Data Visualization Tools

This list focuses on freely available software (for UCalgary)

1. Preparing Data
2. Visualization

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Data Tools:

Data Wrangler / Alteryx Designer Cloud

DataWrangler alpha

alteryx

http://vis.stanford.edu/wrangler

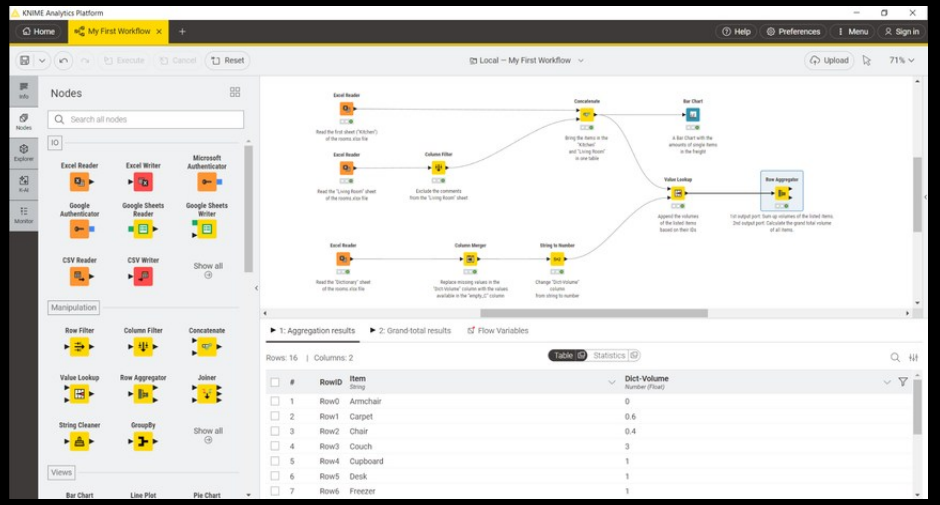
https://www.alteryx.com/products/designer-cloud

- Interactive tool for cleaning & rearranging spreadsheet data
- Suggests changes
- Wrangler: web tool – data uploaded to external site (1000 rows)
  - Strategy – upload synthetic (made up) data, find your data transformations, and download a script to run locally on your real data.
- Import: text, CSV, JSON
- Export: CSV, JSON, TDE (Tableau)

Data Tools:
KNIME (Konstanz Information Miner)

https://www.knime.com/get-started

- Open source, no / low code tool for manipulating data
- Operates with a node-based workflow
  - Each node performs a specific task, and you connect them to create an end-to-end data pipeline.
- Create custom nodes in Python, R, or Java
- Flow chart documents all operations
- Input: csv, excel, xml, json, sql, + more
- Output: csv, excel, word, pdf, json, + more



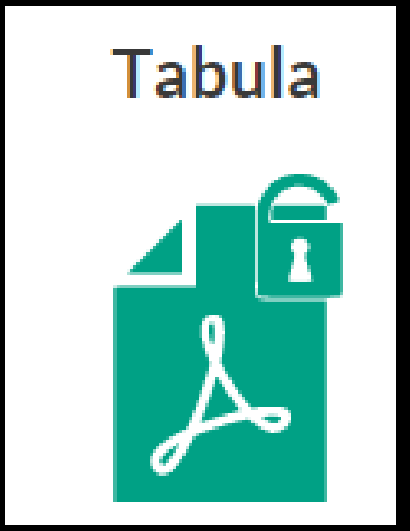
Data Tools: Open Refine

http://openrefine.org/

- Consolidate spelling
- Auto-detect outliers
- Sorting & filtering
- Auto-suggests changes
- Import: Excel, XML, JSON, RDF, CSV
- Export: Excel, CSV, ODF, HTML

Data Tools: Tabula

http://tabula.nerdpower.org/



- Extract data from PDFs
- Stand-alone app for Windows/Mac
- Interactively select table
- Output: CSV, Excel

Data Tools: Generative AI

Suggested Uses:

- Create scripts (python, R, etc) to manipulate data
- Supplement data tables (e.g., lookup latitude/longitude)
- Creating synthetic data (anonymous or testing data)
- Generating metadata (tags, descriptions)

Why Not Create the Entire Visualization/Chart with Generative AI?

- Challenging to keep your visualizations reproducible and to track exactly what transformations AI has made to your data.
- AI hallucinations are hard to identify and can create misleading visuals.
- Creating an entire visualizations is tricky. Often bad labels or other aesthetic details come out wrong so you can be left trying over and over with the hopes of eventually hitting the jackpot.
- See https://www.practicalreporting.com/blog/2025/4/8/its-april-2025-should-you-be-using-ai-to-create-charts-instead-of-exceltableauetc

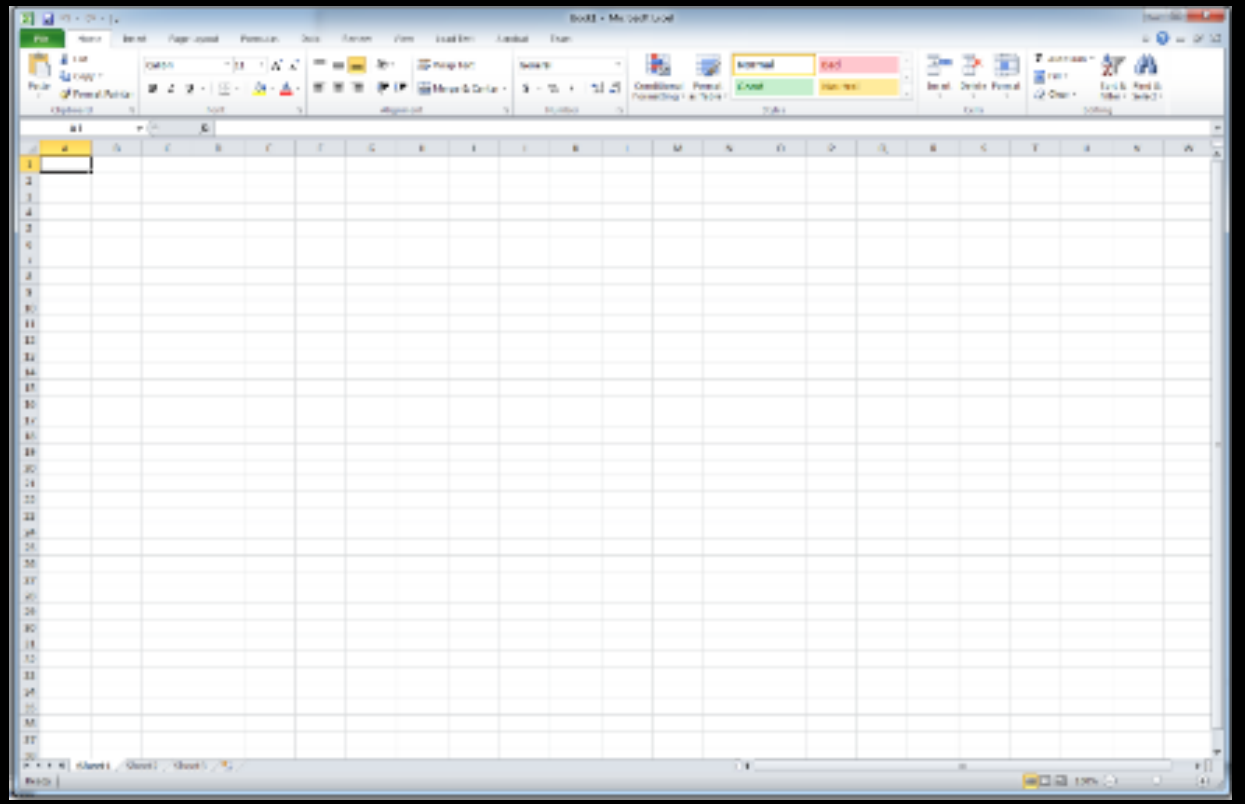
Visualization Tools

We start with general purpose tools and then move into tools for specific visualization types.

- General Purpose
- Special Purpose
  - Text Analysis
  - Sets
  - Maps
  - Networks / Graphs
  - Timelines
- Colour

VIS Tools: Excel

- Simple charts
- Hard to customize
- Can do anything!
  (but takes time & expertise)



VIS Tools: Tableau Public

http://www.tableau.com/

Strengths:

- Many chart types
- Interactive web output
- Access to underlying data
- Many data sources (live)
- Drag & drop – easy to experiment
- Maps
- Good defaults
- Link visualizations

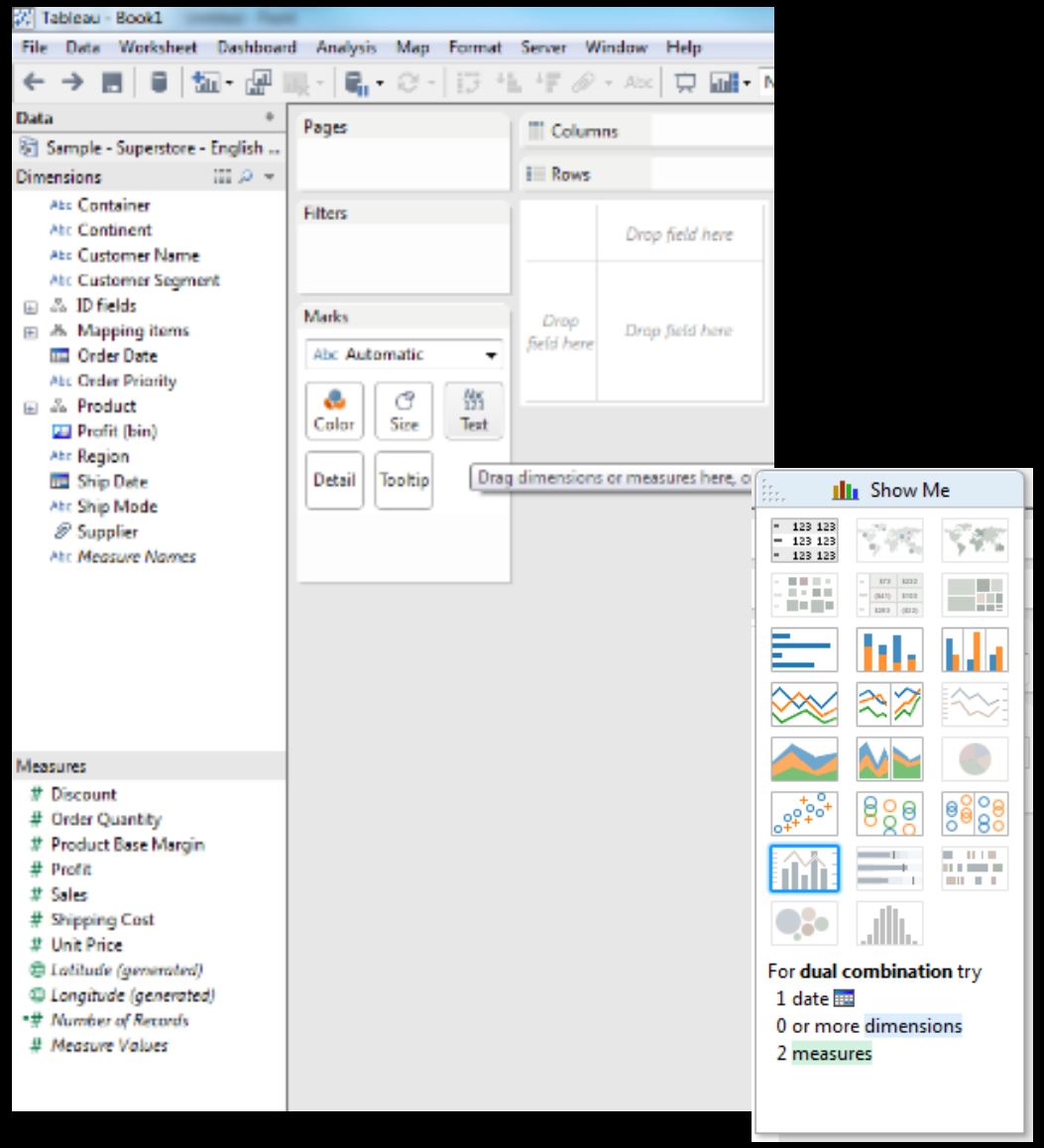
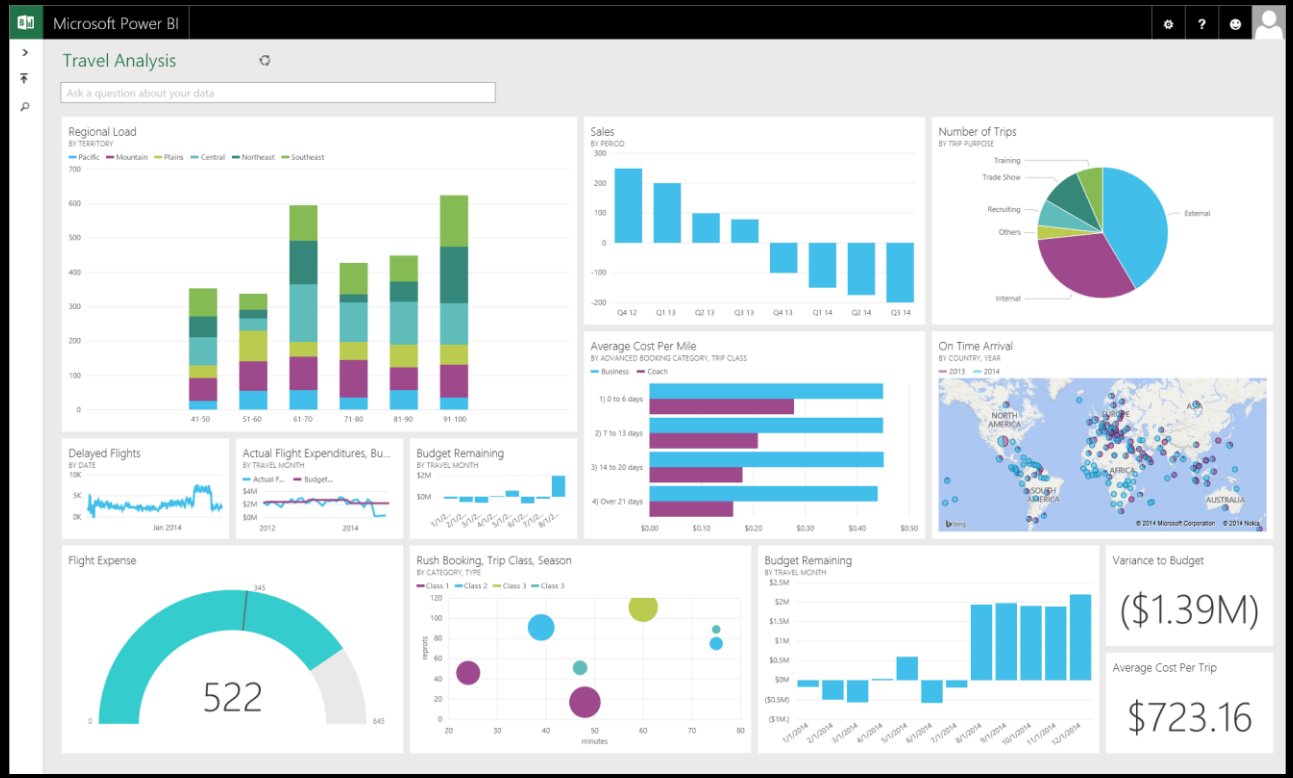


Tableau Public Desktop – Free and has most capabilities paid version

VIS Tools: POWER BI

https://powerbi.microsoft.com/en-us/

- Similar capabilities as tableau
- Can build plugins
- Better data modeling
- Not as customizable
- Exploration not as easy
- Lots of menus
- Less data capacity than Tableau

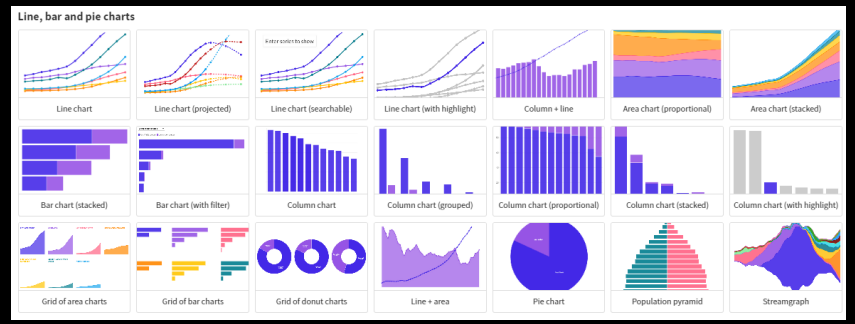


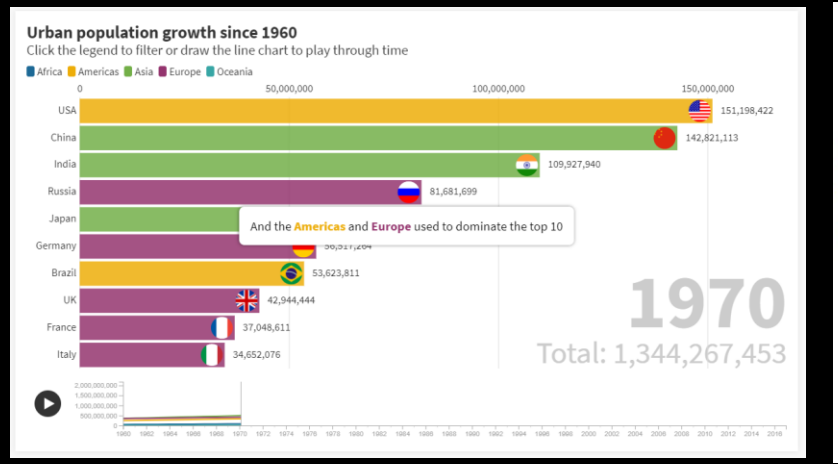
https://www.em360tech.com/microsoft-power-by-dashboard/

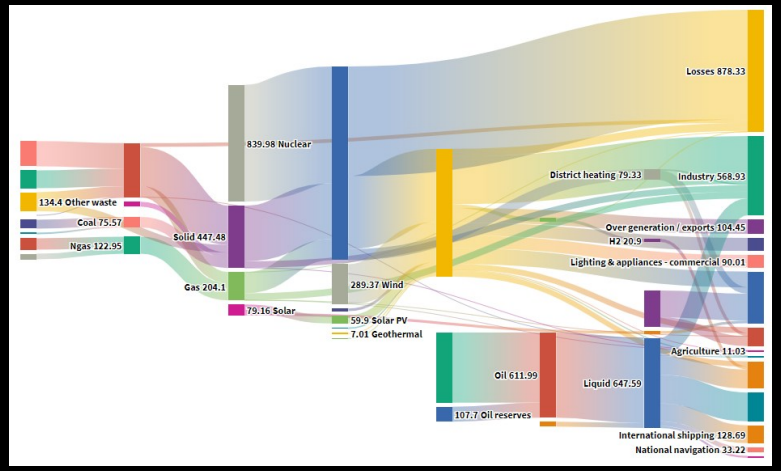
VIS Tools: Flourish

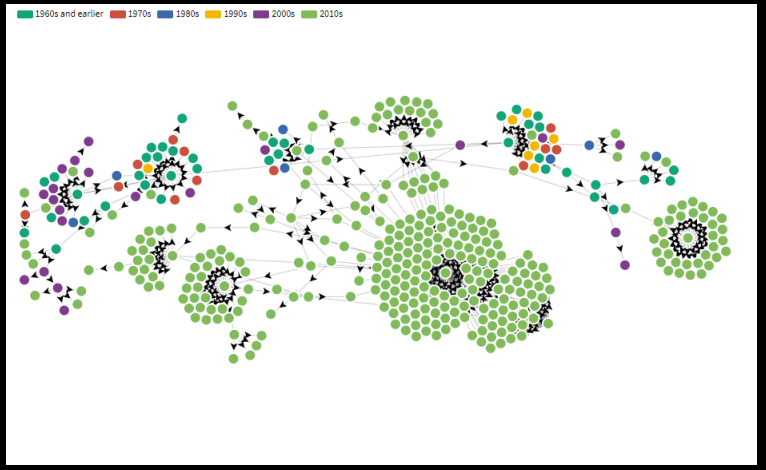
https://flourish.studio/

- Interactive visualizations
- Wide variety of useful chart types
- Free for individual, pay to share
- Stick to relatively small datasets (< 10K rows)





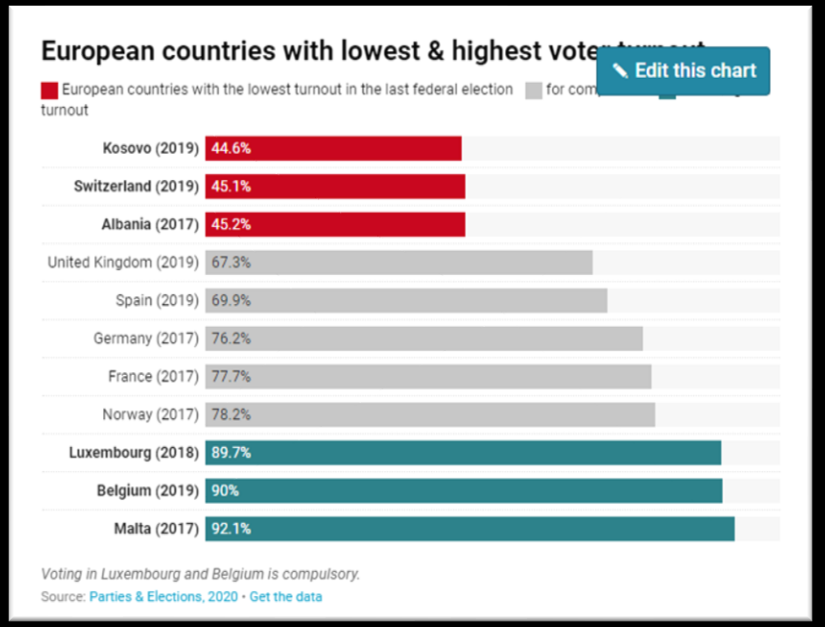


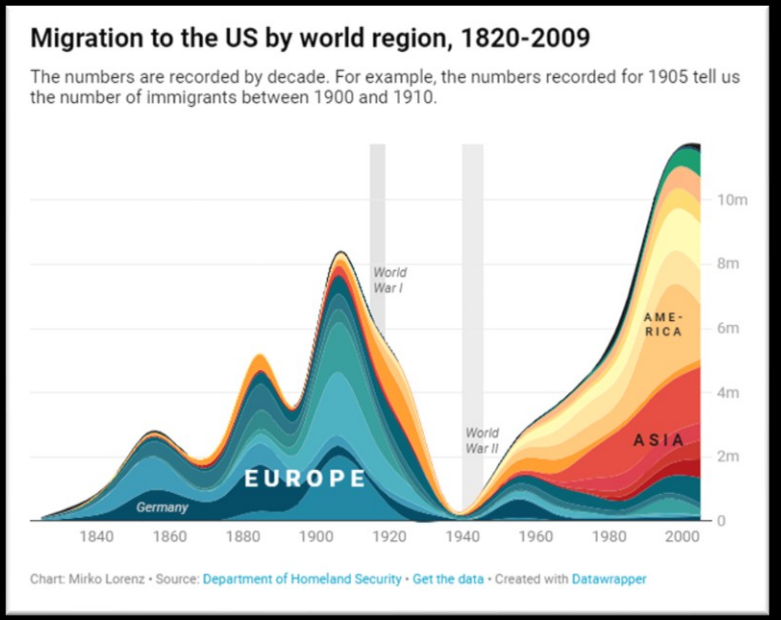


VIS Tools: Datawrapper

https://www.datawrapper.de/

- Many chart types, useful maps
- Variety of mapping types (choropleth, symbols, locator)
- Free, results have “Created with Datawrapper” watermark and you can only export PNG images (not PDF or SVG).

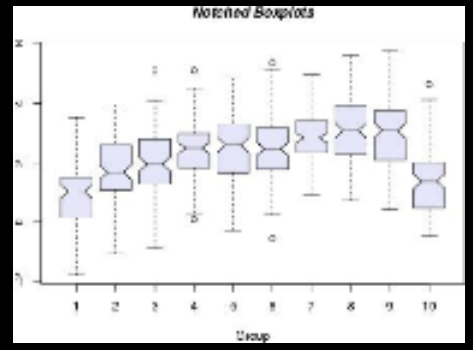


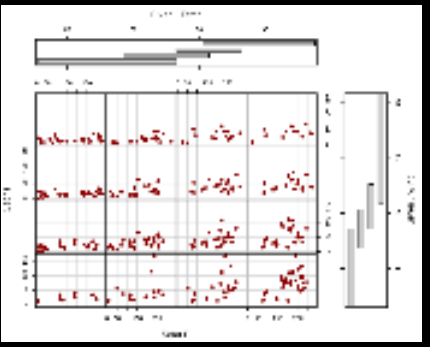


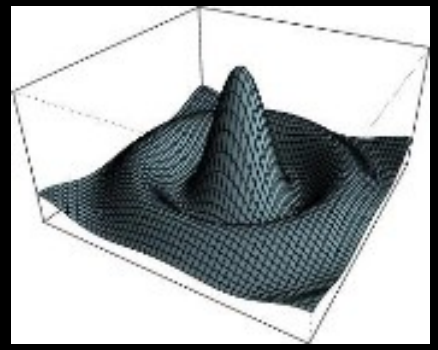
VIS Tools: R

http://www.r-project.org/

- Open-source software originally for statistics & graphics
- All sorts of advanced stats
  - Regression, linear/nonlinear models, time series analysis, clustering, nonparametric tests
- Data wrangling
- Charts & Plots – ggplot2
- 60+ Resources for R
  http://www.computerworld.com/article/2497464/business-intelligence/60-r-resources-to-improve-your-data-skills.html



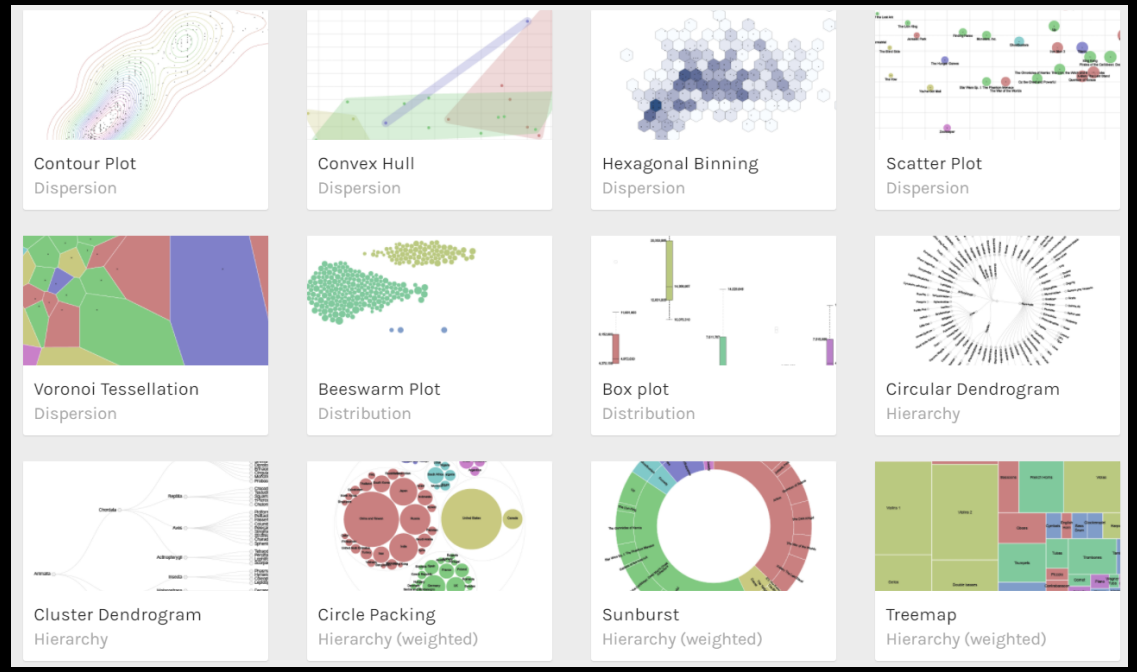


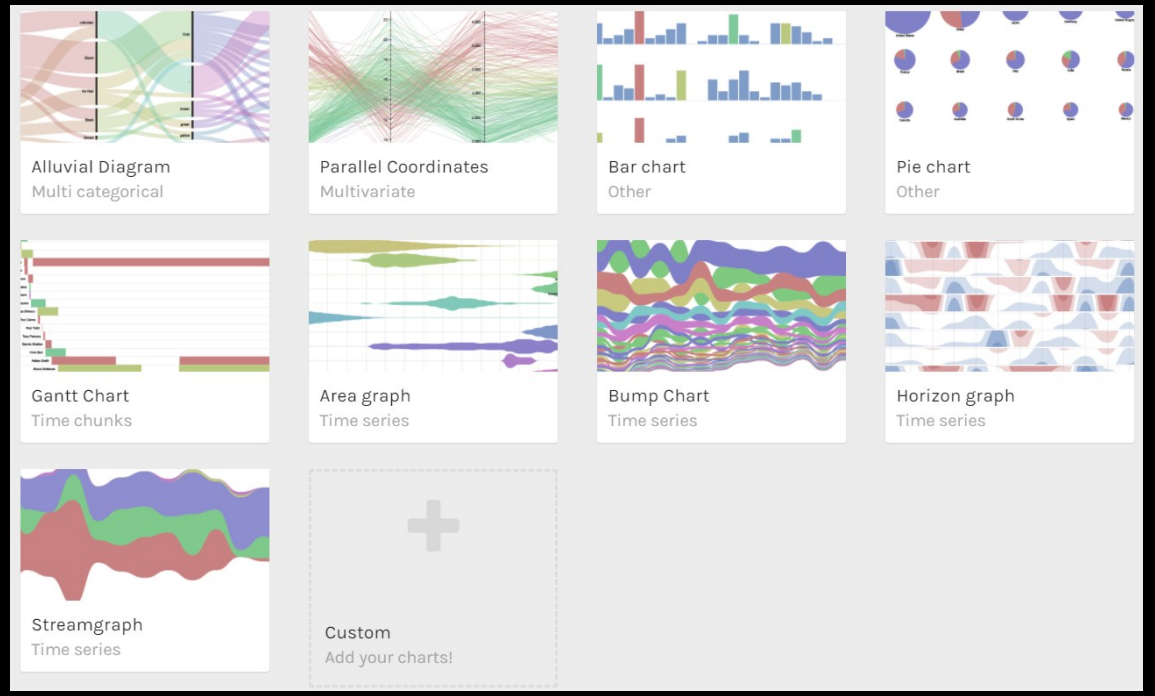


VIS Tools: RAWGraphs

https://rawgraphs.io/

- Create SVG graphics
- Data not uploaded (so remains private)
- 25+ chart types



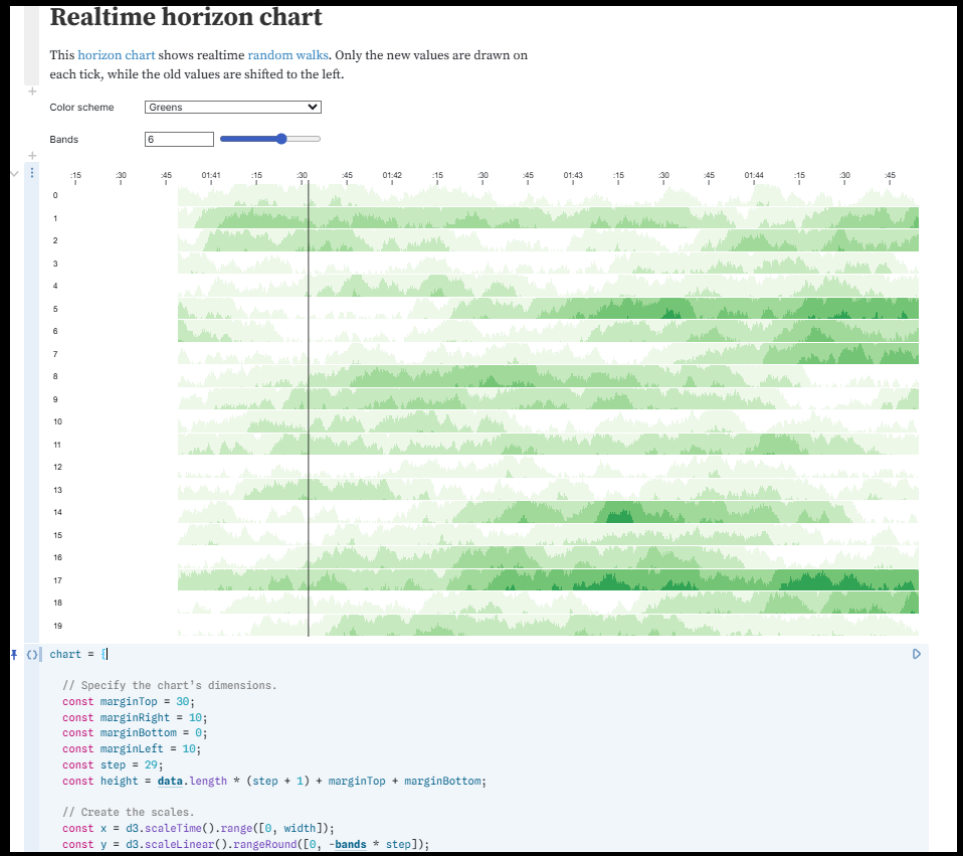


VIS Tools: Observable Notebooks

Observable

https://obserablehq.com

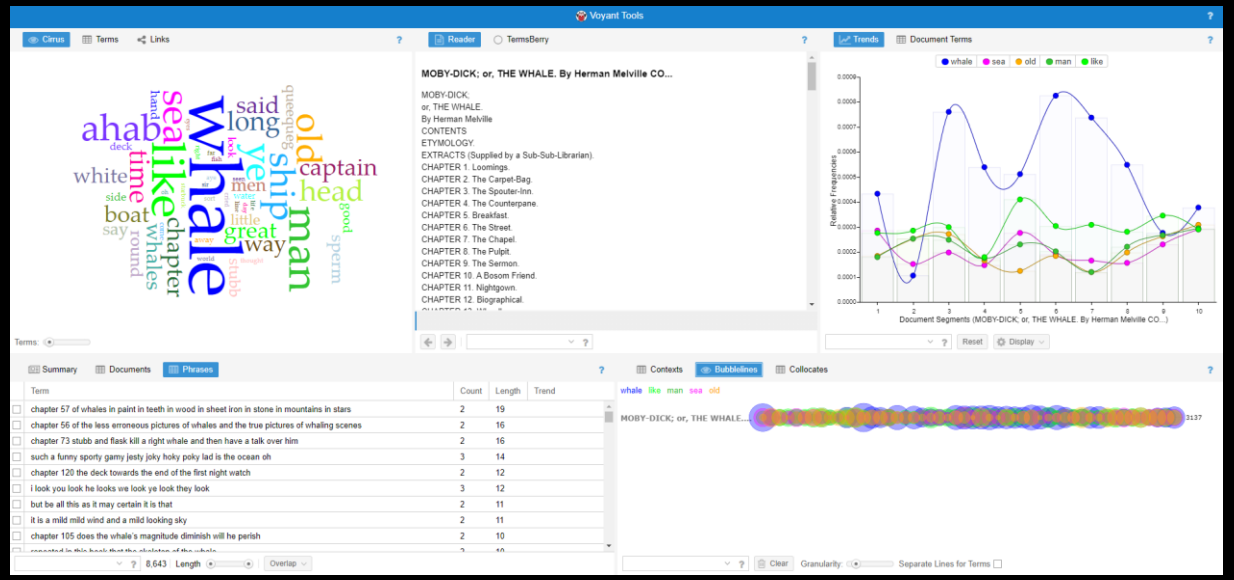
- Like a Jupyter notebook but focused on data visualization
- Uses javascript and D3 (strong visualization javascript library)
- Strong interactivity but coding is needed
- Share via web link, paid subscription for shared editing, removing watermark.



Text Analysis: Voyant

http://voyant-tools.org/

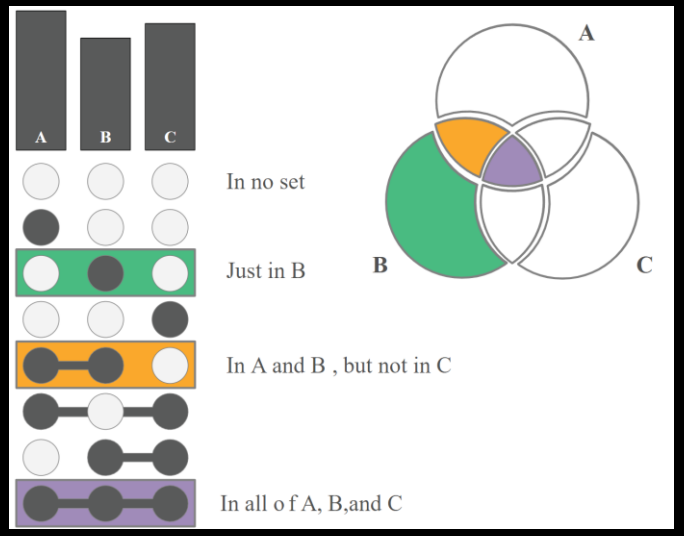
- Import: txt, HTML, XML, PDF, RTF, & Word
- Lexical analysis
  - frequency and distribution
- Export: XML, tsv, html widgets

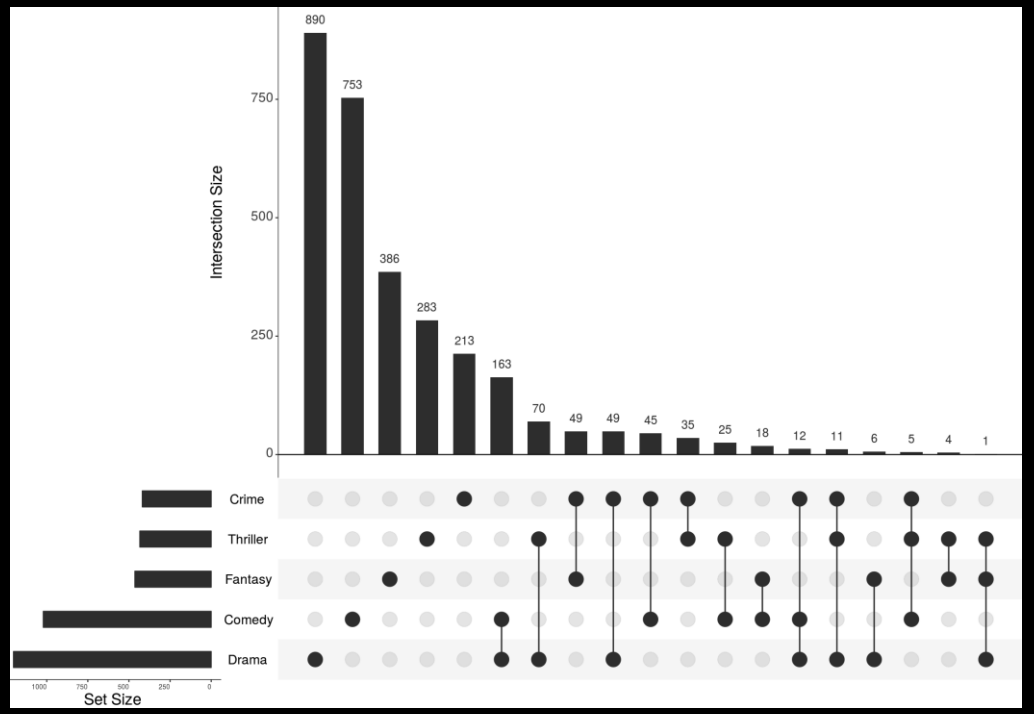


Sets: UpSet

https://upset.app

- Alternative to Venn diagram when you have 4-30 sets.
  - With fewer than 4, use a Venn diagram (e.g., https://bioinfogp.cnb.csic.es/tools/venny/index.html).
- Many implementations
  - Web tool, R library, javascript library, etc



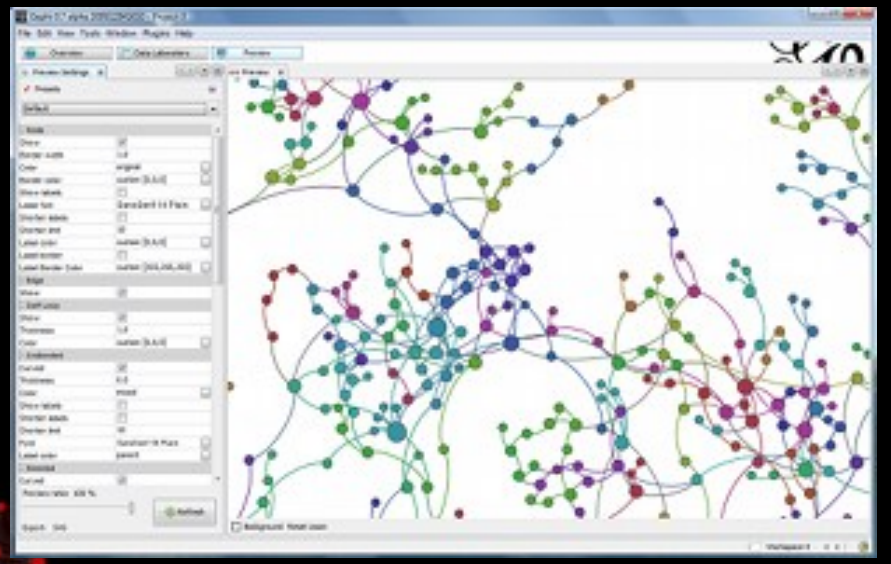


Images from https://upset.app/

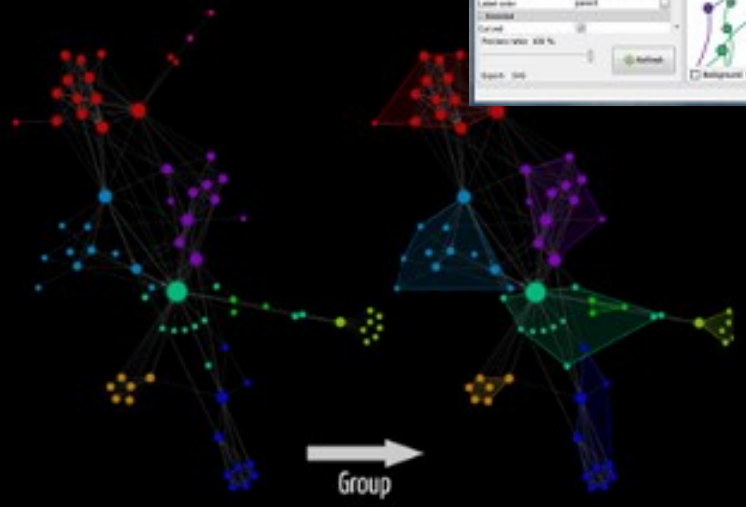
Graphs/Networks: Gephi

Gephi
makes graphs handy

http://gephi.github.io



- Windows/Linux/OS X
- Can handle 50K nodes & 1000K edges
- Interactive
  - Filter
  - Dynamic layout
  - Clustering/hierarchies



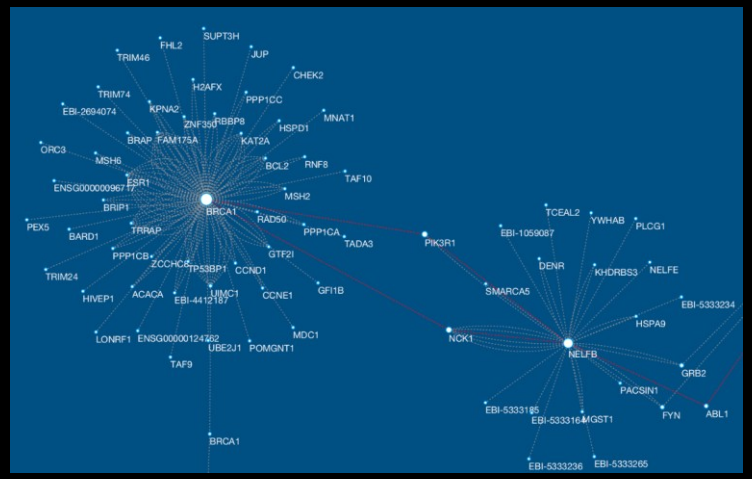
Graphs/Networks: Cytoscape

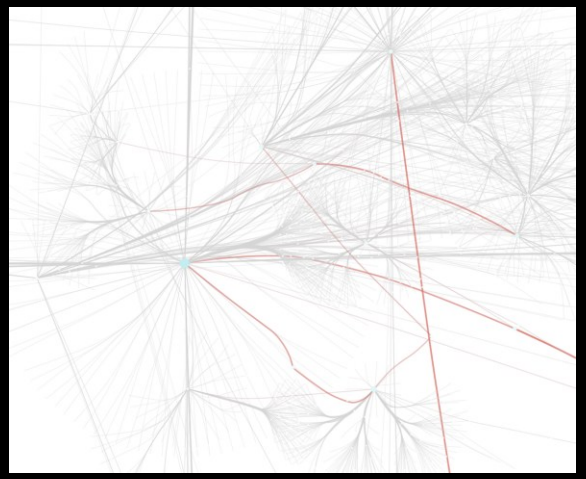
Cytoscape

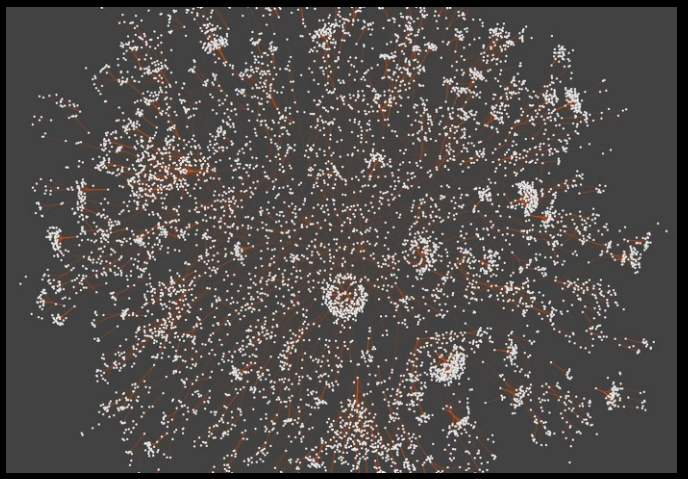
Network Data Integration, Analysis, and Visualization in a Box

https://cytoscape.org/

- Windows/Linux/OS X
- Created for bioinformatics
- Use cytoscape.js to bring your cytoscape projects to the web
- Apps (plugins) provide extra features



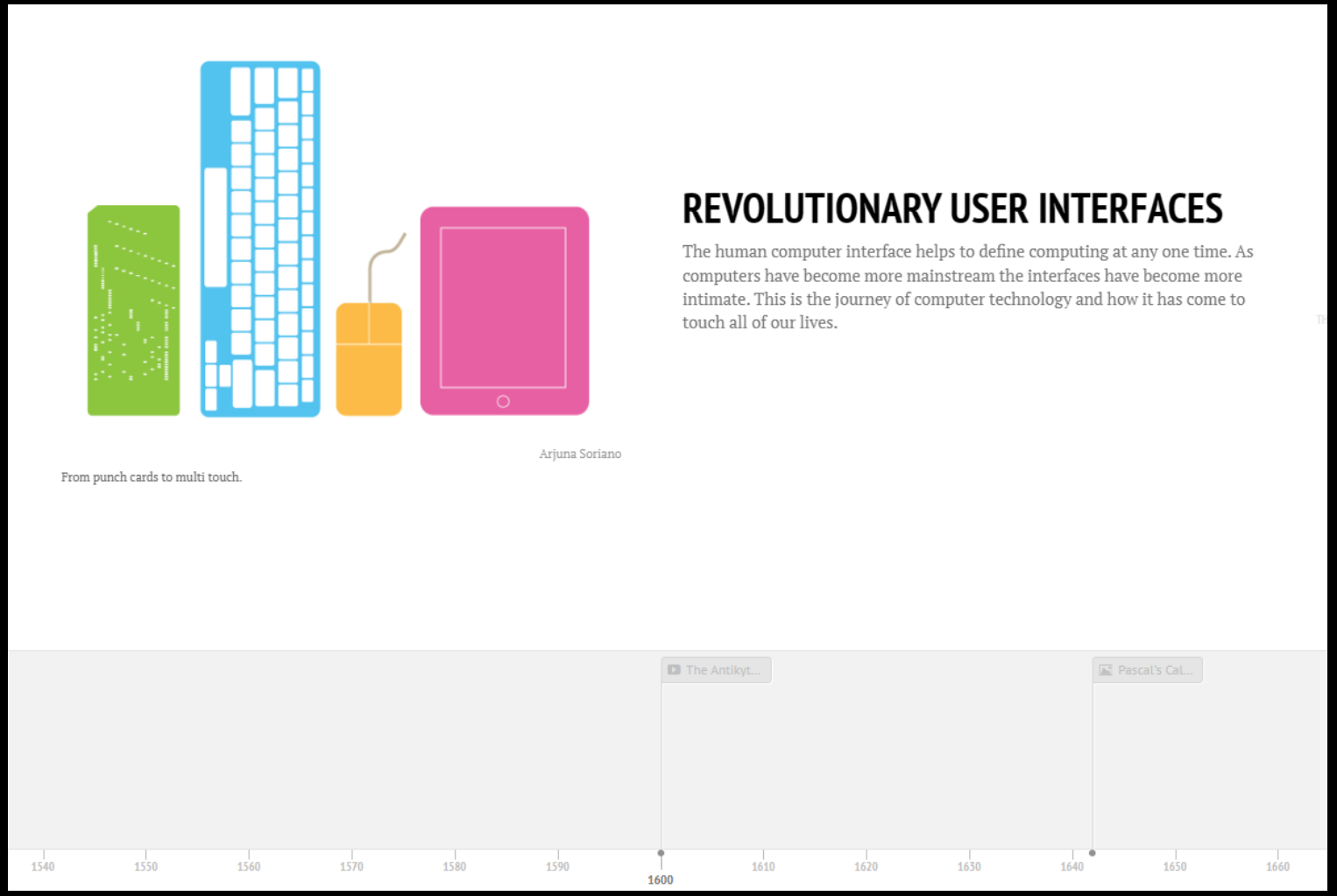




Time: Timeline JS

http://timeline.knightlab.com

- Interactive, web timelines
- Link in URLs and web resources
- Build with Google spreadsheet
- Produces embeddable iframe widget



Colour

Adobe Color - https://color.adobe.com/

- Pick great colour palettes
- Given this colour, pick complementary colours
- Can test contrast, accessibility for colour-blindness

ColorBrewer - http://colorbrewer2.org/

- Help in choosing colours for maps

Color-Buddy - https://color-buddy.netlify.app/

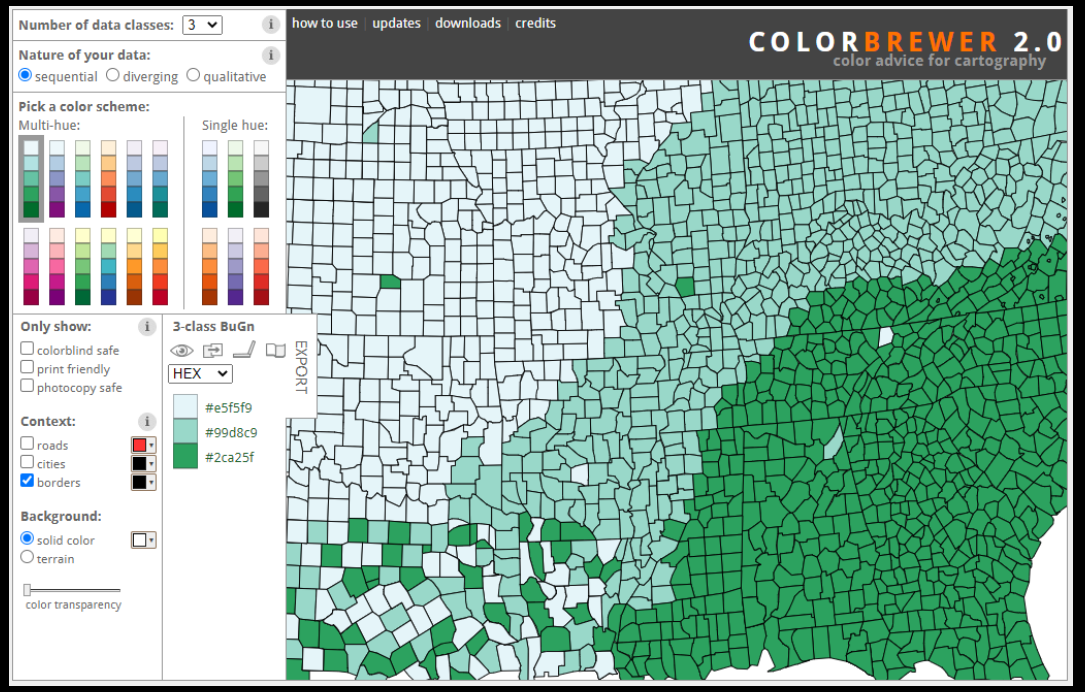
- More options, shows several different types of visualization

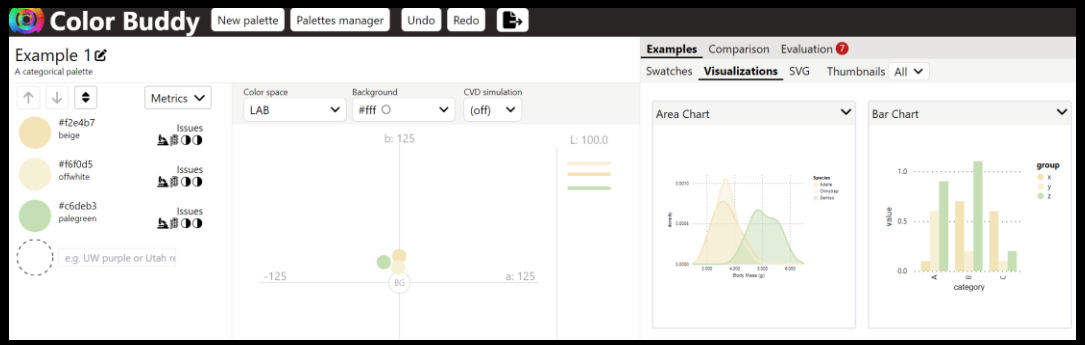
Magic Color Picker - https://text2color.com/picker.html

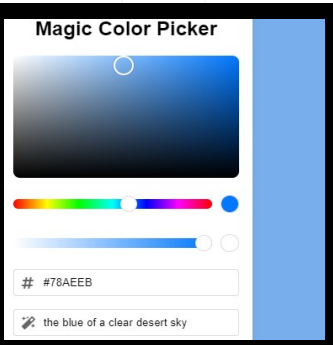
- AI that changes text to RGB colour codes

WebAIM Contrast Checker - https://webaim.org/resources/contrastchecker/

- Tests contrast between text & background colours so you can be sure text is legible







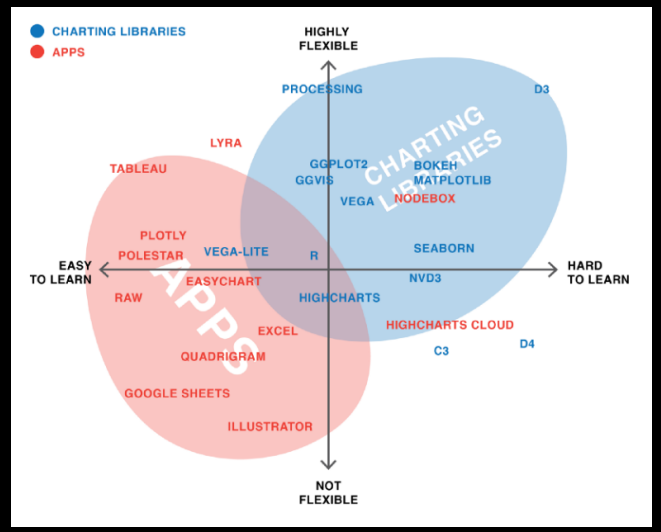
Resources – More Data Vis Tools

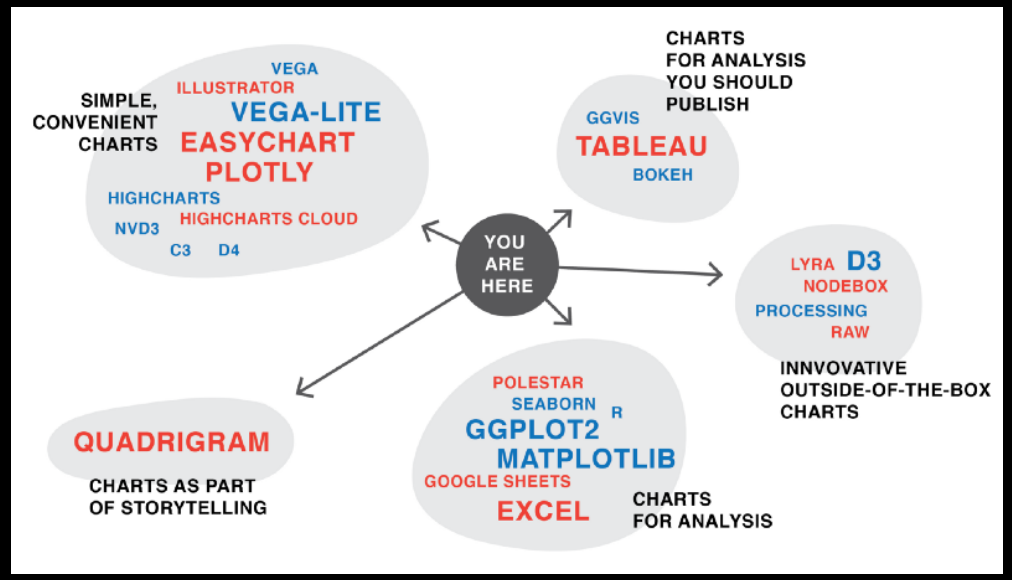
Visualizing Data - https://www.visualisingdata.com/resources/

120+ visualization tools

Sage Research Methods – Visualization Tools
https://methods-sagepub-com.ezproxy.lib.ucalgary.ca/Search/Results?products=[24]&contentTypes=Tools%20Directory

Article on picking a vis tool –
https://source.opennews.org/articles/what-i-learned-recreating-one-chart-using-24-tools/





Questions?

Email John!

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