

Graphics for Qualitative Variables

STAT 133

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`github.com/gastonstat/stat133`

Course web: `gastonsanchez.com/teaching/stat133`

Statistical Graphics

Univariate Statistical Graphics

Visualizing Variability by means of graphical displays

Univariate graphics by type of variable

Qualitative Variable

- ▶ Bar chart
- ▶ Dot chart
- ▶ Pie chart

Quantitative Variable

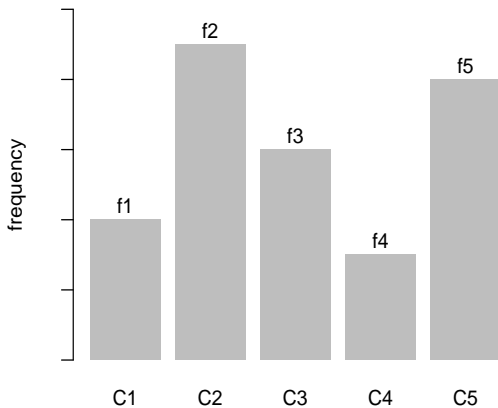
- ▶ All of qualitative
- ▶ Histogram
- ▶ Density curve
- ▶ Boxplot
- ▶ Ogive

Bar Charts

From Frequency Tables ...

| Category | Absolute Frequency | Relative Frequency |
|----------|-----------------------|-----------------------|
| C_1 | f_1 | f_1/n |
| C_2 | f_2 | f_2/n |
| C_3 | f_3 | f_3/n |
| \dots | \dots | \dots |
| C_k | f_k | f_k/n |
| $total$ | n | 1 |

to Bar-charts



Bar-charts

Elements of vertical bar-charts

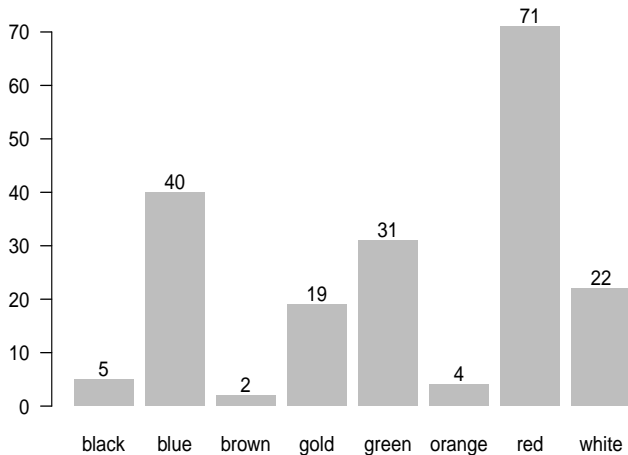
- ▶ categories on horizontal axis
- ▶ frequencies on vertical axis
- ▶ length of bar equal to frequency

(Note that you can also make a horizontal bar-chart, in which case the axes play inverse roles)

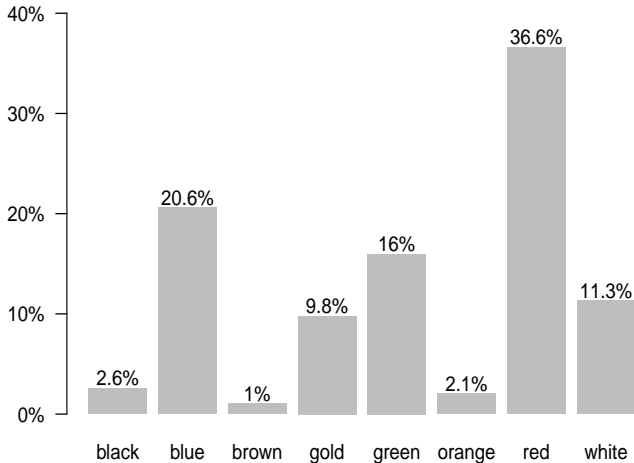
Bar-chart: predominant color in flags



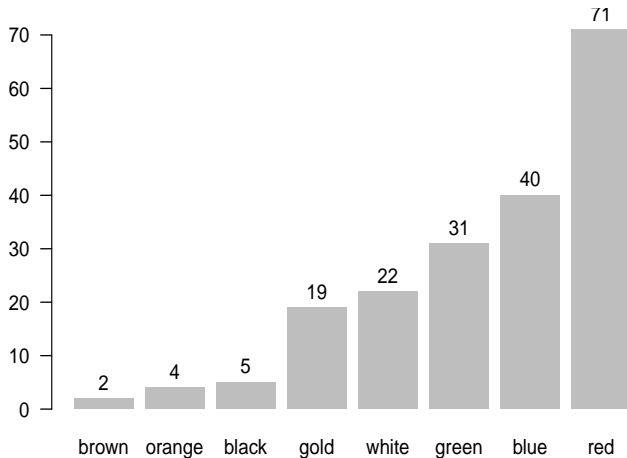
Bar-chart example



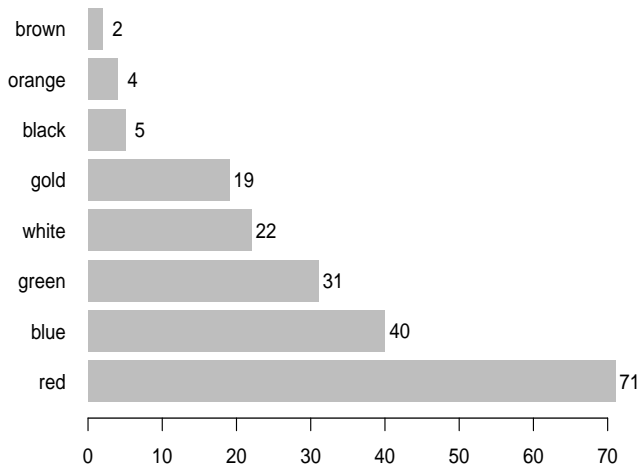
Bar-chart: predominant color in flags



Bar-chart: predominant color in flags



Bar-chart: predominant color in flags

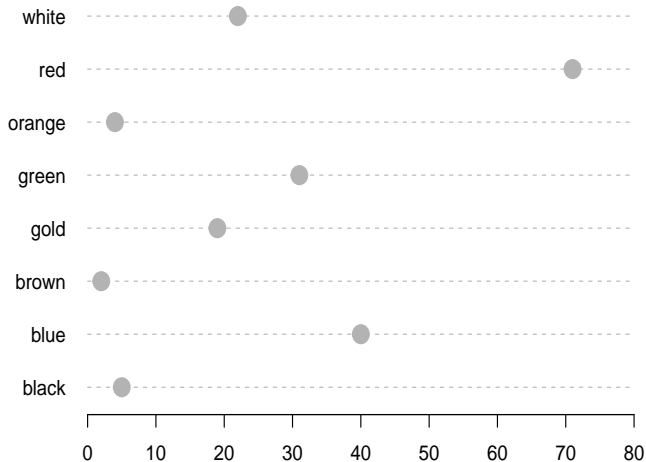


Dot charts

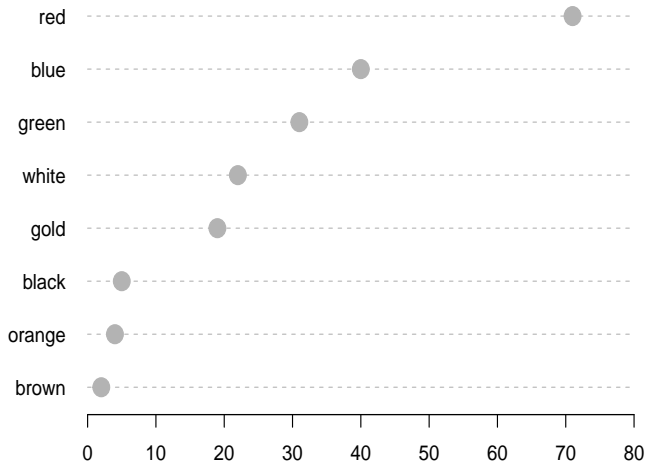
Dot charts

- ▶ Dot-charts are very similar to bar charts.
- ▶ Instead of using bars, dot-charts display frequencies with dots.
- ▶ They are simpler and cleaner than bar charts

Dot-chart: predominant color in flags



Ranked Dot-charts



Ranked dot-chart patterns



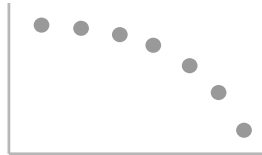
all values roughly the same



differences decrease by roughly the same amount



differences from one value to the next vary significantly



differences from one value to the next increase

Ranked dot-chart patterns



differences from one value
to the next decrease



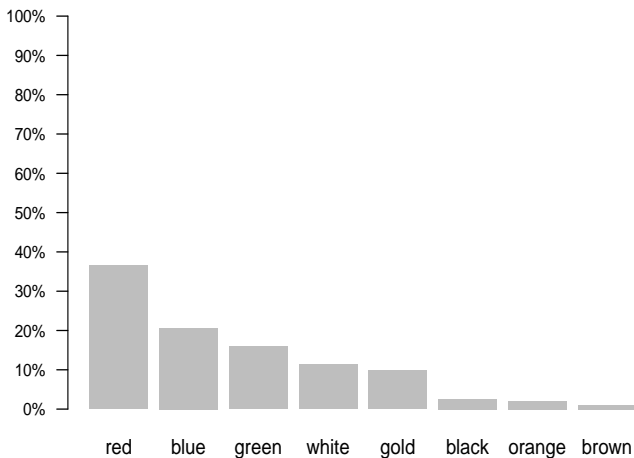
shifting differences from
one value to the next



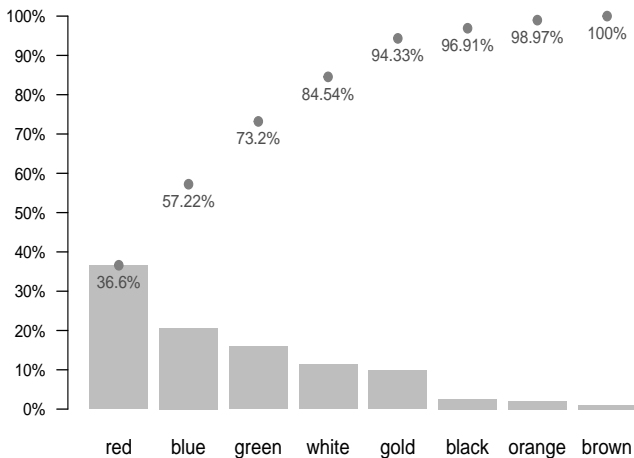
one or more values are extraordinarily
different from the rest

Pareto charts

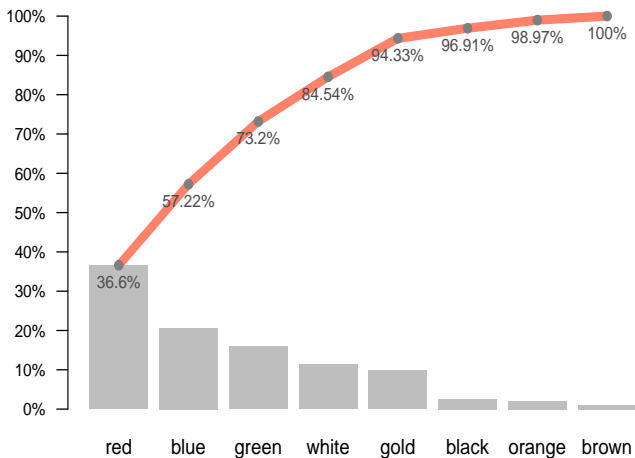
Bar-chart with Pareto Line



Bar-chart with Pareto Line

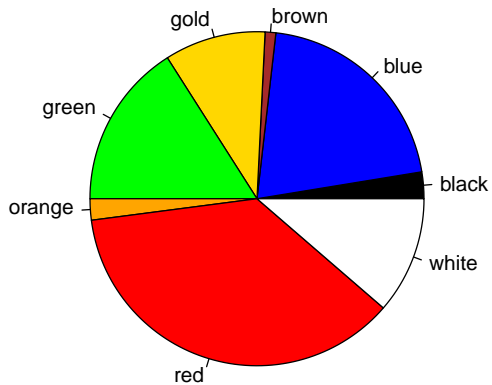


Bar-chart with Pareto Line

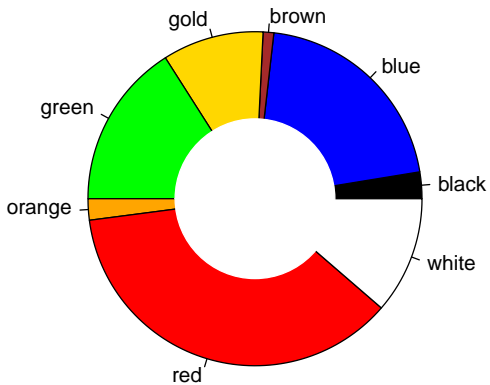


Pie charts

Pie Chart



Donut Chart



Pie charts disadvantages

- ▶ Pie charts force us to compare either 2-D areas formed by each slice or the angles formed
- ▶ Visual perception handles neither of these comparisons easily or accurately