

Data Visualization: Visualization Types

This LibGuide collects resources and tutorials related to data visualization. It is a companion to the visualization services provided by Data and Visualization Services at Duke University Libraries.

About Data Visualization

Visualization Types

Designing a Visualization

Helpful Tools and Tutorials

Learning About Visualization

Common Static Visualization Types

This taxonomy is based on a data taxonomy from: Shneiderman, B. (1996).

The eyes have it: A task by data type taxonomy for information visualizations.

Proceedings of IEEE Symposium on Visual Languages - Boulder, CO (pp. 336-343).

The taxonomy is heavily weighted toward the more abstract information visualization techniques and is less representative of scientific visualizations, which can be highly specialized by domain and are more difficult to generalize.

(A slightly different taxonomy with examples is available at Visual Analytics Digital Library - Visualization Types)

- **1D/Linear**
- **2D/Planar** (incl. Geospatial)
- **3D/Volumetric**
- **Temporal**
- **nD/Multidimensional**
- **Tree/Hierarchical**
- **Network**

1D/Linear

Examples:

- lists of data items, organized by a single feature (e.g., alphabetical order)
(not commonly visualized)

Guide Creator



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Social:



Subjects:

Mathematics, Data & Statistics

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2D/Planar (especially geospatial)

Examples (geospatial):

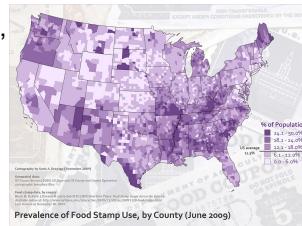
• choropleth

Tools: GeoCommons, Google Fusion Tables, Google Maps API, Polymaps, d3/Provis, Many Eyes, Google Charts, Tableau Public, Sci2, TileMill

Image:

Drzyzga, S. (2009). Prevalence of Foodstamp Use.

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• cartogram

Tools: d3/Provis (Dorling Cartogram)

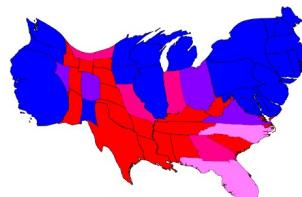
Image:

Morrison, J. (2008). Cartogram of election

results based on data from

FiveThirtyEight.com..

CC BY-NC 2.0



• dot distribution map

Tools: GeoCommons, Google Fusion Tables, Google Maps API, Polymaps, Tableau Public, Sci2, TileMill

Image:

Chun, B. (2010). Dots in My Neighborhood.

CC BY-SA 2.0



• proportional symbol map

Tools: GeoCommons, Google Fusion Tables, Google Maps API, Polymaps, d3/Provis, Many Eyes, Tableau Public, Sci2, TileMill

Image:

Hirst, T. (2008). Proportional symbol map.

CC BY 2.0



• contour/isopleth/isarithmic map

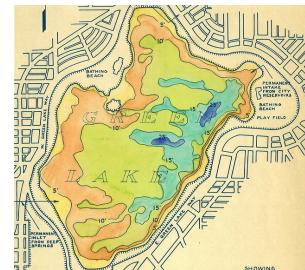
Tools: TileMill

Image:

Seattle Municipal Archives. (2008/1938).

Green Lake depth contour map.

CC BY 2.0



• dasymetric map

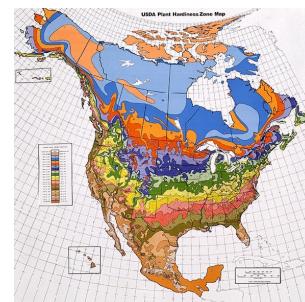
Tools:

Image:

Cathey, H. M. (1990). USDA Hardiness

Zones in North America.

Public Domain



Examples (artificial planes):

• self-organizing map

Tools: Synapse, Matlab

Examples: Last.fm, In Terms of Geography

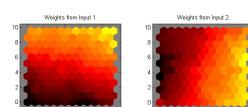


Image created in Matlab from sample data set.

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3D/Volumetric

Broadly, examples of scientific visualization:

- 3D computer models
- surface and volume rendering

- computer simulations

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Temporal

See also:

- Wills, G. (2012). Visualizing Time. New York: Springer.

Examples:

• timeline

Tools: SIMILE Timeline, TimeFlow, Timeline

JS, Excel



Image:

Friendly, M. & Denis, D. J. (2001). Milestones in the history of thematic cartography, statistical graphics, and data visualization. Web document, <http://www.datavis.ca/milestones/>. Accessed: August 30, 2012.



• time series

Tools: most statistical and charting software,

R (A Little Book of R for Time Series),

Timeplot, TimeSearcher, Google Charts,

Tableau Public, Google Fusion Tables

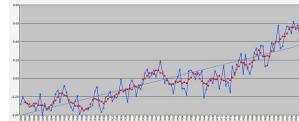


Image:

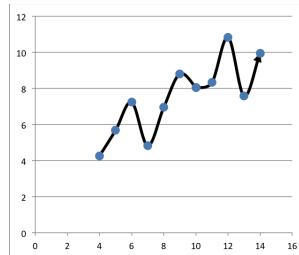
Copley, Z. (2012). Annual Mean Temperature Charts.

CC BY-SA 2.0

• connected scatter plot

Tools: Protovis, JMP, Excel (order data by

time, add "Line" to data series in scatter plot)



Examples: Driving Shifts into Reverse,

Driving Safety, in Fits and Starts

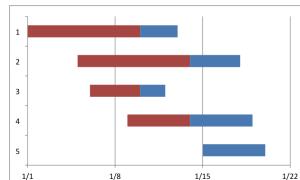
Image created in Excel with data from

Anscombe's quartet.

• Gantt chart

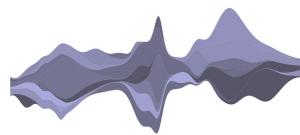
Tools: Excel

Image created in Excel with randomized data.



• stream graph/ThemeRiver

Tools: original Java code, Data Wrapper, d3/Protopis, HTML5/JavaScript, Python, Excel



Examples: The Ebb and Flow of Movies

Image created by code in d3 "examples/stream/" directory.

• arc diagram

(e.g., Thread Arcs, Shape of Song)

Tools: Protopis

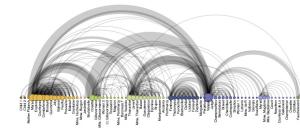
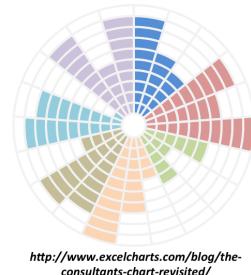


Image created by sample Protopis code.

• polar area/rose/circumplex chart

Tools: Protopis, Excel

Image included in sample Excel spreadsheet.



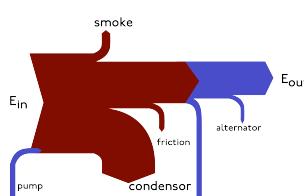
• sankey diagram

Tools: JavaScript, d3 plugin

Image:

LHOON. (2006). Sankey diagram of thermodynamic steam cycle.

CC BY-SA 3.0



• alluvial diagram

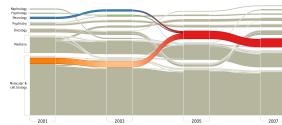
Tools: Alluvial Generator

Image:

Rosvall, M., & Bergstrom, C. T. (2010).

Mapping change in large networks. *PLoS ONE*, 5(1), e8694.

CC BY 2.5



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nD/Multidimensional

Examples (category proportions, counts):

• pie chart

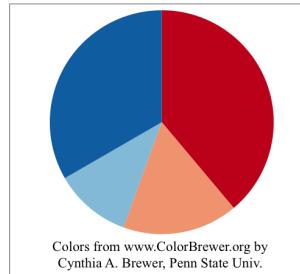
Tools: most statistical and charting software,

Many Eyes, Google Charts, Tableau Public,

Google Fusion Tables

Image created in Excel with randomized

data.



• histogram

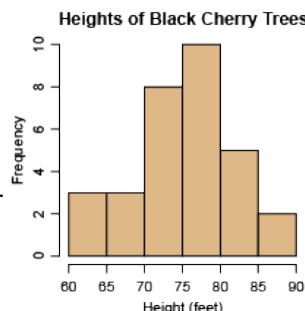
Tools: most statistical and charting software,

Protopis, Many Eyes

Image:

Pyrsmis. (2008). Black cherry tree histogram.

CC BY-SA 3.0



• Wordle, tag cloud

Tools: Wordle, Many Eyes, d3

Image:

Pyrsmis. (2011). Word cloud comparison of two State of the Union speeches by two U.S. presidents.

CC BY-SA 3.0



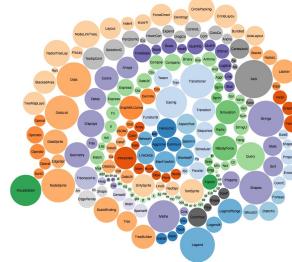
• unordered bubble chart/bubble cloud

Tools: Many Eyes, d3/Protopis

Tutorial: Vallandingham, J. (2012). Building a bubble cloud.

Image created by code in d3

"examples/bubble/" directory.

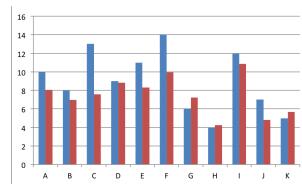


• bar chart, radial bar chart

Tools: most statistical and charting software, Many Eyes, Google Charts, Tableau Public, High Charts, Google Fusion Tables

Image created in Excel with data from

Anscombe's quartet.



• tree map



Tools: d3/Protopis, Many Eyes, Google Charts, Network Workbench/Sci2

Image created by code in d3

"examples/treemap/" directory.



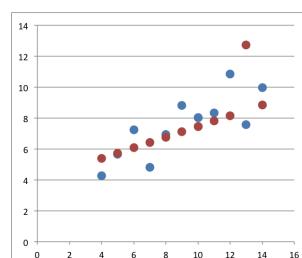
Examples (relationships between variables):

• scatter plot

Tools: most statistical and charting software, Many Eyes, Google Charts, Tableau Public, Google Fusion Tables

Image created in Excel with data from

Anscombe's quartet.



• bubble chart

Tools: Excel, d3, Gapminder, Google Charts, Tableau Public

Image:

Jung, J. (2009). Bubble Chart White.

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2008년 한국 영화 흥행 Top 10



• line chart

Tools: most statistical and charting software,
Many Eyes, Google Charts, Tableau Public,
Google Fusion Tables



Tips: Aisch, G. (2012). Doing the line charts right.

Image:

Copley, Z. (2012). Annual Mean Temperature Charts.

CC BY-SA 2.0



• step chart

Tools: most statistical and charting software,
R, Excel, Protovis, Google Charts

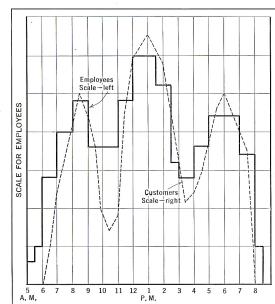


FIG. 19. STAIRCASE OR STEP DIAGRAM

Image:

Weld, W. E. (1959). How To Chart: Facts

From Figures With Graphs. Norwood, MA:

Codex Book Company, Inc.

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• area chart/stacked graph

Tools: most statistical and charting software,
Protovis, Many Eyes, Google Charts, Google
Fusion Tables

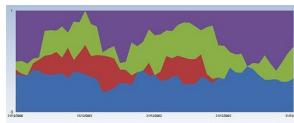


Image:

Grape City, Inc. (2009). Spread 5 for Windows Forms.

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• heat map

Tools: Excel (conditional formatting), d3
(calendar), Protovis

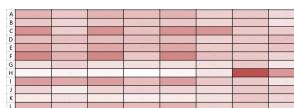


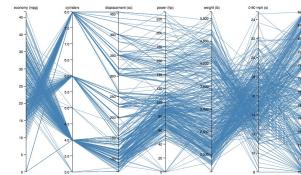
Image created in Excel with data from Anscombe's quartet.

• parallel coordinates/parallel sets

Tools: d3/Protopis

Image created by code in d3

"examples/parallel/" directory.



• radar/spider chart

Tools: Excel

Image:

Jung, J. (2008). Radar Chart A White.

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• box and whisker plot/candlestick chart

Tools: most statistical and charting software,

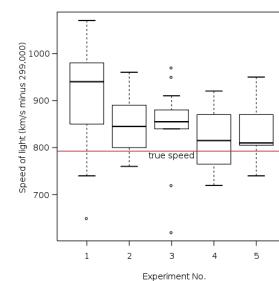
Protopis, Google Charts



Image:

Schutz. (2006). Boxplot representing Michelson and Morley's data on the speed of light.

Public Domain

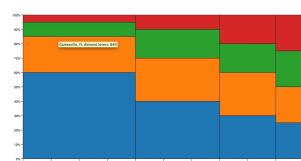


• mosaic display/Marimekko chart

Tools: d3

Image created by code in d3

"examples/marimekko/" directory.



• waterfall chart

Tools: Excel

Image:

Hjohar. (2009). Example of waterfall chart.

Public Domain



• tabular comparison of charts (e.g.,

pairs plots)

Tools: R, Protovis, Many Eyes, Tableau Public

• small multiples

Tools: manual juxtaposition of charts from statistical and charting software, Tableau Public

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Tree/Hierarchical

Examples:

• general tree visualization

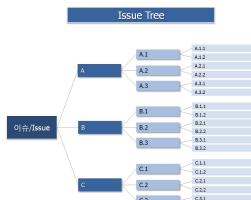
Tools: d3, Google Charts, Network

Workbench/Sci2

Image:

Jung, J. (2008). 3-18 Issue Tree White.

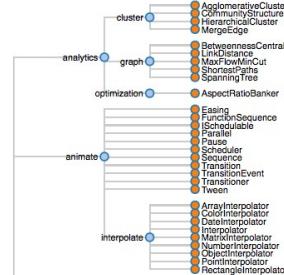
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• dendrogram

Tools: Protovis

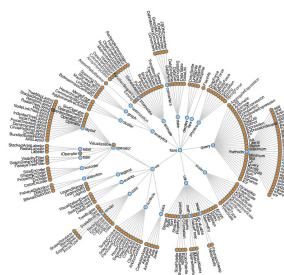
Image created by sample Protovis code.



• radial tree

Tools: d3/Protevi, Network Workbench/Sci2

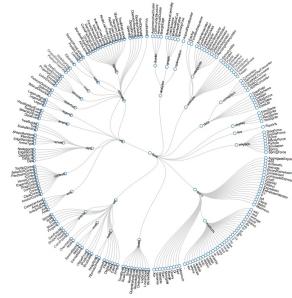
Image created by sample Protovis code.



• hyperbolic tree

Tools: d3

Image created by code in d3
"examples/cluster/" directory.



• tree map

Tools: d3/Protopis, Many Eyes, Google Charts, Network Workbench/Sci2

Image created by code in d3
"examples/treemap/" directory.



• wedge stack graph (radial hierarchy)/sunburst

Tools: d3/Protopis

Image created by code in d3
"examples/partition/" directory.



• icicle/partition chart

Tools: d3/Protopis

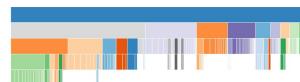


Image created by code in d3 "examples/partition/" directory.

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Network

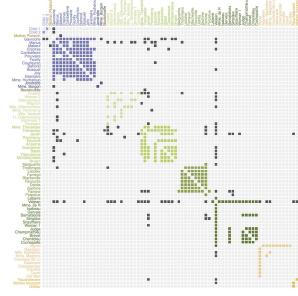
Examples:

• matrix

Tools: d3/Protopis

Image created by sample Protopis code.





- node-link diagram (link-based layout algorithm)

Tools: Pajek, Gephi, NodeXL, VOSviewer, UCINET, GUESS, Network Workbench/Sci2, sigma.js, d3/Protevis, Many Eyes, Google Fusion Tables

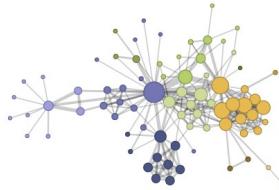


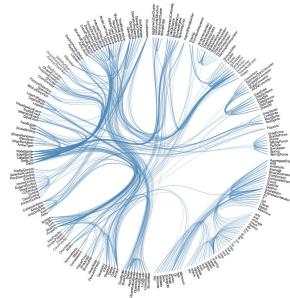
Image created by sample Protevis code.

- dependency graph/circular hierarchy

Tools: d3, Network Workbench/Sci2



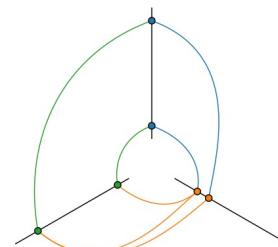
Image created by code in d3
"examples/bundle/" directory.



- hive plot

Tools: d3

Image created by code in d3
"examples/hive/" directory.



- alluvial diagram

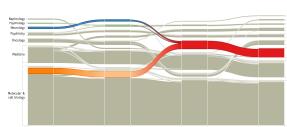
Tools: Alluvial Generator

Image:

Rosvall, M., & Bergstrom, C. T. (2010).

Mapping change in large networks. *PLoS ONE*, 5(1), e8694.

CC BY 2.5



- subway/tube map

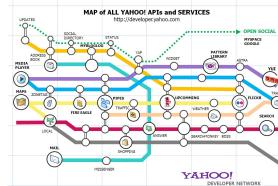
Tools: Subway map jQuery plugin

Image:

Jung, J. (2008). Yahoo YDN Metro Map

White.

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