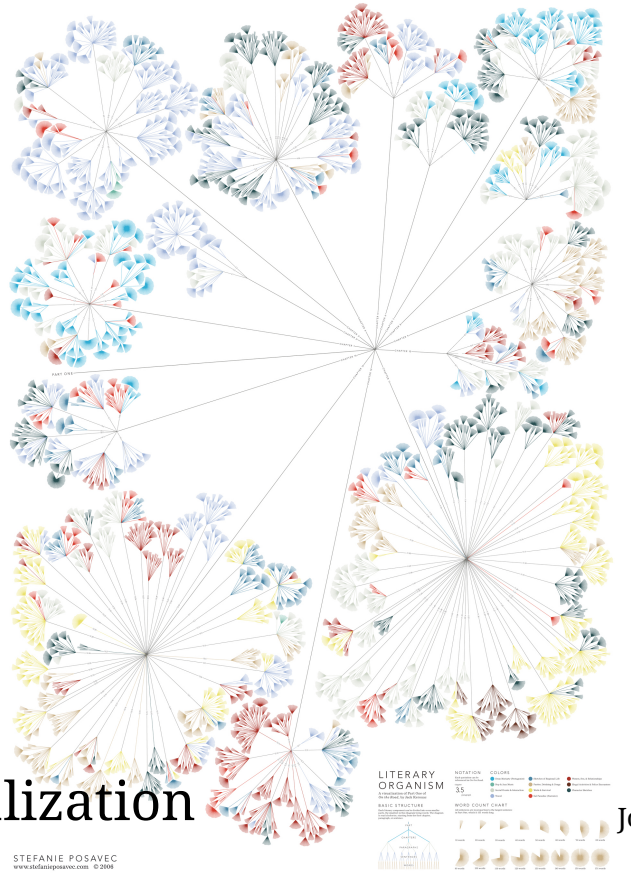


Data Visualization

John Leung 2016

Topics

1. Overview
2. Types of Graphical Visualizations
3. Tools
4. Inspirations

Data Visualization

- Visual Communication
- Visual Representation and Abstraction of Data
- Techniques used to communicate data or information by encoding it as visual objects (e.g., points, lines or bars) contained in graphics
- Is both an art and a science

Goals

- To communicate information clearly and efficiently through graphical means
- To help users analyze and reason about data and evidence
- To make complex data more accessible, understandable and usable, such as making comparisons or understanding causality
- To create a better understanding of the data
- To help uncover trends, realize insights, explore sources, and tell stories Eg. Minimum Wage
- To stimulate viewer engagement and attention Eg. - Climate Change

Graphical Displays Should

- Show the data
- Induce the viewer to think about the substance
- Avoid distorting what the data has to say
- Present many numbers in a small space
- Make large data sets coherent
- Encourage the eye to compare different pieces of data
- Reveal the data at several levels of detail, from a broad overview to the fine structure
- Serve a reasonably clear purpose: description, exploration, tabulation or decoration
- Be closely integrated with the statistical and verbal descriptions of a data set

Types of Graphical Visualizations

Time-series

- A single variable is captured over a period of time, such as the unemployment rate over a 10-year period
- Useful for demonstrating trends and periodicity

Line Charts Eg: Stock charts

Area Charts / Layered Area Eg.

Percent Area Charts Eg.

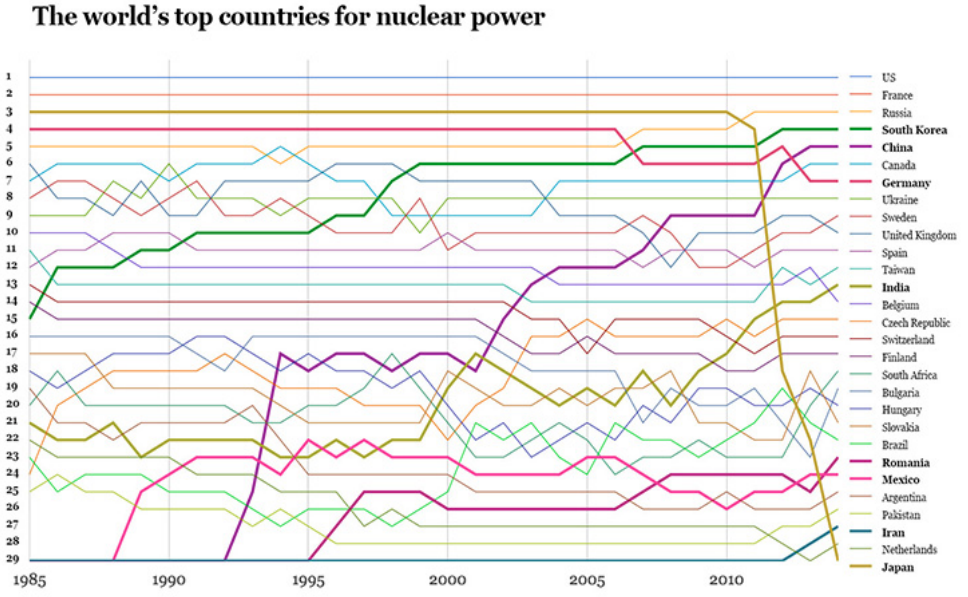
Curve Fitting Charts Explaination

Spline Charts Eg.

OHLC, Candlestick Charts Eg.

Real World Example

Rank Charts / Bump Chart



Gap charts

- Builds on the rank chart by allowing extra space between curves to represent value difference behind the ranking
  Eg. - visurugby

Impact Charts

Eg.

Horizon Graphs

Explanation - Flowing Data

Ranking

- To measure a single variable across discrete members of a group

Bar Charts

- Eg. 1
- Eg. 2

Part-to-whole

- Categorical subdivisions are measured as a ratio to the whole
- Pie charts and bar charts show the comparison of ratios well

Deviation

- Categorical subdivisions are compared against a reference, such as a comparison of actual vs. budget expenses
- Bar charts can show comparison of the actual versus the reference amount Eg. - Deviation Bar Graph

Frequency distribution

- Shows the number of observations of a particular variable for given interval, such as the number of years in which the stock market return is between intervals such as 0-10%, 11-20%, etc.

Histogram

- A type of bar chart, may be used for this type of analysis Eg. 3D histogram

Circular Histogram / SolarPlot Eg.

Box plot

- Helps visualize key statistics about the distribution, such as median, quartiles, outliers, etc.
- Similar to candlestick charts
  Eg.

Correlation

- Comparison between observations represented by two or more variables to determine if they tend to move in the same or opposite directions
- Eg. Plotting unemployment (X) and inflation (Y) for duration
- To emphasize outliers

Scatter plot Eg.

Heat Map Eg.

Color Coded Tables/Tier List Eg.

Radar Chart Eg.

Geographic or geospatial

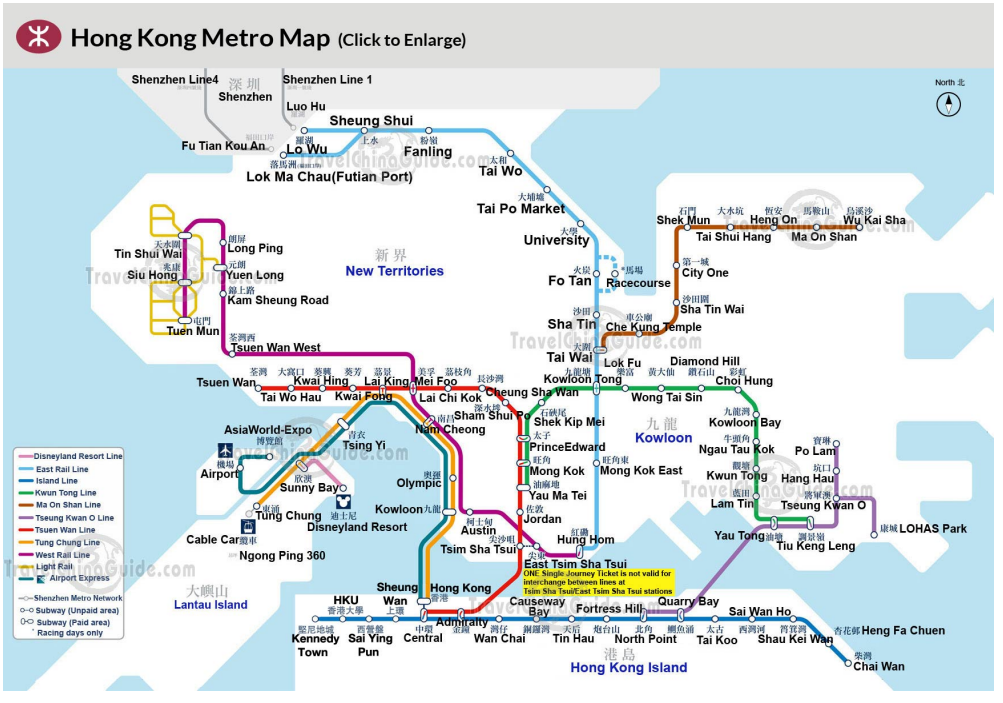
- Comparison of a variable across a map or layout, such as the unemployment rate by state or the number of persons on the various floors of a building

Map Overlays Eg. Social Explorer

Cartogram


2nd Edition
World Population Cartogram 2015
each square = 500,000 people
China 1,367.6 m (or 1.4 billion)
India 1,265.3 m (or 1.3 billion)
Nigeria 183.5 m
Brazil 203.7 M
Russia 146.3 m
Japan 127 m
Philippines 100.8 m
Countries too small to appear on this map (less than 250,000)

Distance Cartogram



Growth Ring Maps

Eg.

Interactive Explorations

- Google Public Data

Tools (Javascript)

- Assemblers
- Single Purpose Libraries
- High level Libraries
- Platforms and Playgrounds
- Lists

Assemblers

- paths.js
- vega video Eg.
- d3

Single Purpose Libraries

Maps

- DataMaps

Network graphs

- sigmajs
- vis.js
- cola

High level Libraries

d3 dependent:

- dc.js
- ploty
- TauCharts
- plottable
- c3
- recharts

High level Libraries

Non d3 dependent:

- echarts
- charts.js
- highcharts

Non open source

- fusion charts
- AM Charts

Platforms and Playgrounds

- caravel
- Runkit
- Lyra
- Hydrogen

Lists

- https://github.com/fasouto/awesome-dataviz
- http://www.jsgraphs.com/

Inspirations / Eye Candies

- d3 Gallery
- TimeViz Browser
- information aesthetics
- Data Pointed
- Information Geographies
- Flowing Data
- Foreign Born Population

Sources

Wikipedia

Images:

- Cover Image
- World Population
- Nuclear Power
- HK Metro

https://github.com/fuzzthink/presentations