UCDAVIS DataLab
Data Science and Informatics

Data Visualization Guidelines

Choosing a Plot Type

First, make sure you've chosen an appropriate plot type. The table below has *suggestions*. Sometimes other plot types may be more appropriate.

First Feature	Second Feature	Plot
categorical		bar, dot
categorical	categorical	bar, dot, mosaic
numerical		box, density, histogram
numerical	categorical	box, density
numerical	numerical	line, scatter, heatmap

For three or more features, use point shapes, line styles, colors, or facets.

Checklist

Next, go through this checklist with each visualization you plan to use for communications:

- ☐ **Does the visualization present a finding?** Don't include plots that are uninformative or redundant.
- ☐ **Title?** Make sure the title explains what the visualization shows.
- ☐ **Axis labels?** Label the axes in plain language (no variable names!).
- ☐ **Axis units?** Label the axes with units (inches, dollars, etc).
- ☐ **Legend?** Any plot that shows two or more groups coded by style or color must include a legend.
- ☐ **Appropriate scales and limits?** Make sure the scales and limits of the axes do not lead people to incorrect conclusions. For side-by-side plots or plots that viewers will compare, use identical scales and limits.
- ☐ **Is the data hiding the message?** Sometimes using a *faithful* sample is more revealing than all of the data. In scatter plots, overlapping points can hide patterns in the data. Take a sample, make the points smaller, or use a two-dimensional density plot (a smooth scatter plot) instead.
- ☐ **Are there too many details on the plot?** A plot with too many details can be overwhelming and obscure the story the data is trying to tell. If a plot shows more than 5 groups, consider whether there's a sensible way to use faceting to break the plot into multiple subplots.
- ☐ **Does it use geometry efficiently?** Carefully consider whether the basic graphical elements of each plot match the data type and use space efficiently. For example, pie plots are hard to read. Generally a dot plot is a better choice.
- ☐ **Accessible and print safe?** Design visualizations to be legible to a diverse audience. Use point, line, and fill styles to distinguish groups in addition to color so that visualizations are accessible to colorblind people. Also consider whether people will print your visualization in black and white. The `RColorBrewer` and `viridis` packages can help with choosing colors.