

Data visualization

Describing visualizations



A taxonomy for data graphics

- We can break visualizations down into four basic elements:
 - Visual cues
 - Coordinate system
 - Scale
 - Context

Visual cues

- These are the building blocks of any given visualization.
- Identify 9 separate visual cues.

Cues 1–9

1. **Position** (numerical) where in relation to other things?
2. **Length** (numerical) how big (in one dimension)?
3. **Angle** (numerical) how wide? parallel to something else?
4. **Direction** (numerical) at what slope? In a time series, going up or down?
5. **Shape** (categorical) belonging to which group?
6. **Area** (numerical) how big (in two dimensions)?
7. **Volume** (numerical) how big (in three dimensions)?
8. **Shade** (either) to what extent? how severely?
9. **Color** (either) to what extent? how severely? Beware of red/green color blindness.

Coordinate systems

1. **Cartesian** This is the familiar (x, y) -rectangular coordinate system with two perpendicular axes
2. **Polar**: The radial analog of the Cartesian system with points identified by their radius ρ and angle θ
3. **Geographic**: Locations on the curved surface of the Earth, but represented in a flat two-dimensional plane

Scale

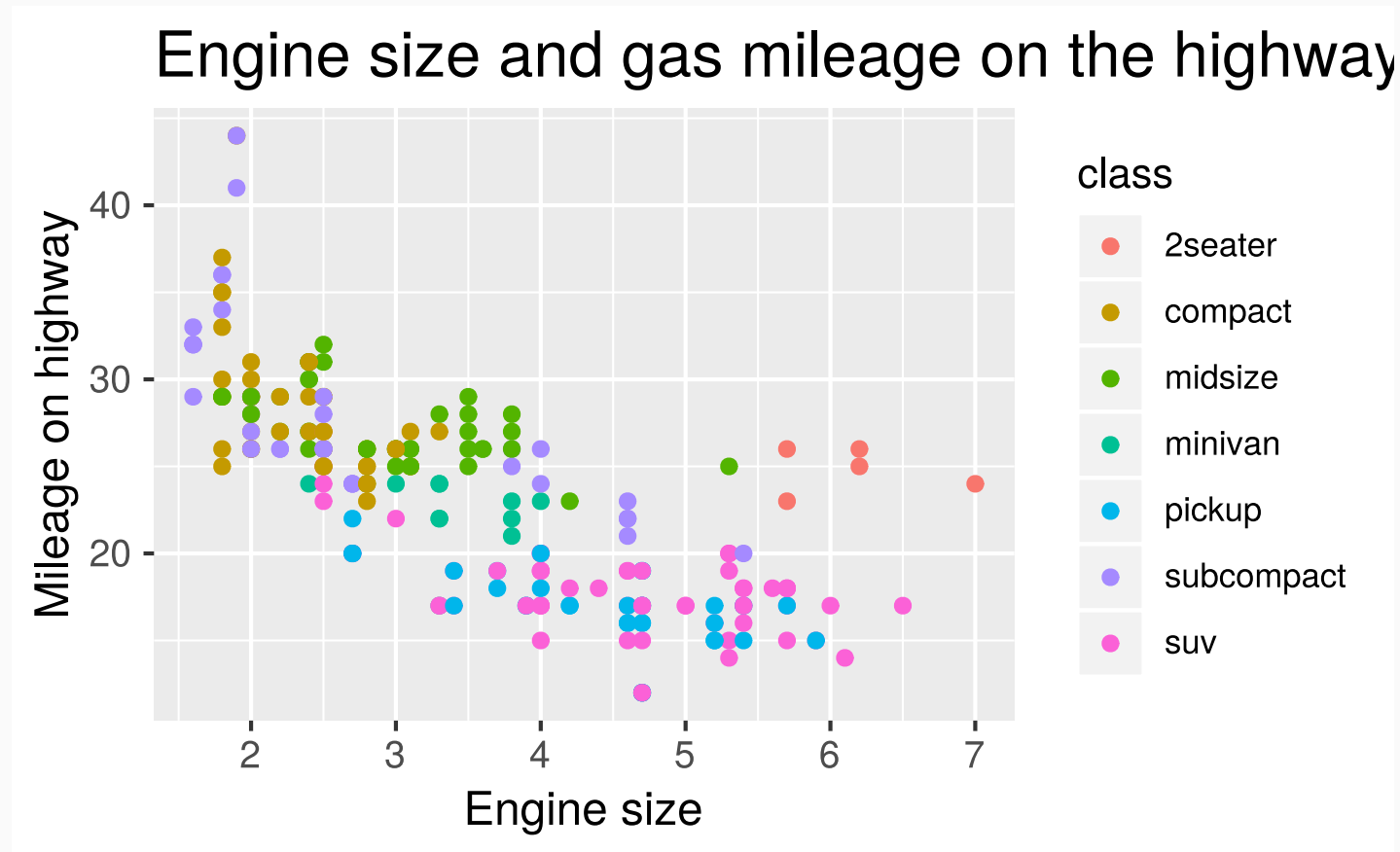
1. **Numeric:** A numeric quantity is most commonly set on a *linear, logarithmic, or percentage* scale.
2. **Categorical:** A categorical variable may have no ordering or it may be *ordinal* (position in a series).
3. **Time:** A numeric quantity with special properties. Because of the calendar, it can be specified using a series of units (year, month, day). It can also be considered cyclically (years reset back to January, a spring oscillating around a central position).

Context

- Annotations and labels that draw attention to specific parts of a visualization.
 - Titles, subtitles
 - Axes labels that depict scale (tick mark labels) and indicate the variable
 - Reference points or lines
 - Other markups such as arrows, textboxes, and so on (it's possible to overdo these)

Example plot

How many of the previous elements can you identify in this plot?



Credits

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Acknowledgments

Content adapted from *Modern Data Science with R* by Benjamin Baumer, Daniel Kaplan, and Nicholas Horton, chapter 2.