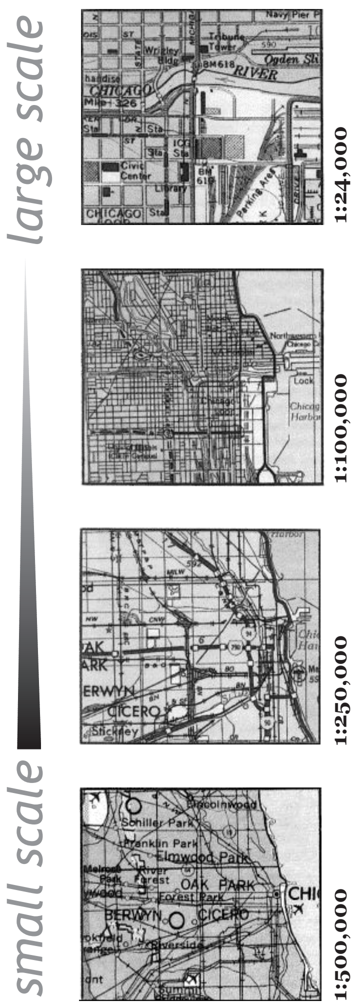
Map Generalization and Classification

Our human and natural environments are complex and full of detail. Maps work by strategically reducing detail and grouping phenomena together. Driven by your intent, maps emphasize and enhance a few aspects of our world and deemphasize everything else.



Larger-scale maps:

- ✓ less area.
- ✓ more detail.
- ✓ less generalization.
- ✓ less classification.

Transformation from large to small scale requires generalization and classification:

- ✓ city becomes area, then point.
- ✓ diversity of cities combined into a few categories (small, medium, large).
- ✓ minor streets and roads removed.
- ✓ different types of streets and roads combined into a few categories.
- ✓ houses, then major buildings removed.
- ✓ small streams removed.
- ✓ detail removed from rivers and roads.
- ✓ less important text removed.

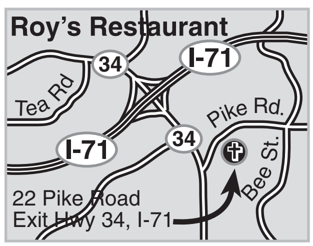
Smaller-scale maps:

- ✓ more area.
- ✓ less detail.
- ✓ more generalization.
- ✓ more classification.

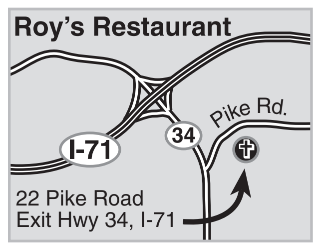
Two processes reduce detail on maps:

1 **Map Generalization:** the systematic reduction of detail to enhance the point of your map.

Poor generalization:

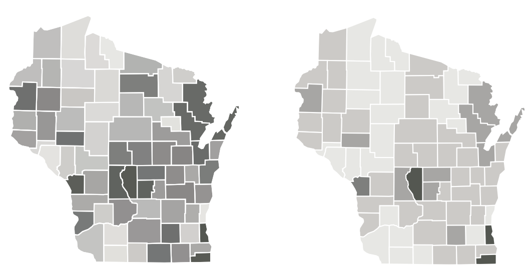


Good generalization:



2 **Data Classification:** the systematic categorization of data to enhance the point of your map.

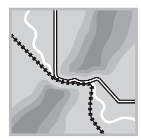
Same data, *two* classifications ...

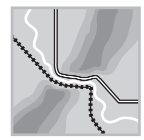


... two very *different* maps.

displacement

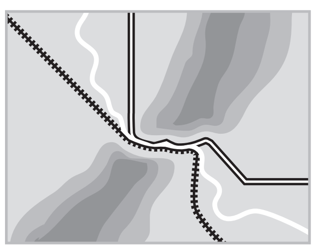
Displacement moves features which interfere with each other apart. Moving features away from their actual location makes the features easier to differentiate and understand.



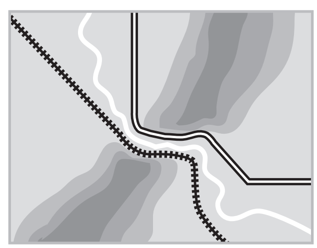


Map Intent: For a state road map, where it is important for map readers to distinguish the relative location of roads, railroads, and rivers, displace the railroad and road so the relation between these features in the gap in the ridge is clear.

Poor displacement:



Good displacement:



Displacement of map features sacrifices location accuracy for visual clarity. Displacement of point and line features is common on maps where such features are crowded together in certain areas.

Questions to ask which guide displacement:

- ✓ are important map features interfering with each other?
- ✓ will the slight movement of a map feature make it and its neighboring features easier to distinguish?
- ✓ will the slight movement of a map feature lead to confusion because the feature has been moved?
- ✓ does the displacement of map features help to make the map look less cluttered?

2a Data Classification: Qualitative Data

Data classification is shaped by your goals for your map. In general, features in the *same* class should be more *similar* than dissimilar; features in *different* classes should be more *dissimilar* than similar. Use color *hue* and *shape* and *texture* to symbolize different classes of *qualitative* data.

qualitative point data

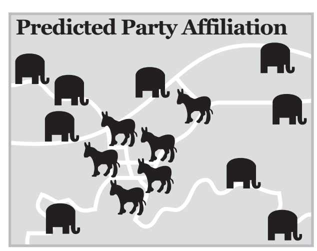
Classification reveals patterns that are difficult to see in unclassified data. Students poll community members about social issues to learn about community politics. The bottom left classification is not very revealing. The bottom right classificiation reveals more about the political landscape. Include the unclassified data so map viewers can decide if your classification is justified.

Unclassified:

Poor classification:

- ● **Family Values**
- ■ **Religious Values**
- ▲ **Legal Values**
- ◆ **Social Welfare Issues**

Good classification:

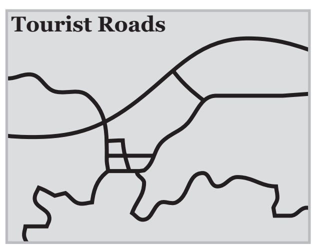


- **Democrat**
- **Republican**

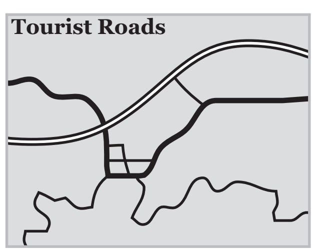
qualitative line data

Roads are often classified in terms of who builds and maintains them (federal, state, local). However, this classification is not the best if your map is for tourists. Your goal for the map (tourism) should shape classification (tourism-based classes of roads).

Unclassified:

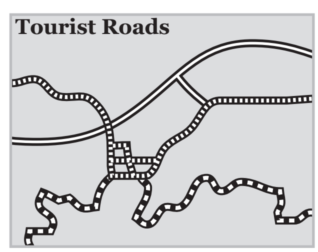


Poor classification:



Federal Highway
State Highway
Local Road

Good Classification:

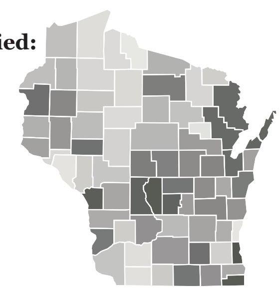


Fast Travel
Historical Sites
Natural Beauty

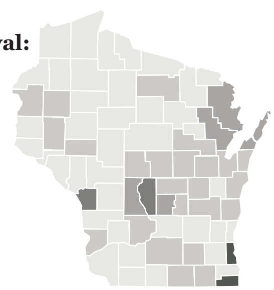
quantitative area data

*In addition to determining the number of classes, you must decide where to place **boundaries between the classes.** Classification schemes set these boundaries. This map shows the density of* **mobile homes (dark** = *higher density) unclassified and as a 5-class map using four different classification schemes.*

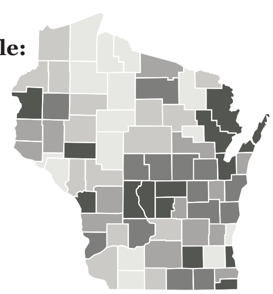
Unclassified:



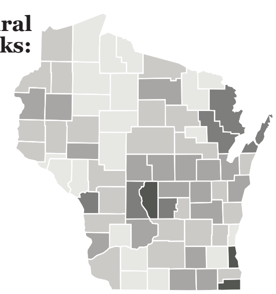
Equal Interval:



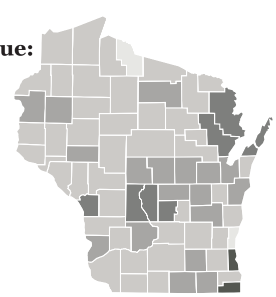
Quantile:



Natural Breaks:



Unique:



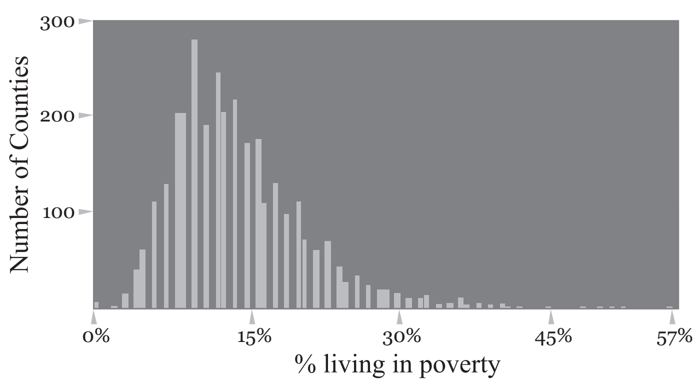
thinking drives classification

Poverty is a contentious issue. Debates rage over defining poverty, why it exists, and how to address it. The U.S. Census Bureau provides official data on poverty in the U.S., and different classifications of Census 2000 poverty data follow.

It is easy to get the percent of people in each county in the U.S. who live in a state of official poverty. But choosing how to map the data is not as easy. Common (and equally valid) data classification schemes – methods for placing boundaries between the classes on a map – are easy to generate but difficult to choose from. Understanding the benefits and problems with each classification scheme is vital, as is clarifying why you are making the map. Together, these guide the thinking behind choosing the most appropriate classification scheme for your data.

graphing data

Selecting a classification scheme without examining your data as a graph is a bad idea. As examples in this section reveal, classification schemes can mask important characteristics of your data and perhaps undermine the goal of your map.
A simple histogram can be constructed from your data: the x-axis is your data variable (from low to high) and the y-axis the number of occurrences of each value:



The 2000 U.S. poverty data have a cluster of counties near the lower to mid-end of the graph, with a smaller number of counties skewed out to 57%. You can easily note where a classification scheme places class boundaries, which values are grouped together, and which values are in different groups. If a particular classification scheme seems to violate the basic classification rule (features in the same class should be more similar than dissimilar; features in different classes should be more dissimilar than similar), then consider a different classification scheme. Consider placing the graph on your final map, so map users can see how the data are classified.

quantile scheme

Quantile schemes place the same number of data values in each class. *Quantile schemes are attractive in that they always produce distinct map patterns: a quantile classification will* ***never*** *have empty classes, or classes with only a few or too many values. Quantile schemes look great. The problem with quantile schemes is that they often place similar values in different classes or very different values in the same class.*

The map suggests that poverty is a significant issue in many counties, and the numerous counties in the top, darkest classes impart a rather ominous view of poverty in the United States.