



Cartography Lecture #6 proportional point symbol mapping

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Proportional point symbol mapping



proportional point symbol mapping, also called graduated or variable point symbol mapping.

History of Proportional Point Symbols, The earliest history of proportional point symbols on maps is a history of the use of the proportional or graduated *circle*.

- In 1801, graduated circles have been used to depict statistical data, which were often compiled by geographical areas such as cities, states, or countries.
- In 1851, they were used in the mapping of city populations in the British Isles.
- They were also used in France by 1859 to portray port tonnages.

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Proportional point symbol mapping Specifications



- The cartographer selects a symbol form (such as a circle, square, or triangle) and varies its size from place to place, in proportion to the quantities it represents.
- It is specified that the conceptual basis for this technique is easily understood by most map readers.



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Proportional point symbol mapping Specifications (cont..)



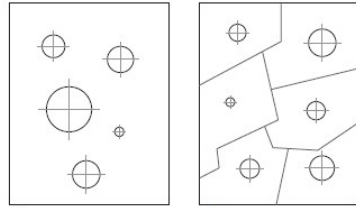
- Shape and size are the two most important visual variables in this map type.
- Hue and/or value can also play an important role, particularly if more than one variable is shown on the map.
- Map readers can form a picture of the quantitative distribution by examining the pattern of differently sized symbols (see below figure).



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Methods

There are two commonly accepted instances when the cartographer selects proportional point symbol mapping: when data occur at points and when they are aggregated at points within areas.



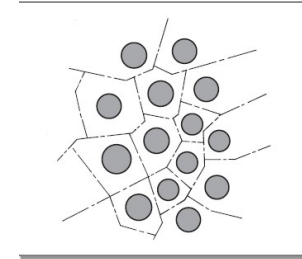
The attribute data that should not be used:

- Interval level data,
- densities, and,
- data with relatively small and unvarying attribute data ranges.

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The type of data that can be mapped are:

- Total population;
- percentage of the population;
- value added by manufacturing,
- retail sales,
- employment,
- agricultural commodity,
- tonnage shipped at ports, and so on.



Note: If the overall attribute data range is small and unvarying, the range of symbol sizes will also be small and reveal very little about the data (as shown in the below figure).

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proportional symbol types

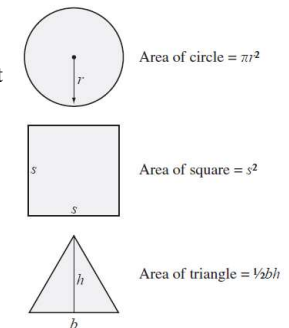
The types of the symbolize used in the proportional maps are:

1. **Two-Dimensional Geometric Symbols,**
2. **Three-Dimensional Geometric Symbols,**
3. **Pictorial Symbols**

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proportional symbol types (cont.)

1. Two-Dimensional Geometric Symbols, such as circles, squares, and triangles, are the most common forms of proportional symbols, with the circle being the dominant form and simple. In each case, the *area* is the geometric characteristic that is customarily scaled to geographical magnitudes



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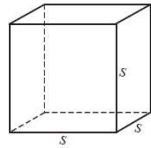
proportional symbol types (cont.)



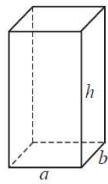
2-Three-Dimensional Geometric Symbols, Cartographers and geographers have experimented with point symbols of three-dimensional appearance, including spheres, cubes, and other geometrical volumes. Although it gives very pleasing and visually attractive maps. However, most map readers cannot correctly gauge the scaled values of these maps.



Volume of sphere = $4/3\pi r^3$



Volume of square = s^3



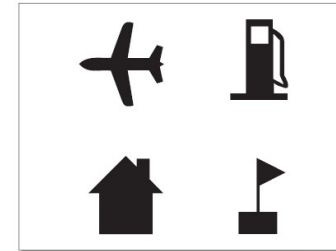
Volume of prism = abh

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proportional symbol types (cont.)



3-Pictorial Symbols Pictorial symbols, also called pictographic, mimetic, or replicative symbols, are increasing in use for proportional symbol maps. This is due both to the widespread availability of digital artwork (that is, clipart), and the ease with which the artwork can be imported into GIS and other software packages.



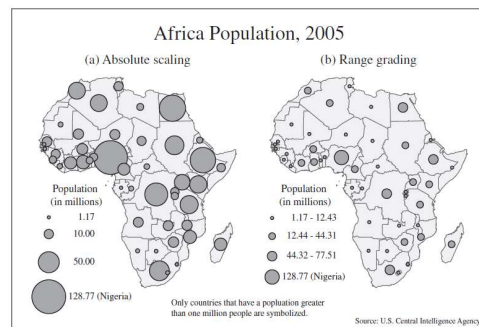
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PROPORTIONAL SYMBOL SCALING and TYPE



The scaling technique chosen is one of the most important aspects of proportional symbol mapping. There are three common scaling techniques:

1. **Absolute scaling**,
2. **Apparent magnitude scaling**,
3. **Range grading**.



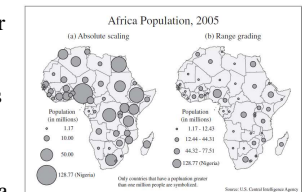
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PROPORTIONAL SYMBOL SCALING



The scaling technique chosen is one of the most important aspects of proportional symbol mapping. There are three common scaling techniques:

1. **Absolute scaling**, symbols are scaled proportionally to their data values and are therefore also in proportion to each other
2. **Apparent magnitude scaling**, This method is also known as perceptual scaling, psychological scaling, or Flannery compensation. is a variation of absolute scaling as correction factors are applied to compensate for the underestimation of a symbol's area or volume.
3. **Range grading**. In this scaling method, a symbol represents a range of data values



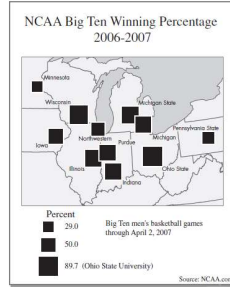
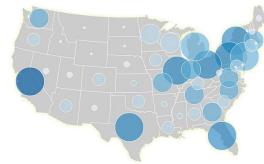
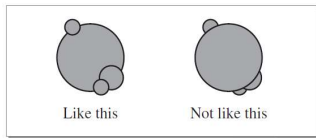
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Square and Overlapping Symbols



The Square Symbol, Graduated squares are used in quantitative point symbol mapping in much the same fashion as circles.

Overlapping Symbols, One of the biggest challenges in proportional symbol design is producing a set of symbols that visually stand out (that is, are not too small) but at the same don't have excessive overlap (when the largest symbols are *too* large).



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PROPORTIONAL SYMBOL LEGEND DESIGN



The legend serves as the visual anchor for interpreting symbol sizes, whether it is estimating symbol magnitude (as with absolute or apparent magnitude scaling) or determining symbol class (as with range-graded symbols).

Major issues in legend design are the choice of symbol arrangement and style, selecting the number of symbols to include in the legend when scaled absolute or apparent magnitude scaling has been used, and how to handle class ranges when the symbols have been range graded.

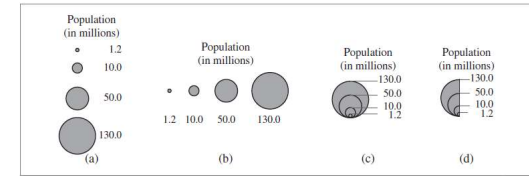


FIGURE 8.15 VARIOUS PROPORTIONAL SYMBOL LEGEND DESIGNS.

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Thank you