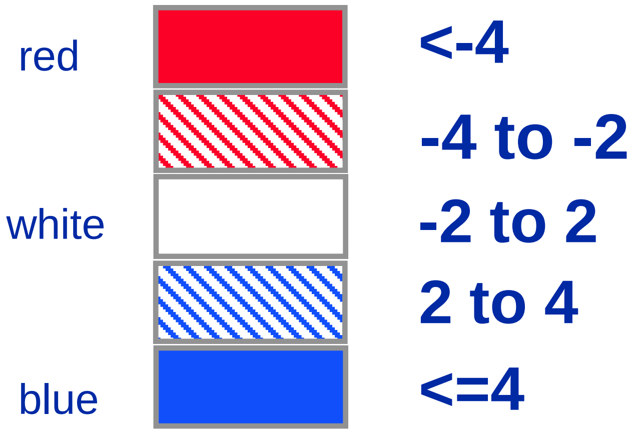
- Opposites



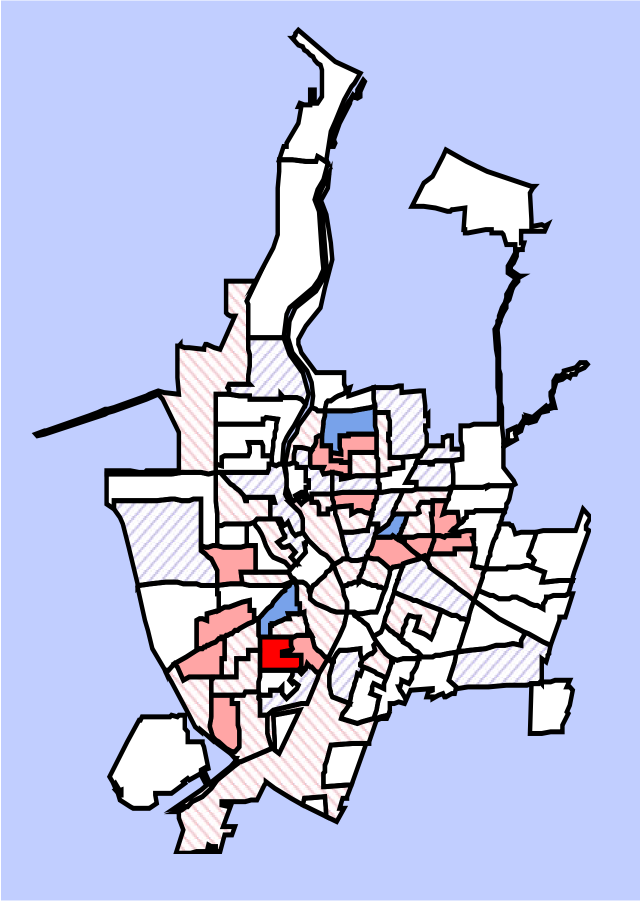
Double-Ended Scales

Extremes Emphasized

- critical value of zero
- e.g., regression residuals, time change
- blue and red contrast
- white center is ground



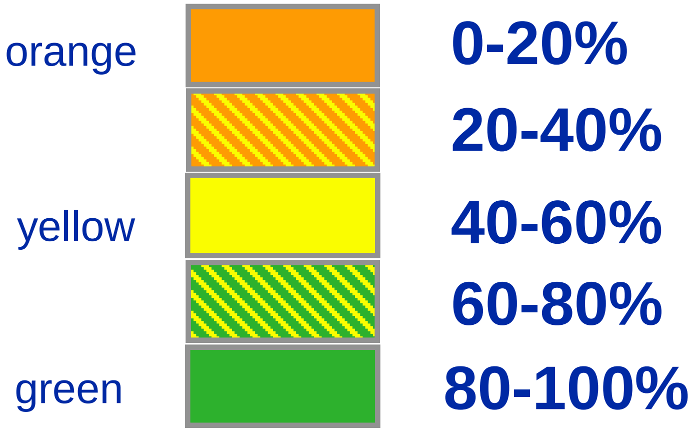
Change Map



Double-Ended Scales

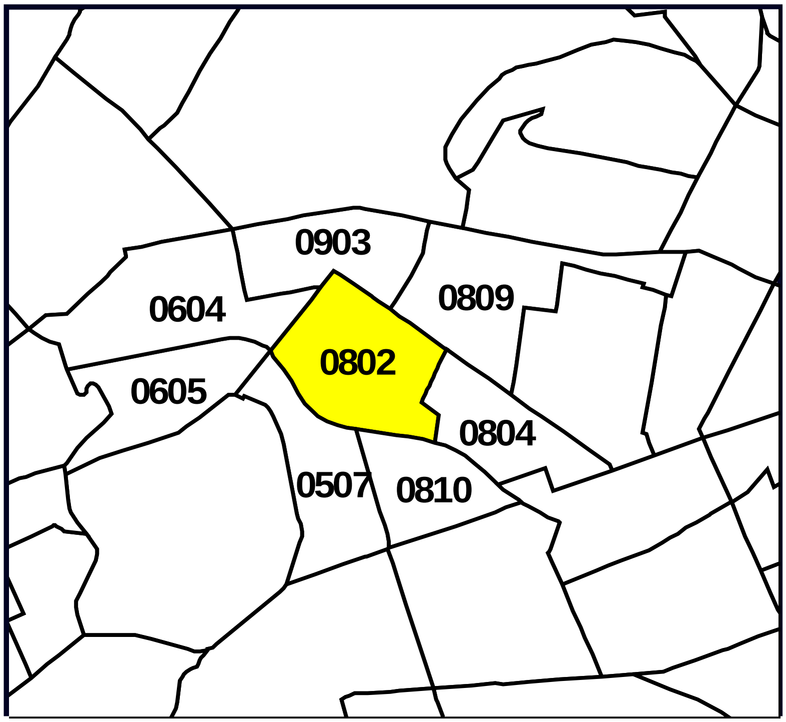
Balance Emphasized

- 50% is desired
- yellow contrasts with white paper
- green and orange contrast

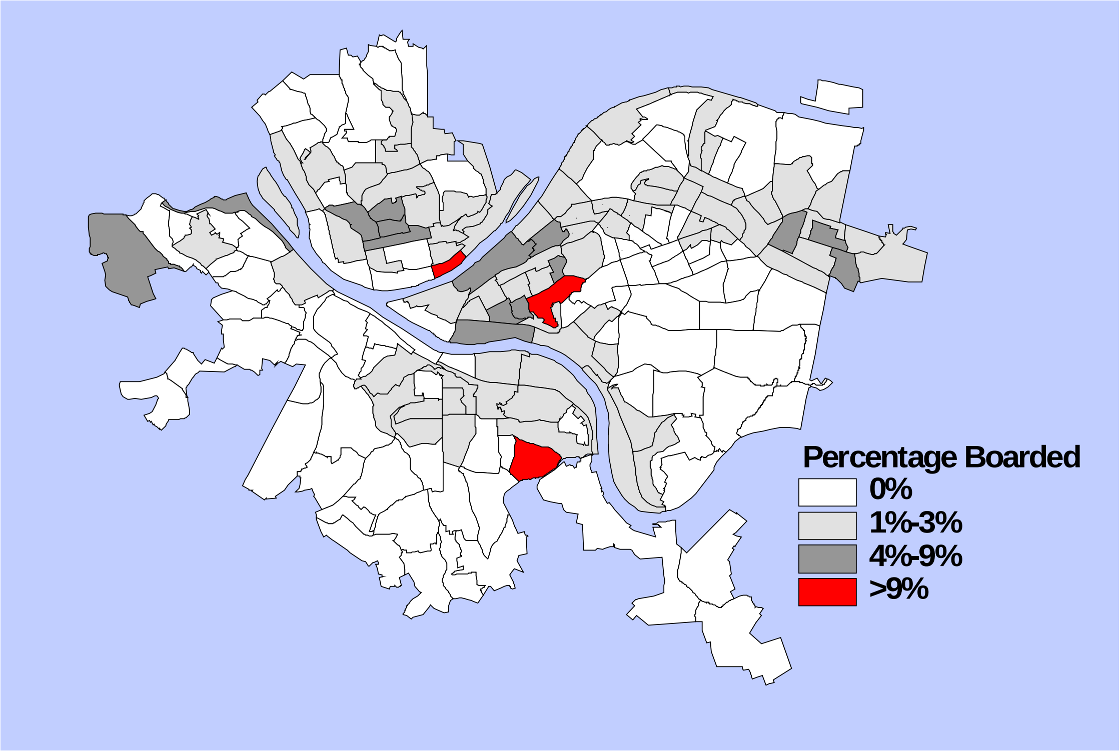


Color Spot

White background allows yellow color spot to be visualized



Color Spot Ramps

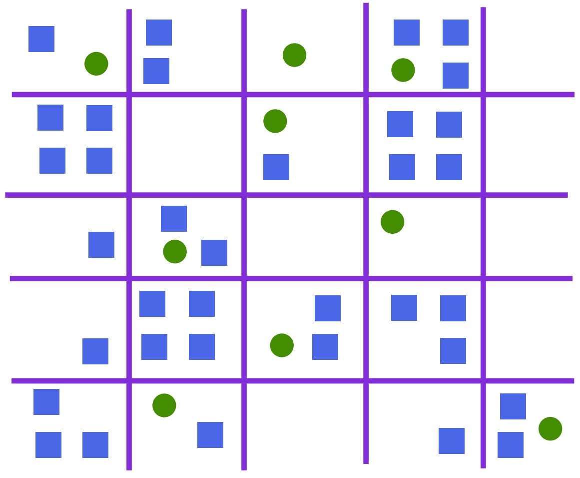


Graphical Hierarchy

Graphical Hierarchy

Goal

- direct attention toward or away from available Information



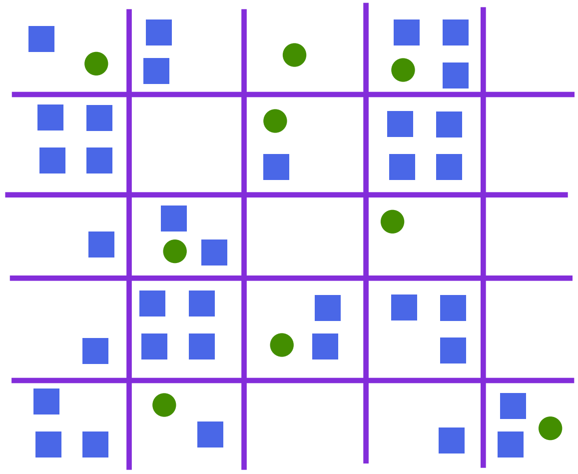
Graphical Hierarchy

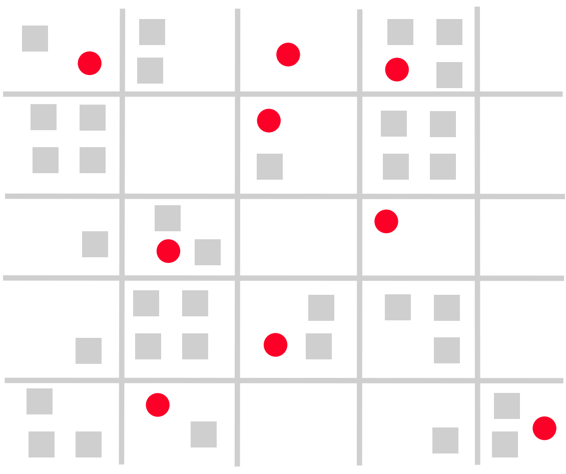
Goal

- direct attention toward or away from available Information

Figure-Ground

- visual separation of a scene into recognizable *figures* and inconspicuous *background (ground)*





Graphical Hierarchy

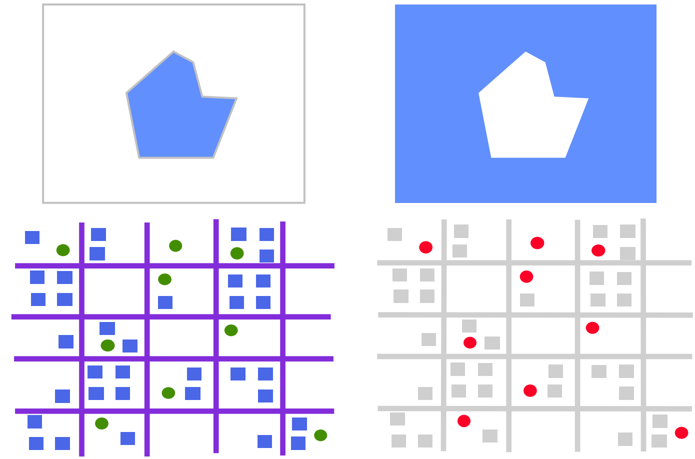
Ground

- larger of two contrasting areas

Graphical Hierarchy

Ground

- larger of two contrasting areas
- grays, light browns, heavily saturated hues



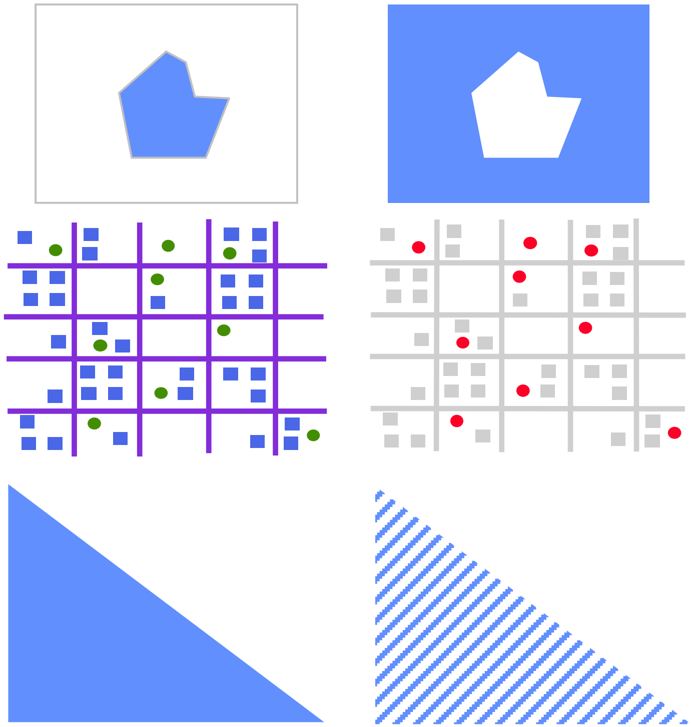
Graphical Hierarchy

Ground

- larger of two contrasting areas
- grays, light browns, heavily saturated hues

Figure

- long wavelength hues
- coarse texture



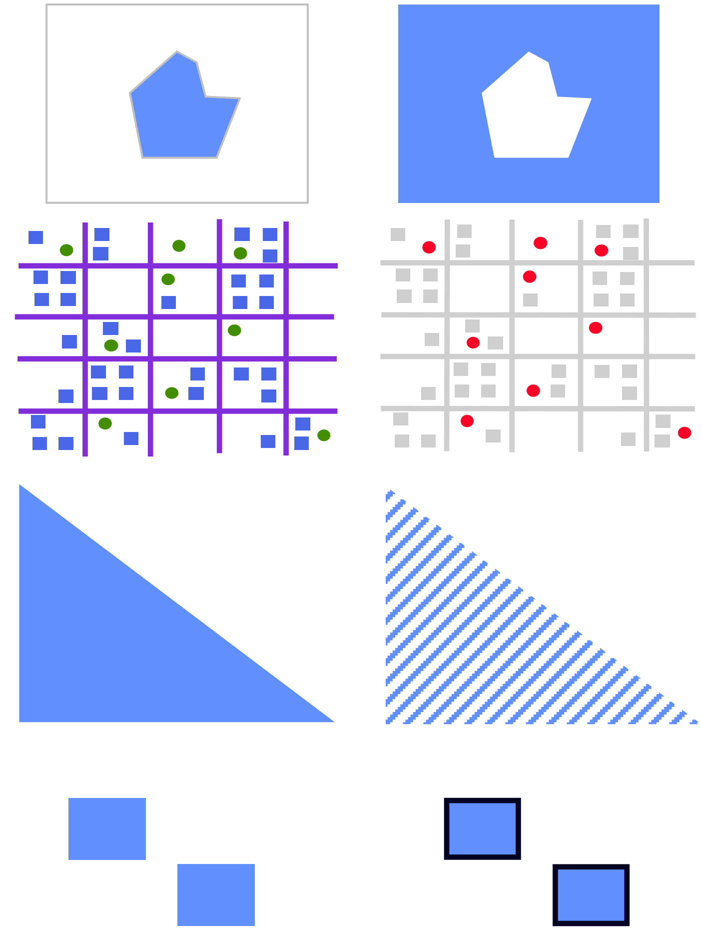
Graphical Hierarchy

Ground

- larger of two contrasting areas
- grays, light browns, heavily saturated hues

Figure

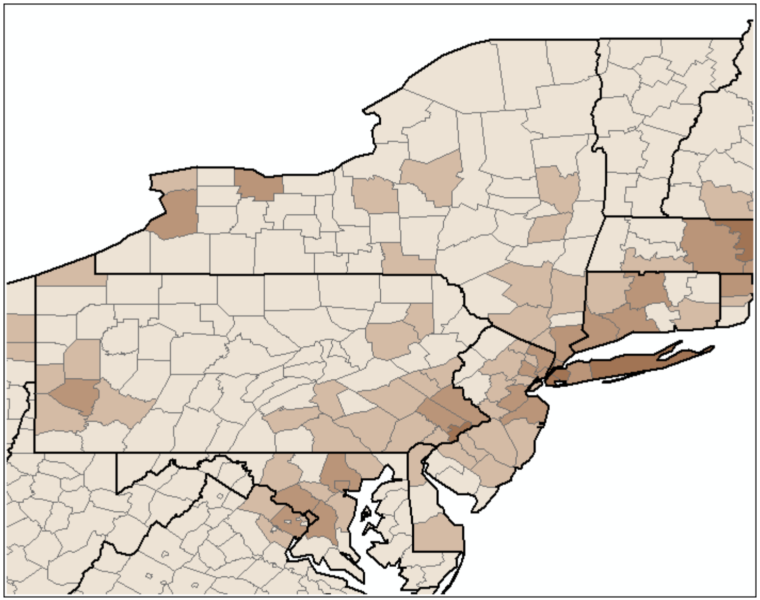
- long wavelength hues
- coarse texture
- **strong edge**



Choropleth Maps

Choropleth Maps

Map using different colors or patterns to show different values over space



Legend

States

Counties

POP2003

-99 - 162000

162001 - 559264

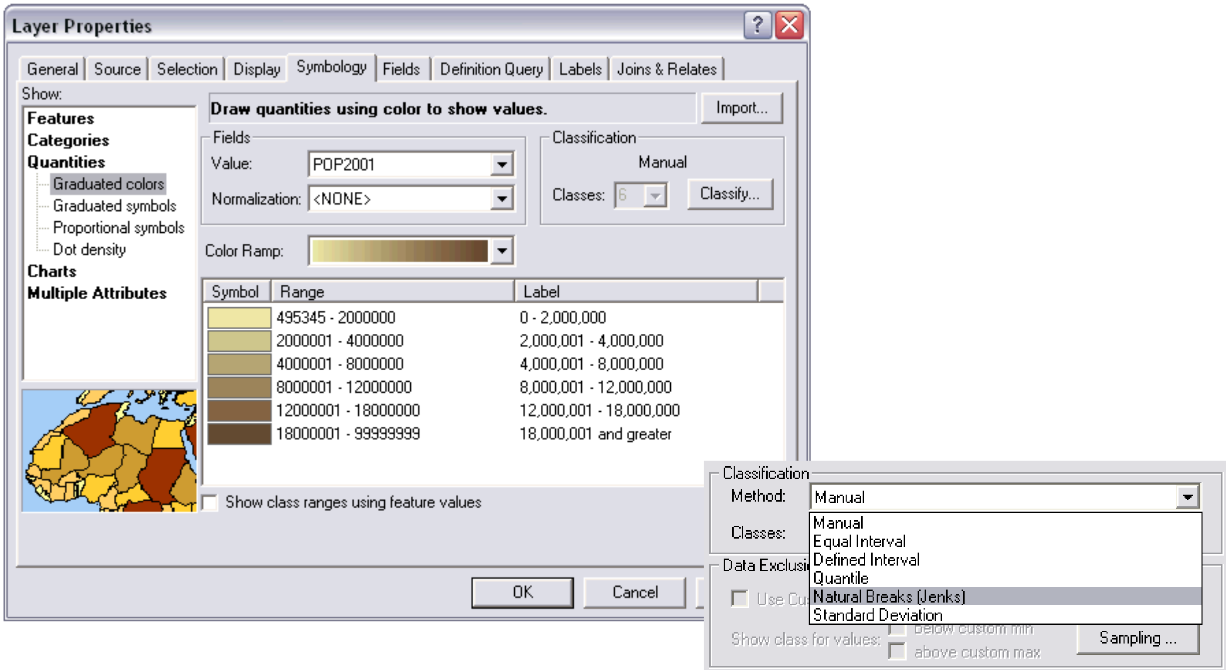
559265 - 1370157

1370158 - 3581375

3581376 - 9873548

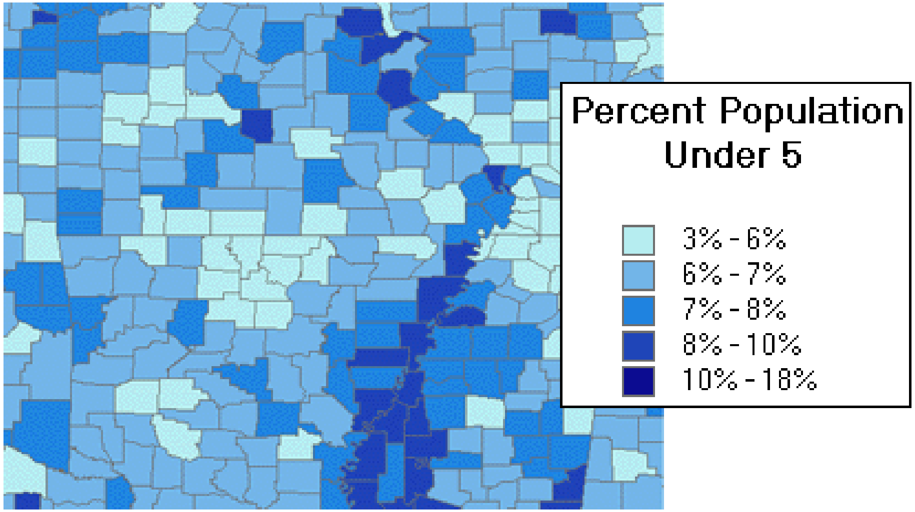
Classifications

Process of placing data into groups that have a similar characteristic or value



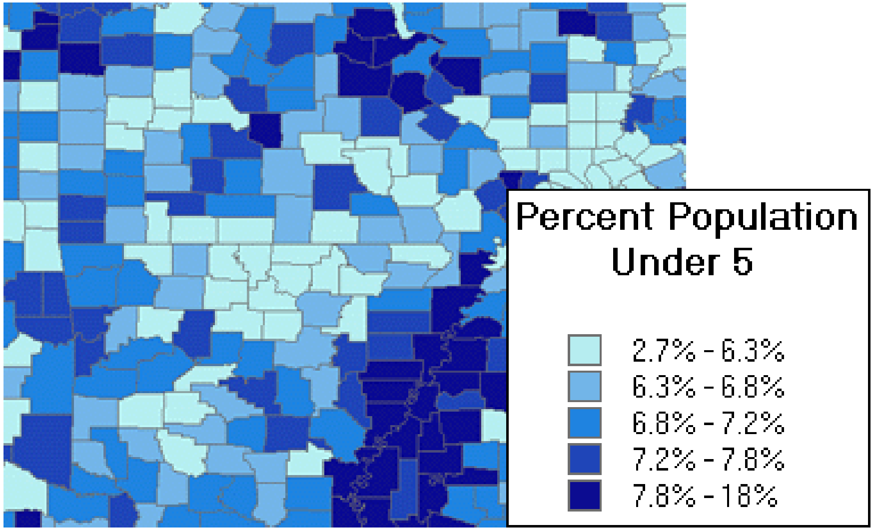
Natural Breaks

Classes are based on natural groupings inherent in the data
Looks for where there are big jumps in data



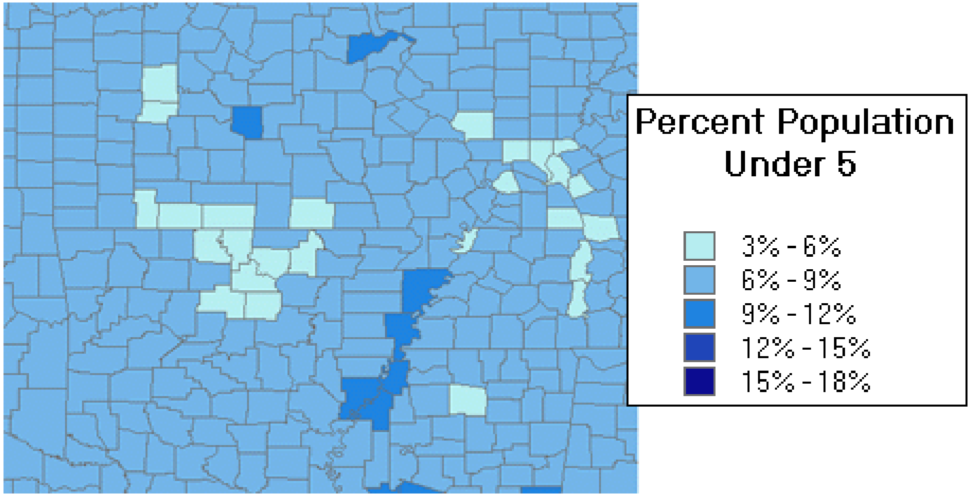
Quantiles

Each class contains an equal number of features
Good for linearly distributed data



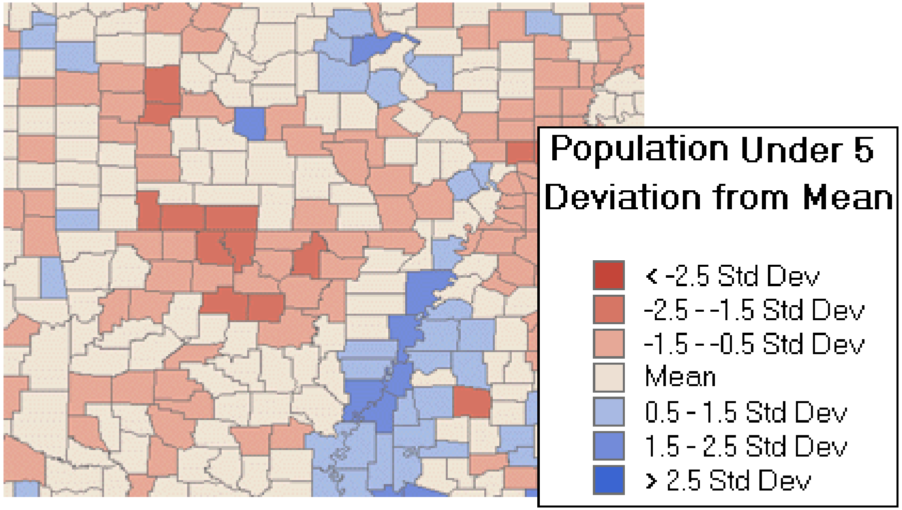
Equal Interval

Divides the range of attribute values into equal-sized Subranges (e.g. 0–100, 101–200, and 201–300)



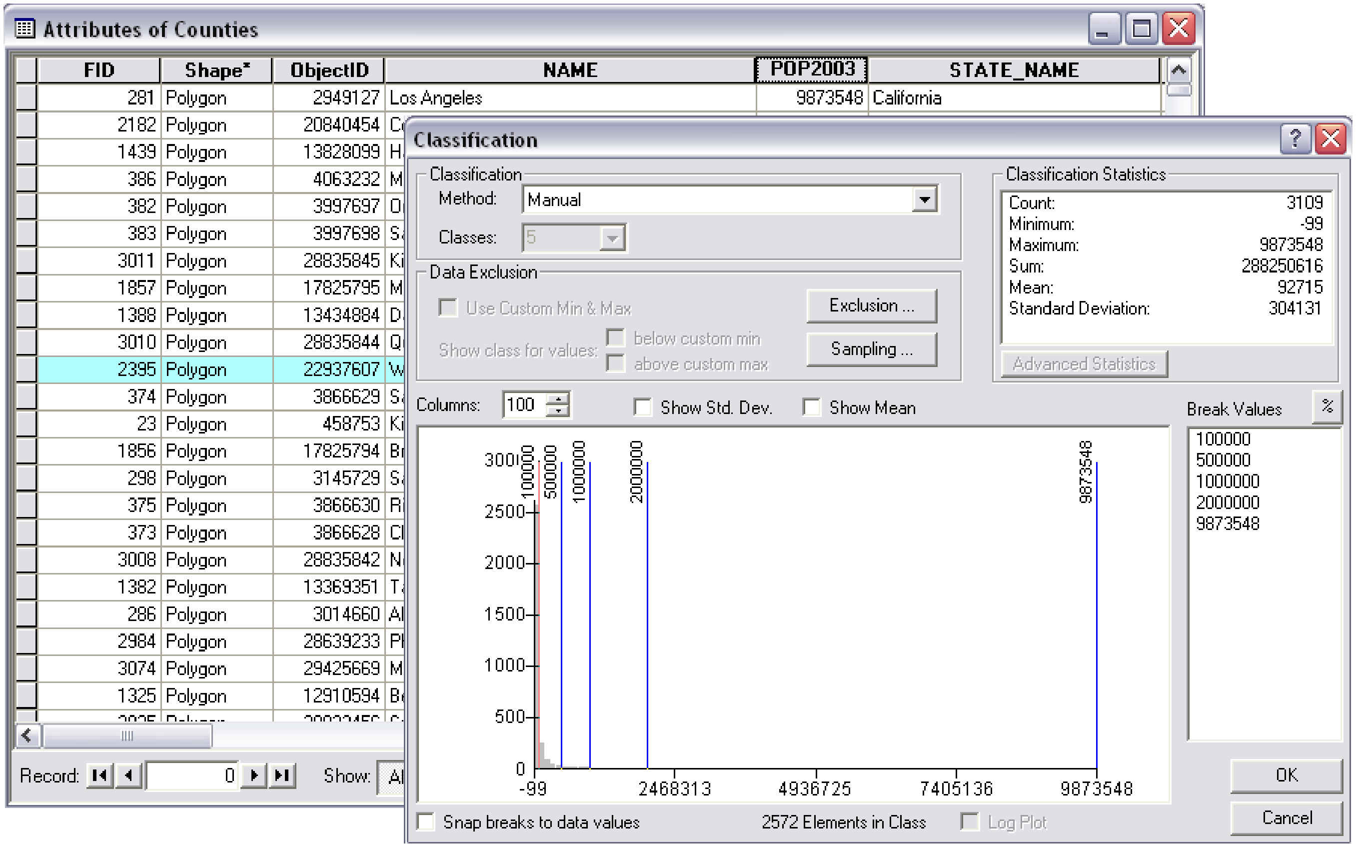
Standard Deviation

Calculates the mean of the data distribution and then maps one or two standard deviations above or below the mean



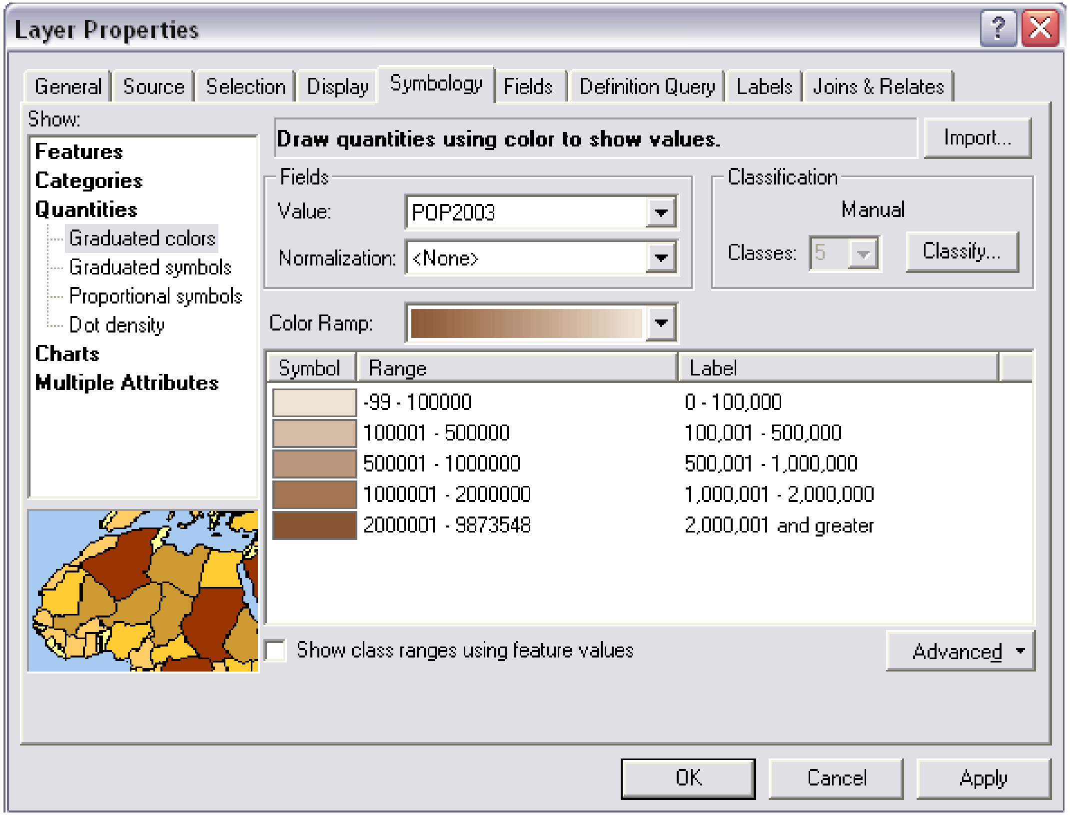
Custom Scales

Know your data!

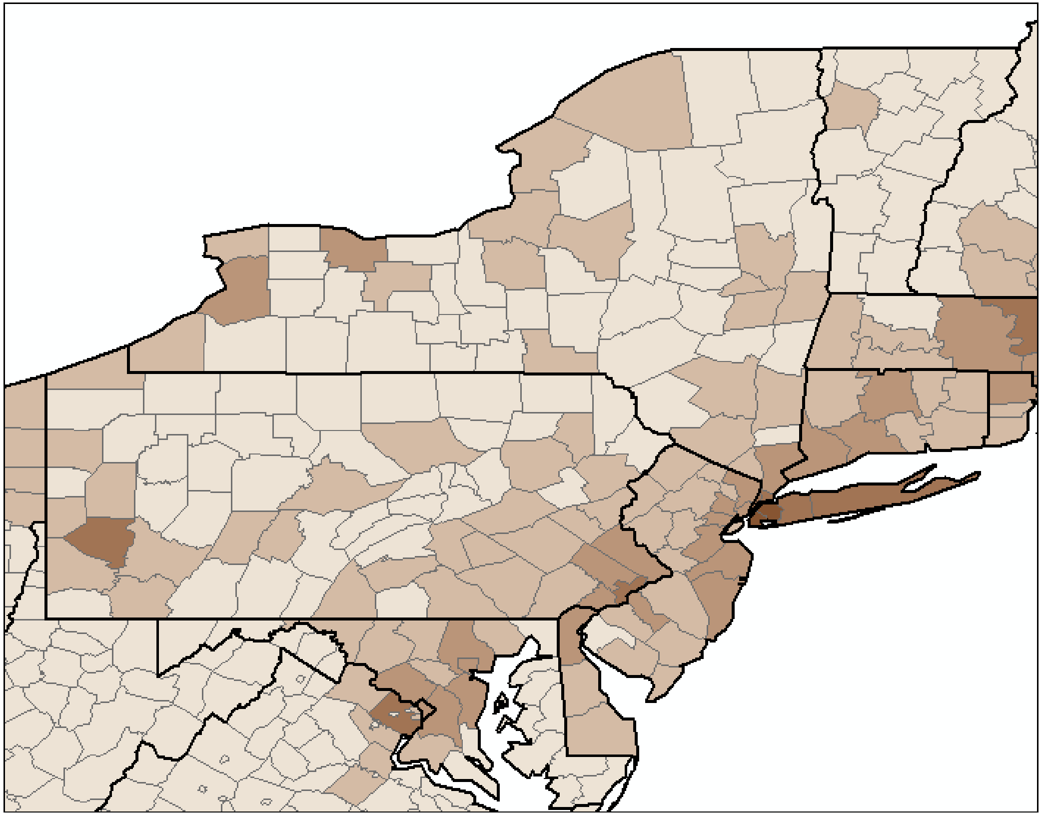


Custom Scales

Edit the legend



Custom Scales



Legend

States

Counties

POP2003

0 - 100,000

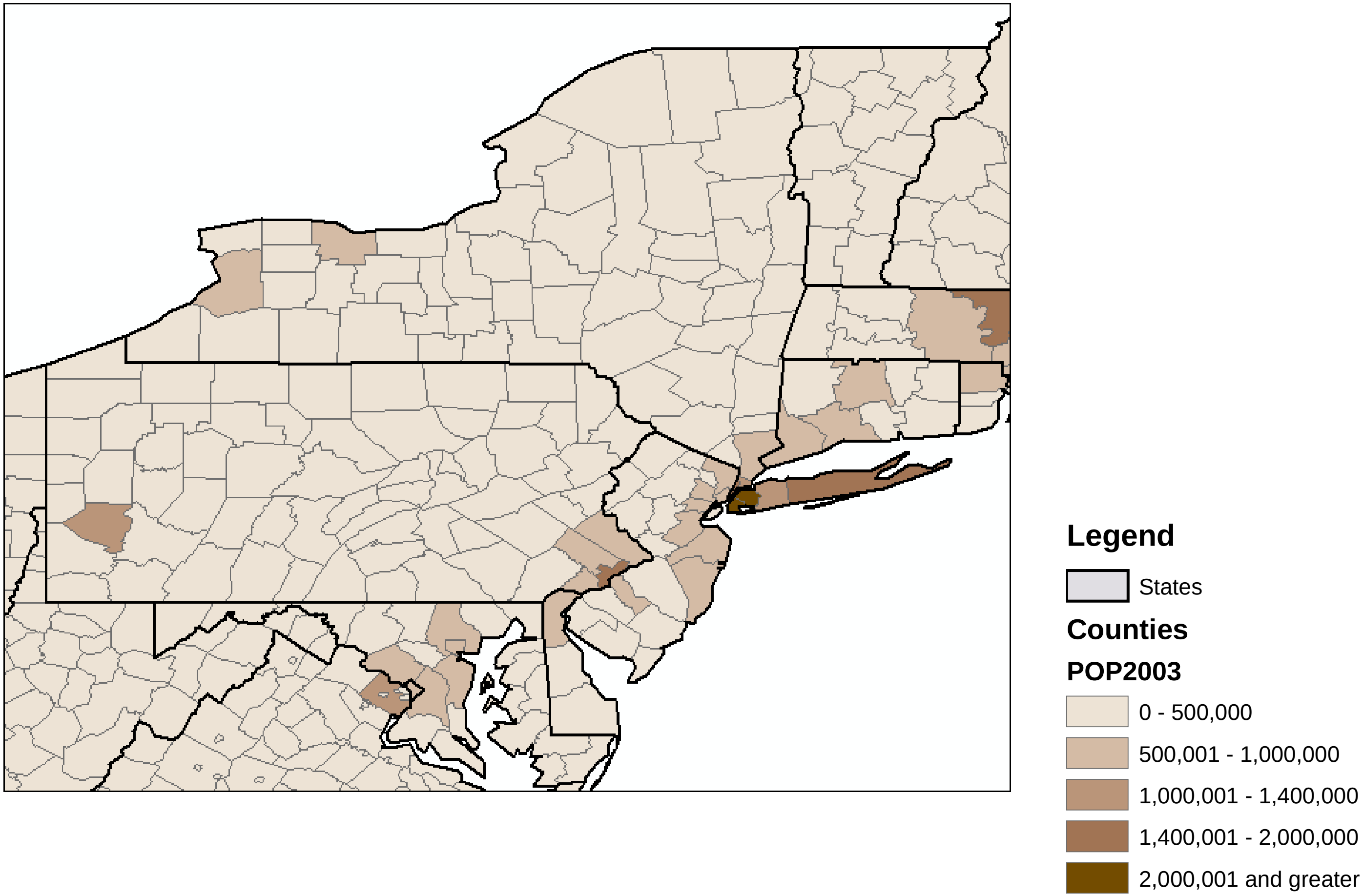
100,001 - 500,000

500,001 - 1,000,000

1,000,001 - 2,000,000

2,000,001 and greater

Custom Scales



Normalizing Data

Divides one numeric attribute by another in order to minimize differences in values based on the size of areas or number of features in each area

Examples:

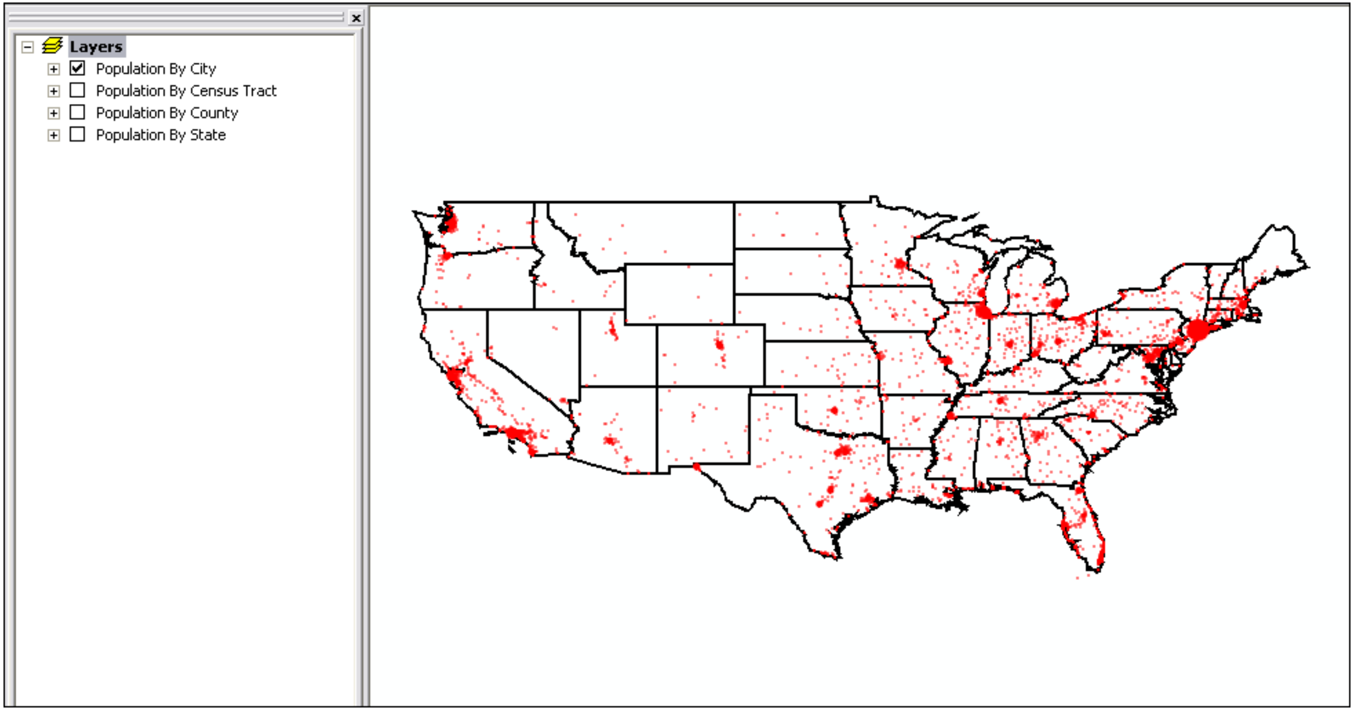
- Dividing the 18- to 30-year-old population by the total population yields the percentage of people aged 18–30

- Dividing a value by the area of the feature yields a value per unit area, or density

Map Layers, Scale Thresholds, and Hyperlinks

Map Layers

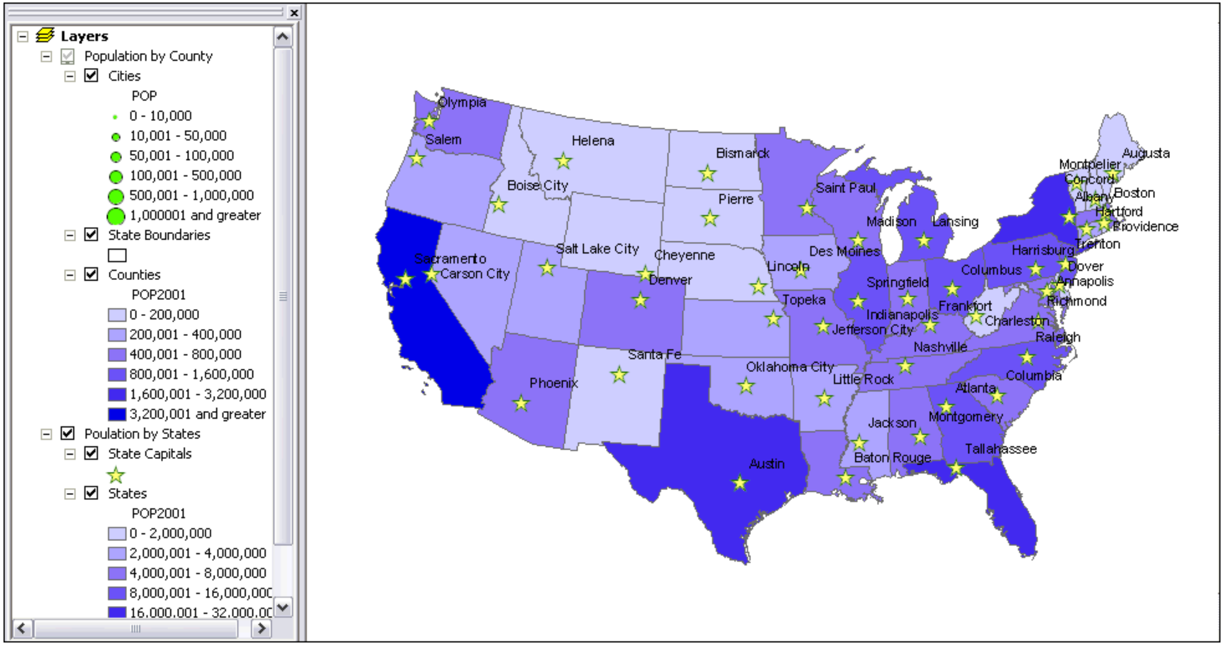
Organizes your layers
Group logically and rename



Scale Thresholds

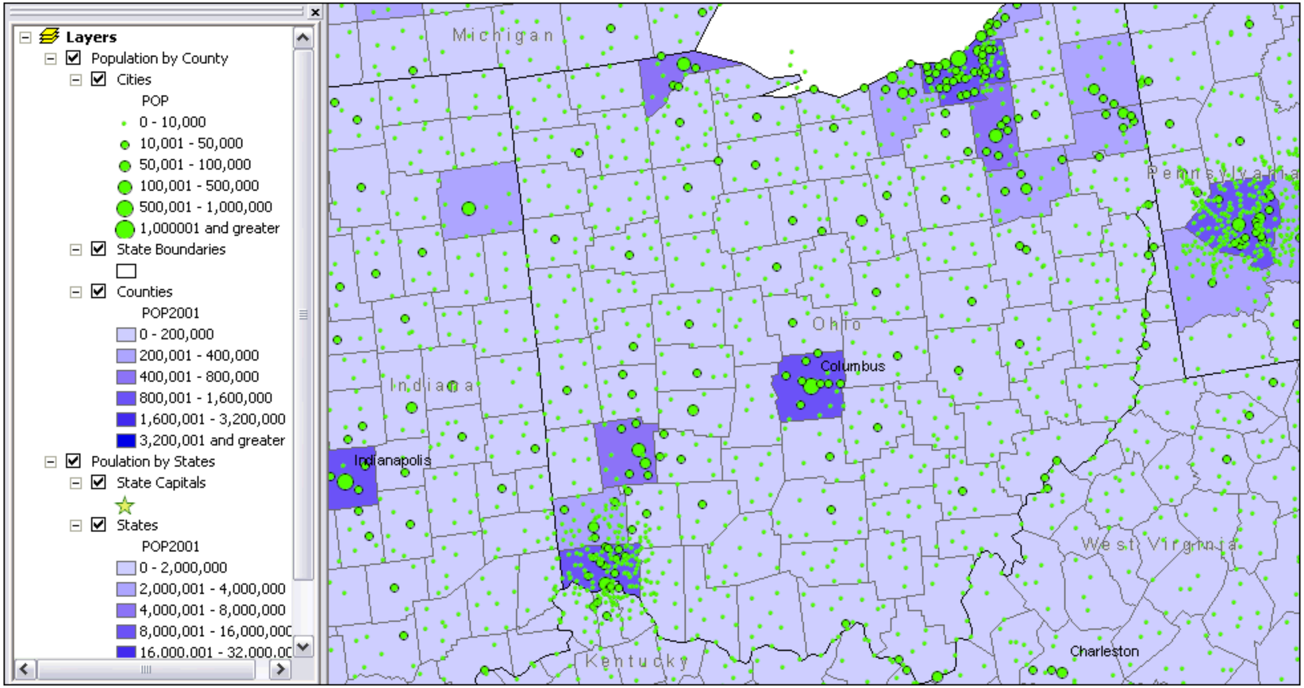
Minimum Scale Range

- If you zoom out beyond this scale, the layer will not be visible



Scale Thresholds

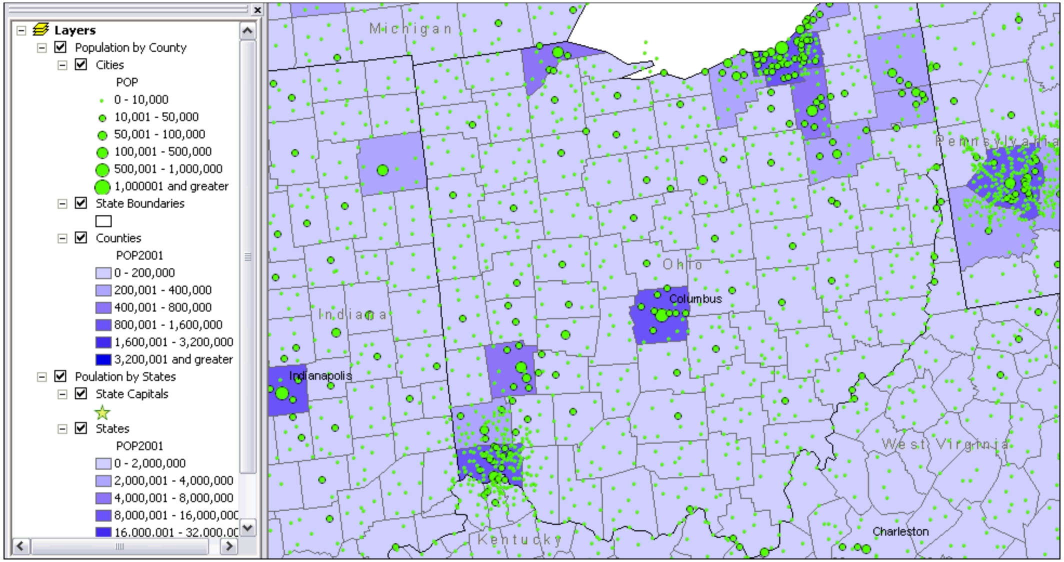
When you zoom in, the layers are visible



Scale Thresholds

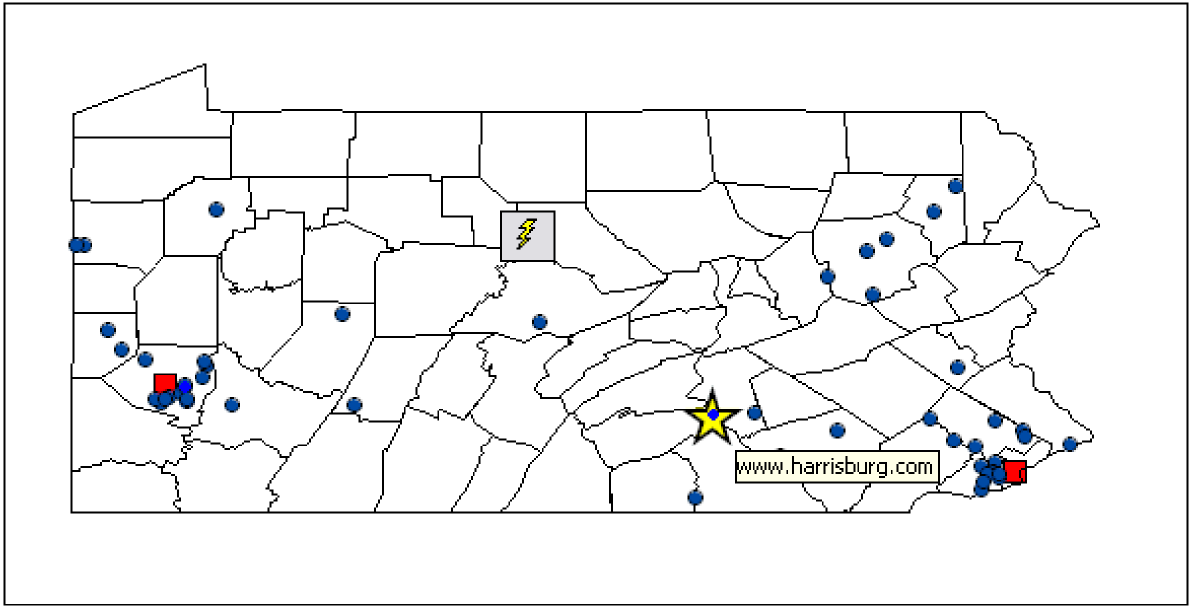
Maximum Scale Range

- If you zoom in beyond this scale, the layer will not be visible
- State Capitals not visible at this scale



Hyperlinks

Links images, documents, WEB pages, etc. via features on a map



Summary

- Vector GIS
- Graphic Elements
- Colors
- Graphical Hierarchy
- Choropleth Maps
- Map Layers
- Scale Thresholds
- Hyperlinks