

Data Visualization Tools

This list focuses on freely available software (for UCalgary)

1. Preparing Data
2. Visualization

By John Brosz, PhD
Data & Visualization Curator
LCR, University of Calgary
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Data Tools:

Data Wrangler / Alteryx Designer Cloud

DataWrangler^{alpha}

The Alteryx logo, featuring the word "alteryx" in a blue, lowercase, sans-serif font, enclosed within a white rectangular box.

<http://vis.stanford.edu/wrangler>

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

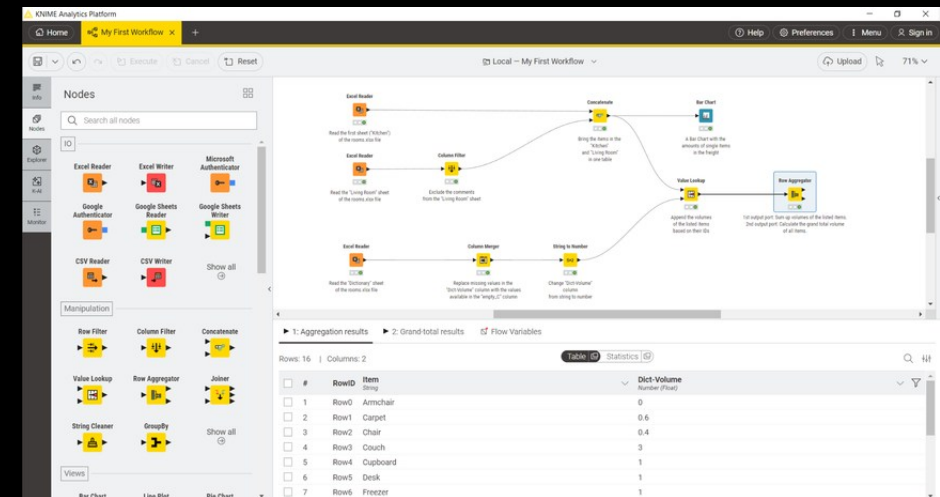
- Interactive tool for cleaning & rearranging spreadsheet data
- Suggests changes
- Wrangler: web tool – data uploaded to external site (1000 rows)
 - Strategy – upload synthetic (made up) data, find your data transformations, and download a script to run locally on your real data.
- Import: text, CSV,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

A screenshot of the Open Refine web interface. The main area displays a table with 10 rows of data. The columns include 'ID', 'Title', 'Author', 'Year', 'Publisher', 'Number of Pages', and 'Year Published'. The table is titled '1000 rows' and has a 'Group' column set to 'Group 1: 10 10 00 rows'. The interface includes a 'Using Facets and Filters' sidebar on the left and a 'Columns' panel on the right. The data rows are as follows:

ID	Title	Author	Year	Publisher	Number of Pages	Year Published
1	1000000	John Doe	2010	ABC Press	100	2010
2	1000001	Jane Smith	2011	DEF Books	120	2011
3	1000002	Bob Johnson	2012	GHI Media	150	2012
4	1000003	Alice Brown	2013	JKL Publishing	180	2013
5	1000004	Charlie White	2014	MNO Books	200	2014
6	1000005	Diana Green	2015	PQR Press	220	2015
7	1000006	Frank Black	2016	STU Media	250	2016
8	1000007	Grace King	2017	VWX Books	280	2017
9	1000008	Henry Lee	2018	YZA Publishing	300	2018
10	1000009	Ivy Chen	2019	BCD Press	320	2019

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>



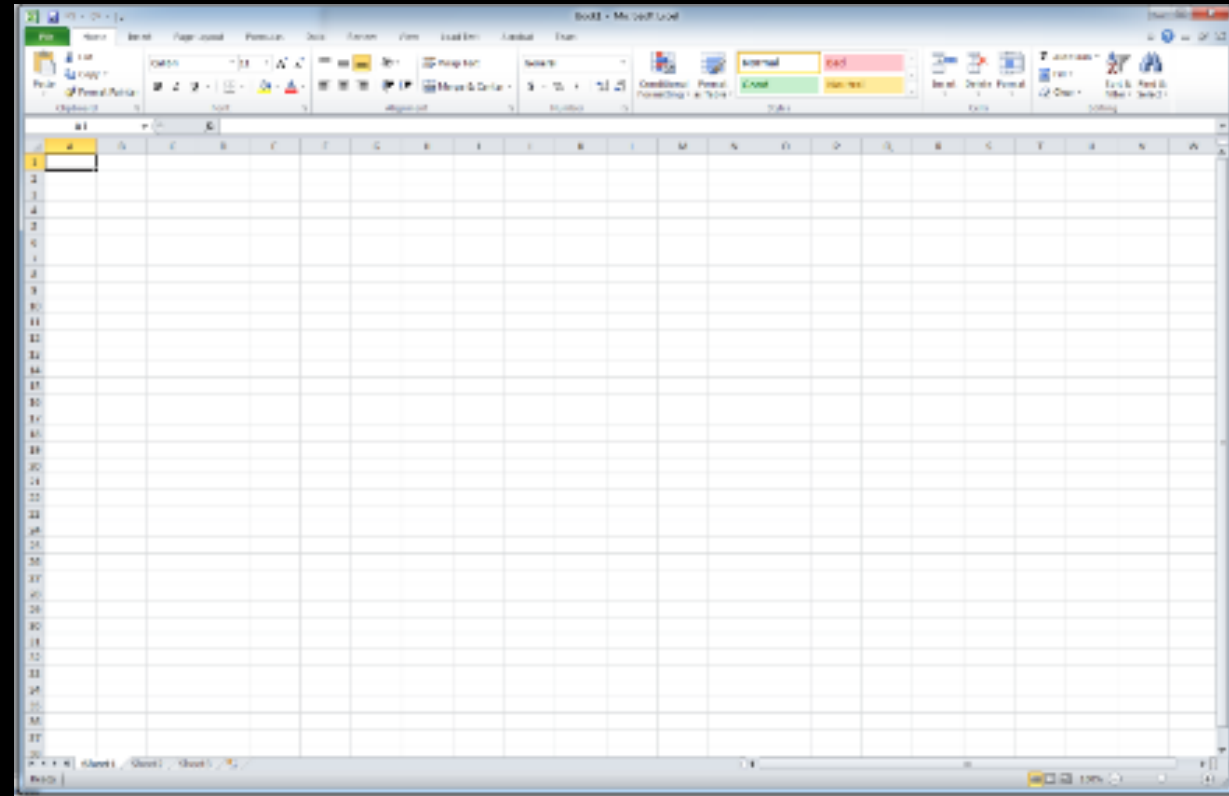
Visualization Tools

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)



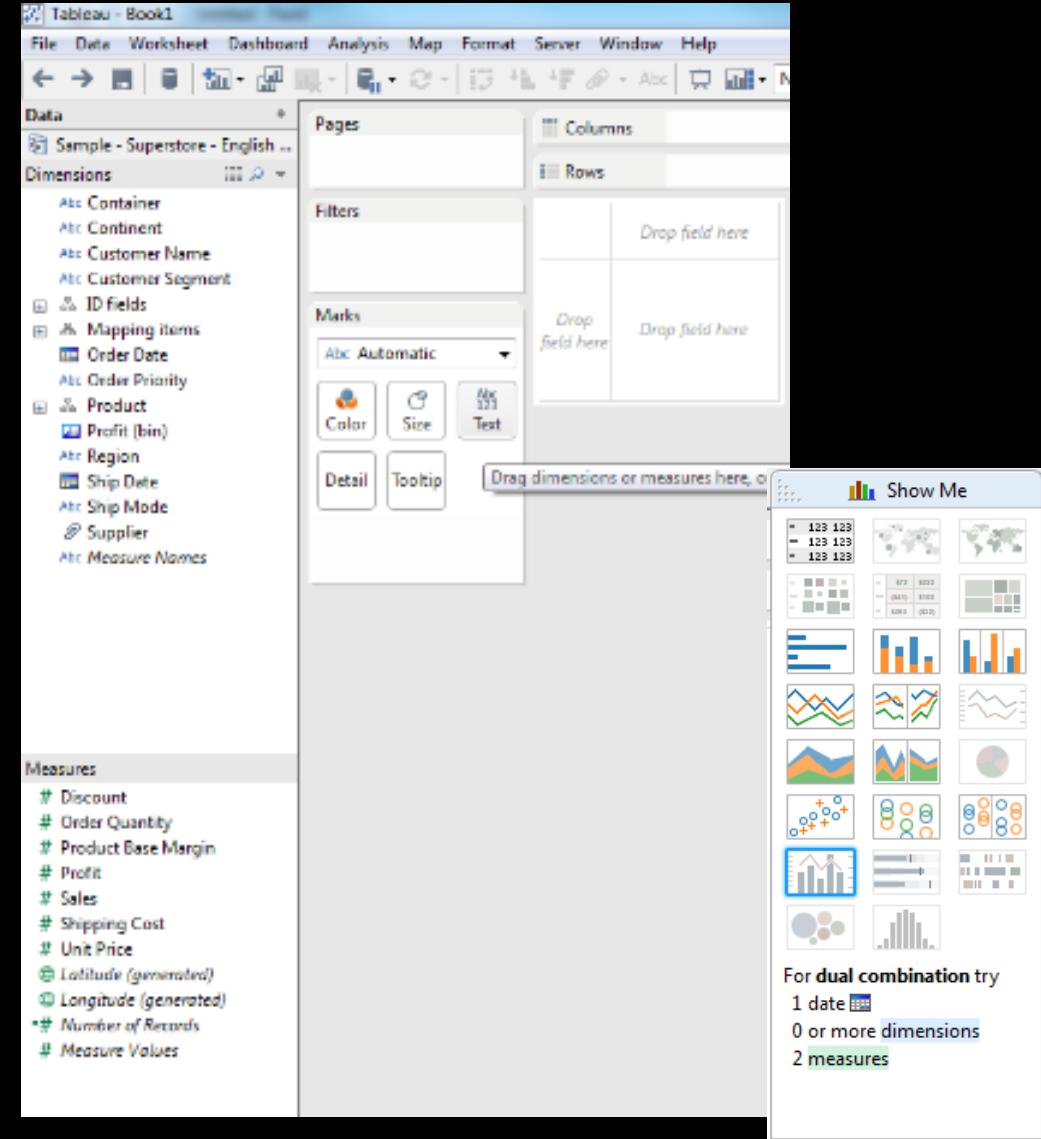
VIS Tools: Tableau Public

<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

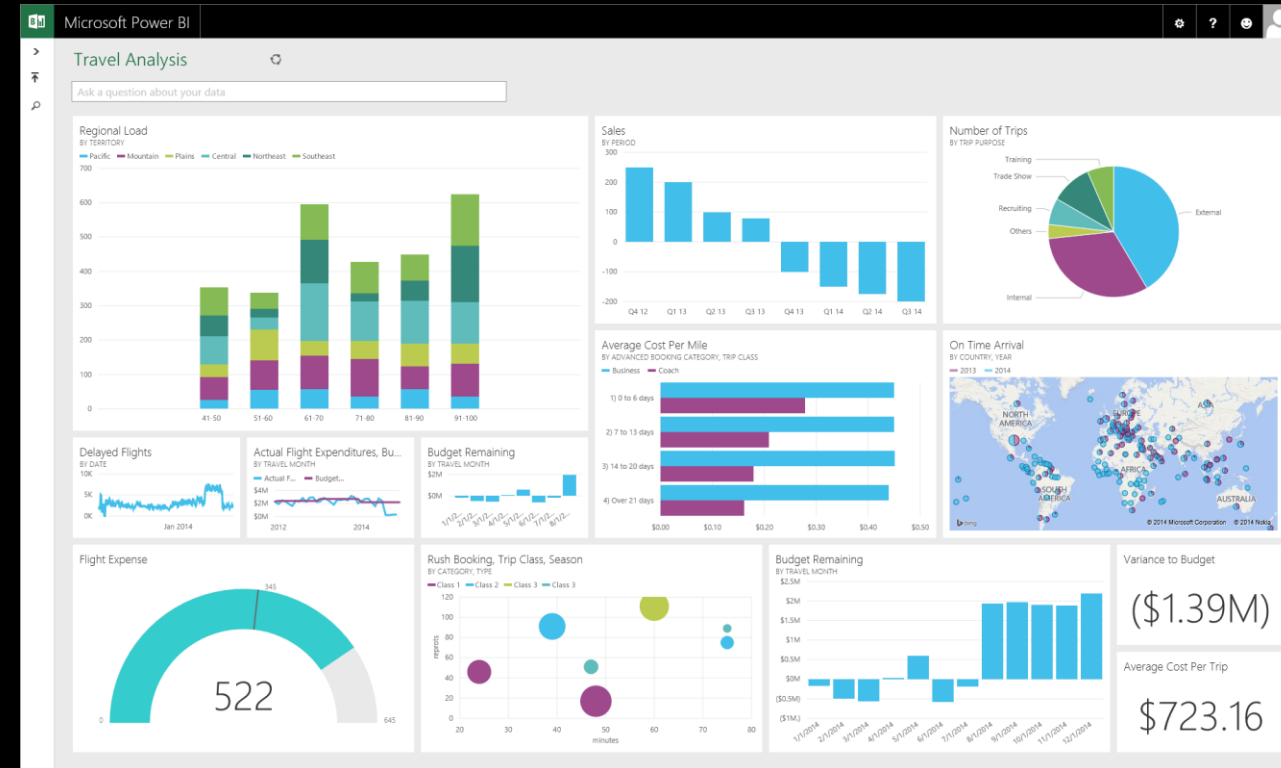


VIS Tools: POWER BI



<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



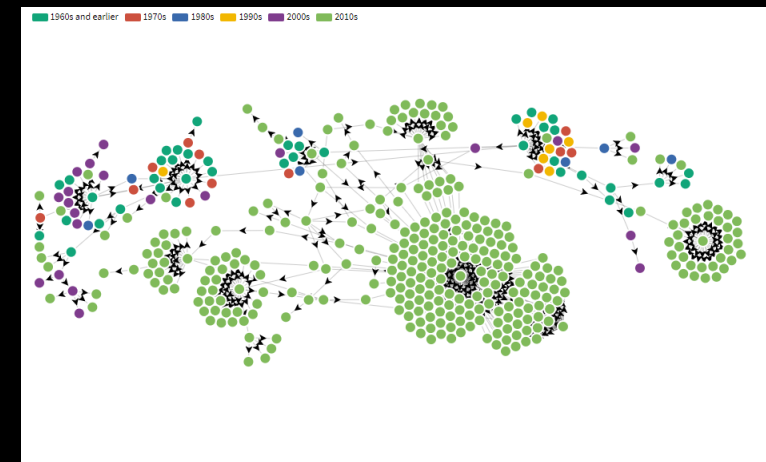
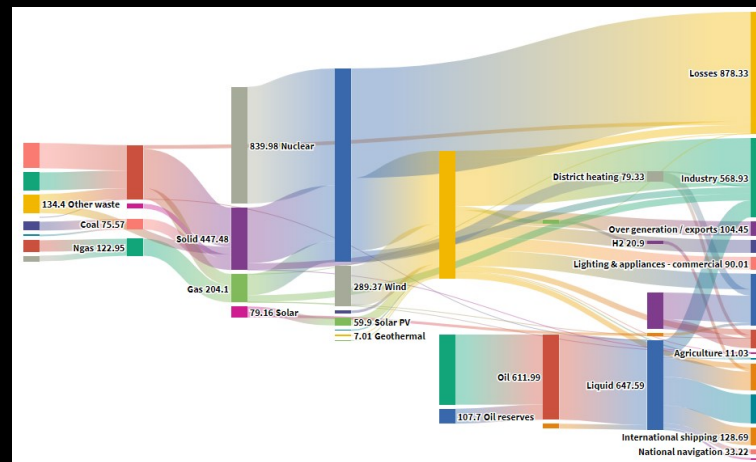
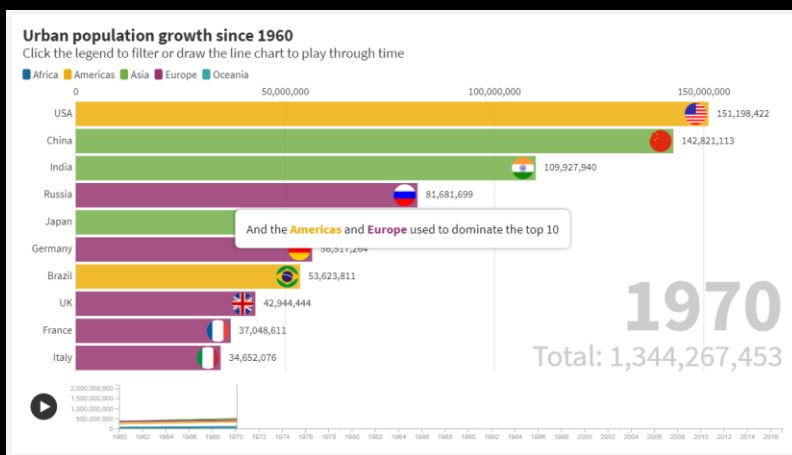
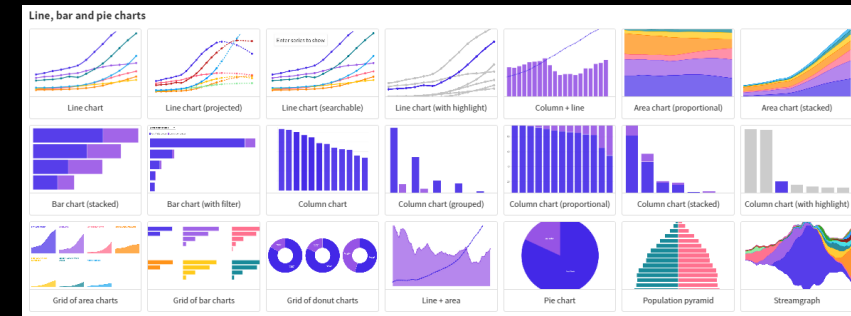
<https://www.em360tech.com/microsoft-power-by-dashboard/>

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)

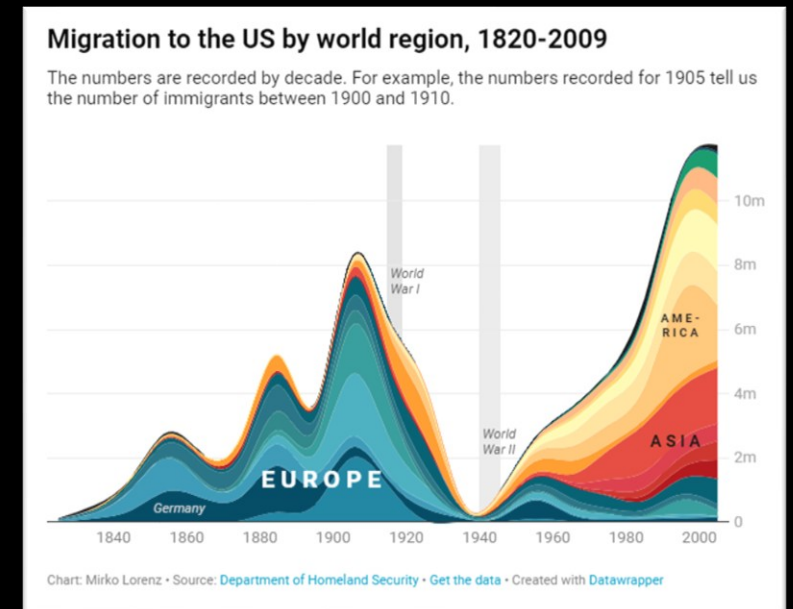
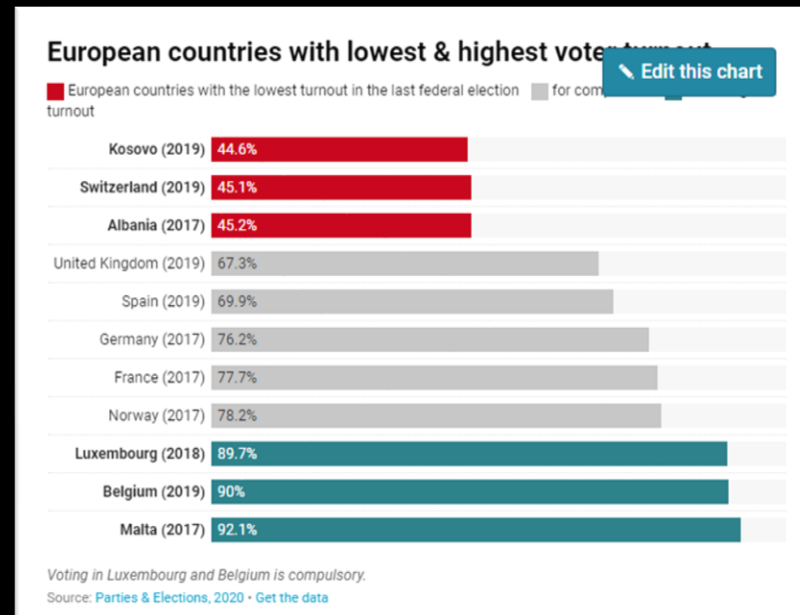
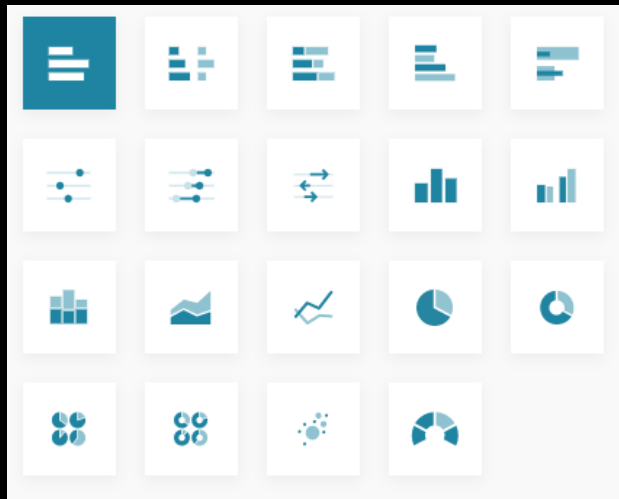


VIS Tools: Datawrapper

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).



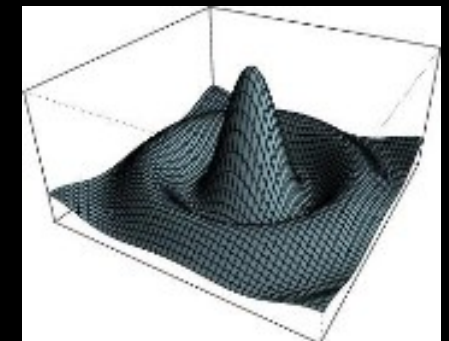
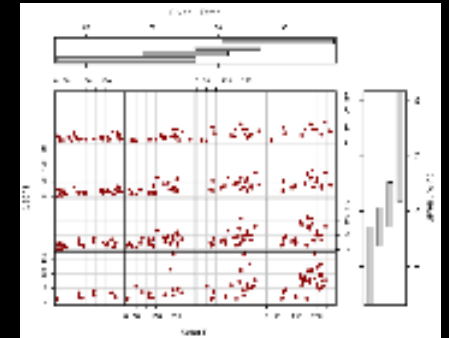
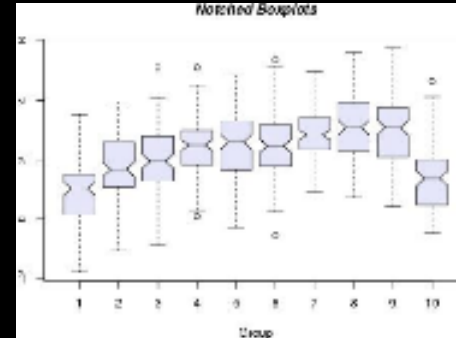
VIS Tools: R



<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>

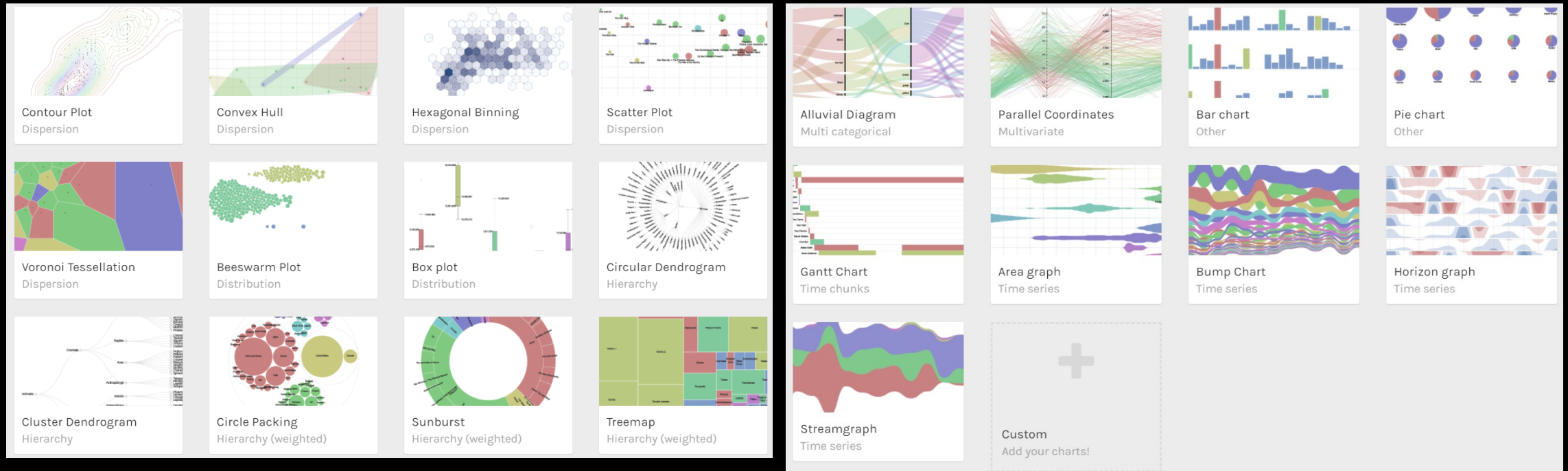


VIS Tools: RAWGraphs



<https://rawgraphs.io/>

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

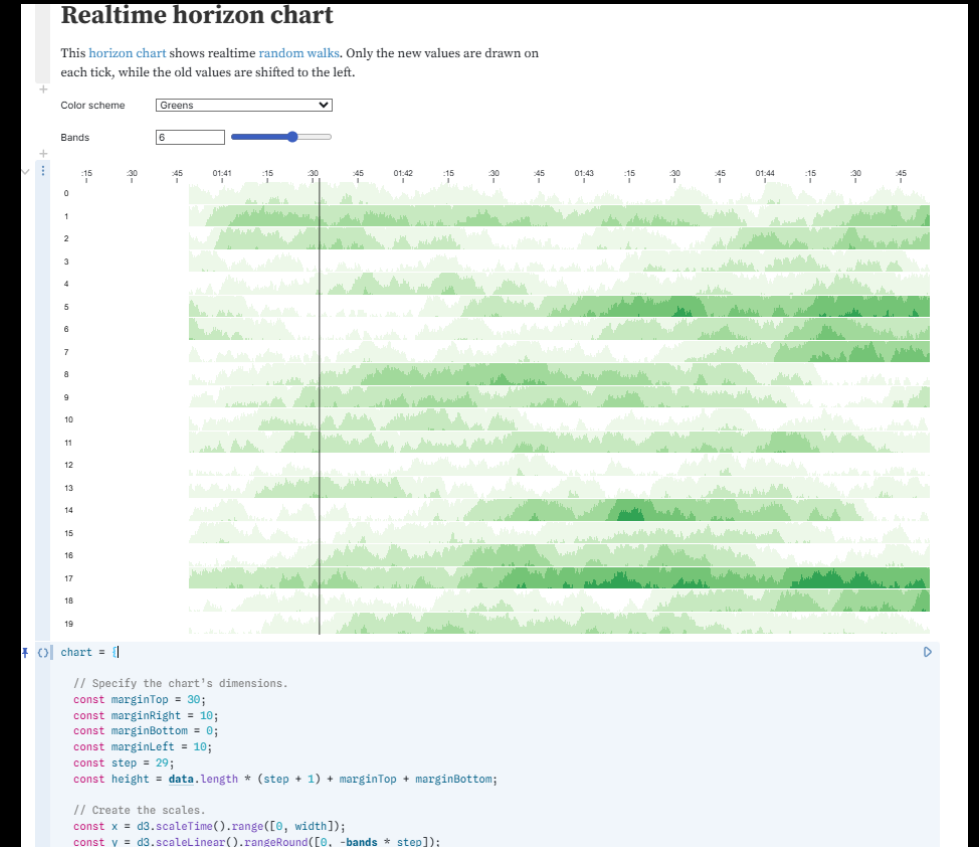


VIS Tools: Observable Notebooks



<https://observablehq.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



The screenshot displays the Voyant Tools interface for the text "MOBY-DICK; or, THE WHALE. By Herman Melville CO...".

- Word Cloud:** The most prominent words are "whale", "sea", "old", "man", and "like". Other visible words include "ahab", "white", "time", "boat", "say", "side", "round", "chapter", "men", "ship", "head", "captain", "man", "good", "sperm", "great", "way", "said", "long", "young", "old", "man", "ship", "head", "captain", "man", "good", "sperm", "great", "way".
- Table of Terms:** A table with columns for Term, Count, Length, and Trend. The first few rows are:

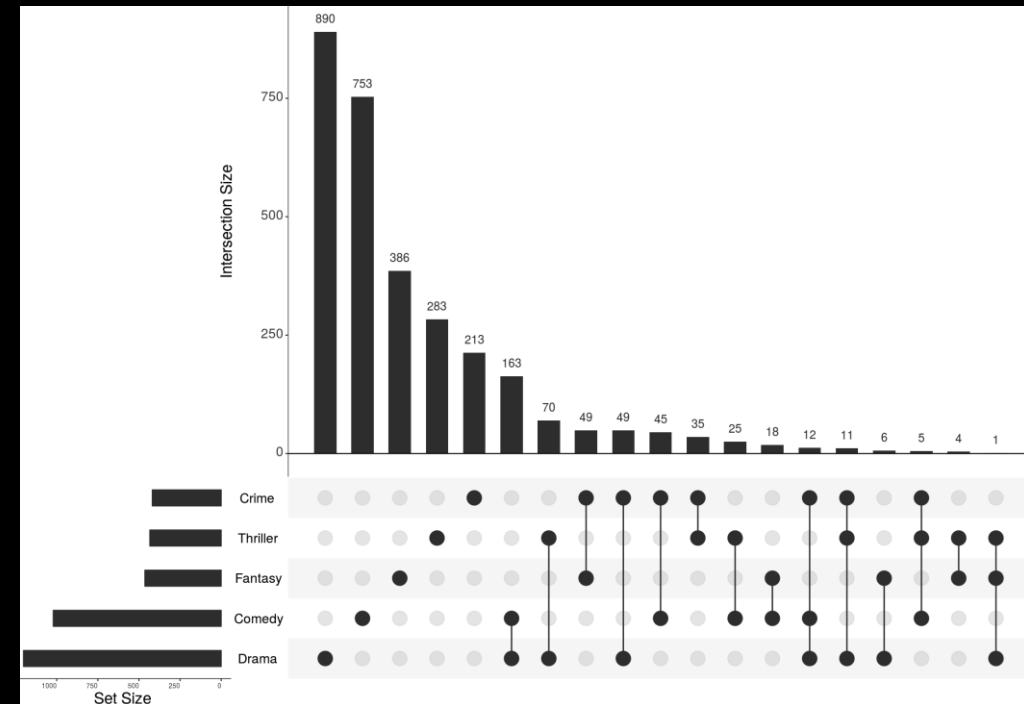
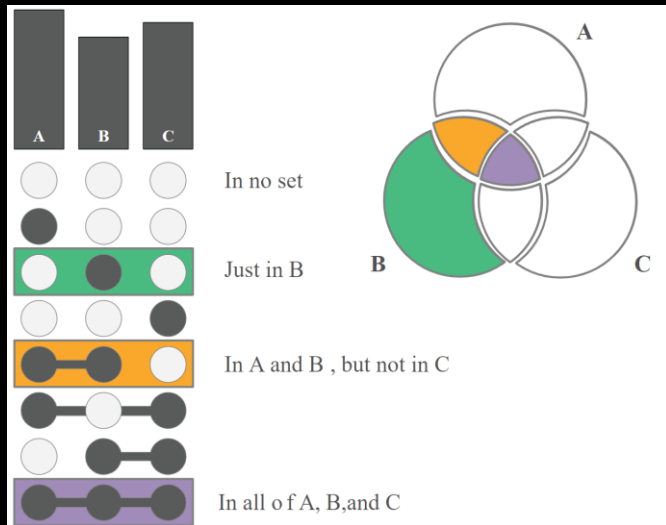
Term	Count	Length	Trend
chapter 57 of whales in paint in teeth in wood in sheet iron in stone in mountains in stars	2	19	
chapter 56 of the less erroneous pictures of whales and the true pictures of whaling scenes	2	16	
chapter 73 stubb and flask kill a right whale and then have a talk over him	2	16	
such a funny sporty gamy jesty joky hoky posy lad is the ocean oh	3	14	
chapter 120 the deck towards the end of the first night watch	2	12	
i look you look he looks we look ye look they look	3	12	
but be all this as it may certain it is that	2	11	
it is a mild mild wind and a mild looking sky	2	11	
chapter 105 does the whale's magnitude diminish will he perish	2	10	
appeared in this book that the children of the whale	1	10	
- Line Graph:** A line graph showing the relative frequency of the terms "whale", "sea", "old", "man", and "like" across document segments. The x-axis represents document segments (1-10) and the y-axis represents relative frequency (0.0000 to 0.0009). The "whale" series (blue) shows the highest frequency, peaking at approximately 0.0008 at segment 5.
- Table of Contents:** A list of chapters and sections, including "MOBY-DICK; or, THE WHALE. By Herman Melville CO...", "CONTENTS", "ETYMOLOGY", "EXTRACTS (Supplied by a Sub-Sub-Librarian)", and "CHAPTER 1. Loomings" through "CHAPTER 12. Biographical".

Sets: UpSet

<https://upset.app>



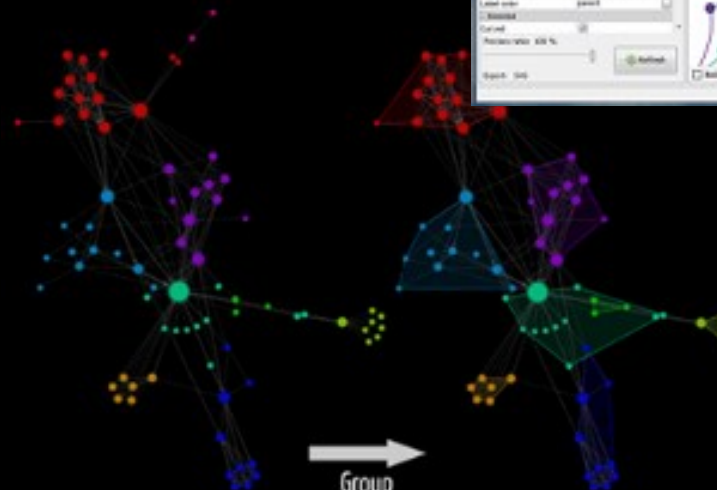
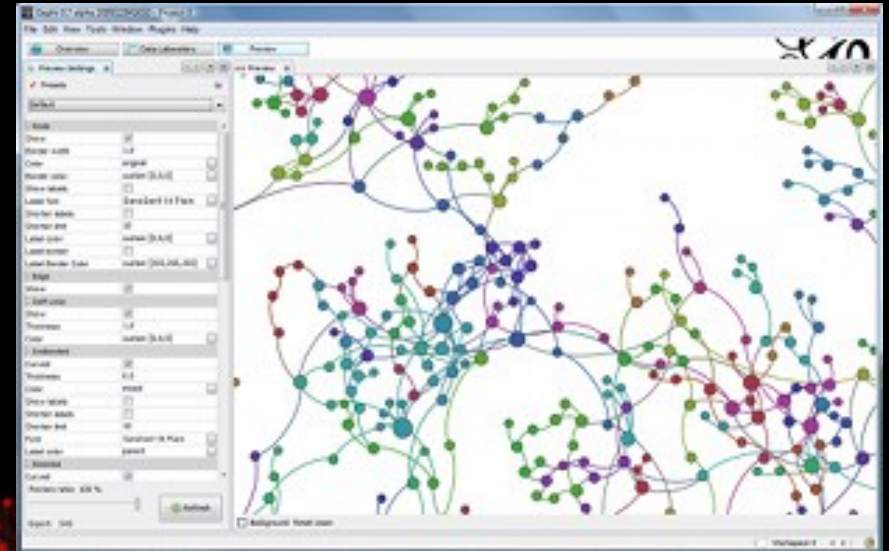
- Alternative to Venn diagram when you have 4-30 sets.
 - With fewer than 4, use a Venn diagram (e.g., <https://bioinfogp.cnb.csic.es/tools/venny/index.html>).
- Many implementations
 - Web tool, R library, javascript library, etc



Graphs/Networks: Gephi

<http://gephi.github.io>

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

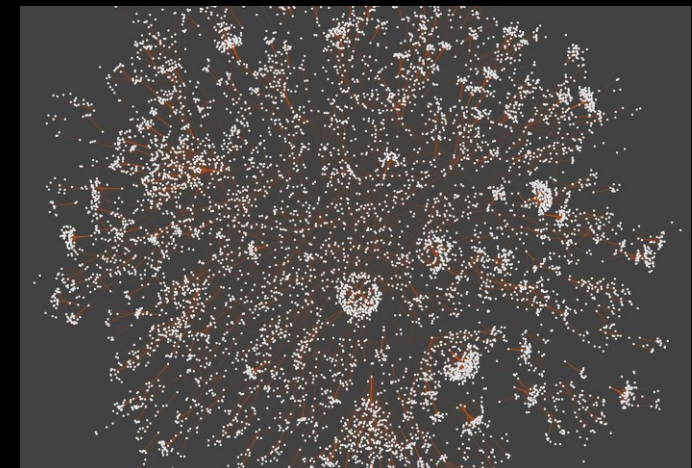
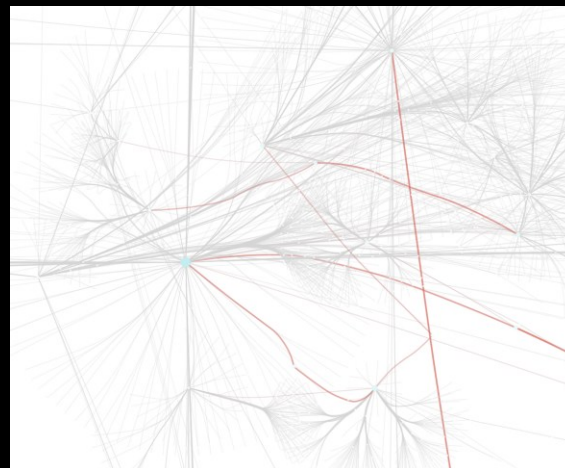
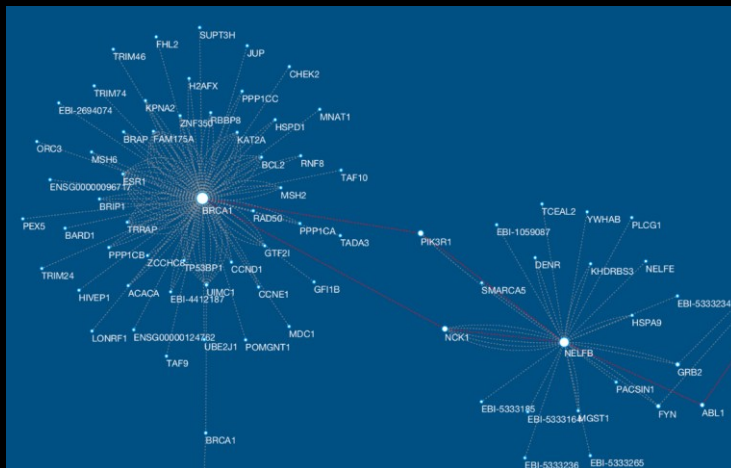


Graphs/Networks: Cytoscape

<https://cytoscape.org/>



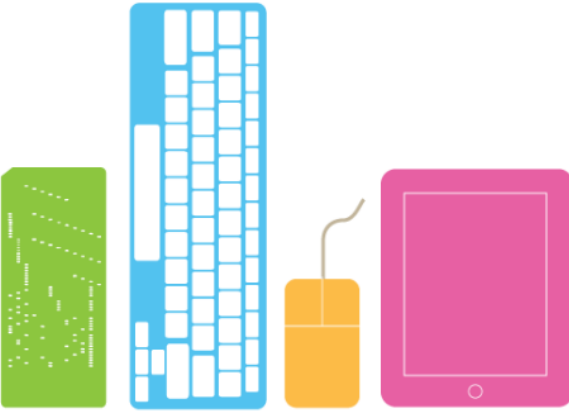
- Windows/Linux/OS X
- Created for bioinformatics
- Use cytoscape.js to bring your cytoscape projects to the web
- Apps (plugins) provide extra features



Time: Timeline JS

<http://timeline.knightlab.com>

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



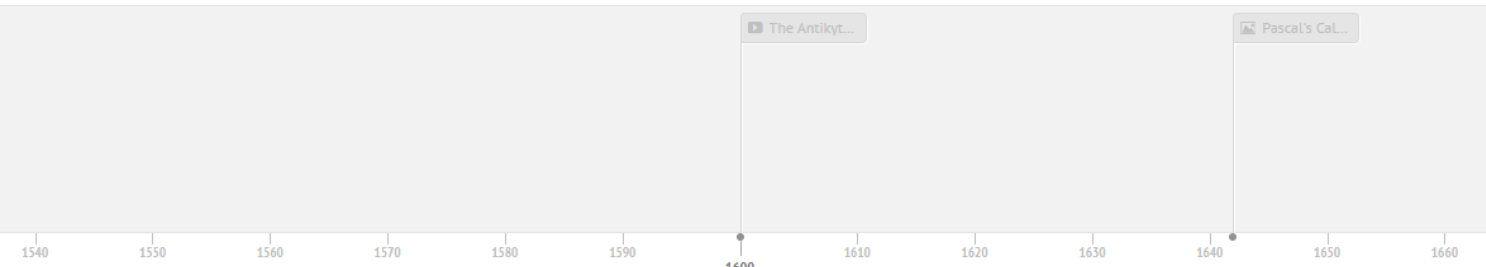
The graphic illustrates the evolution of user interfaces through four stages: 1. A green vertical strip representing punch cards. 2. A blue keyboard. 3. An orange mouse with a cord. 4. A pink tablet device. The items are arranged in a slightly ascending line from left to right.

REVOLUTIONARY USER INTERFACES

The human computer interface helps to define computing at any one time. As computers have become more mainstream the interfaces have become more intimate. This is the journey of computer technology and how it has come to touch all of our lives.

Arjuna Soriano

From punch cards to multi touch.



The timeline axis at the bottom shows a horizontal scale from 1540 to 1660. Two event markers are visible: 'The Antiky...' at approximately 1600 and 'Pascal's CaL...' at approximately 1642.

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/>

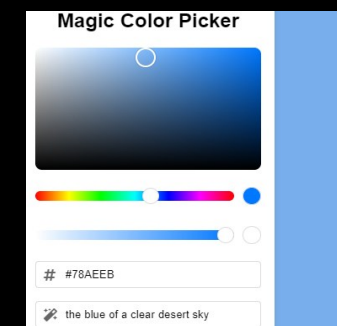
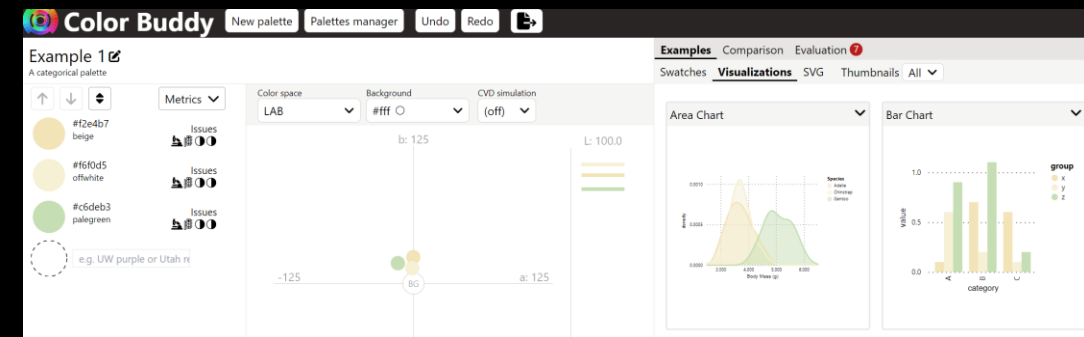
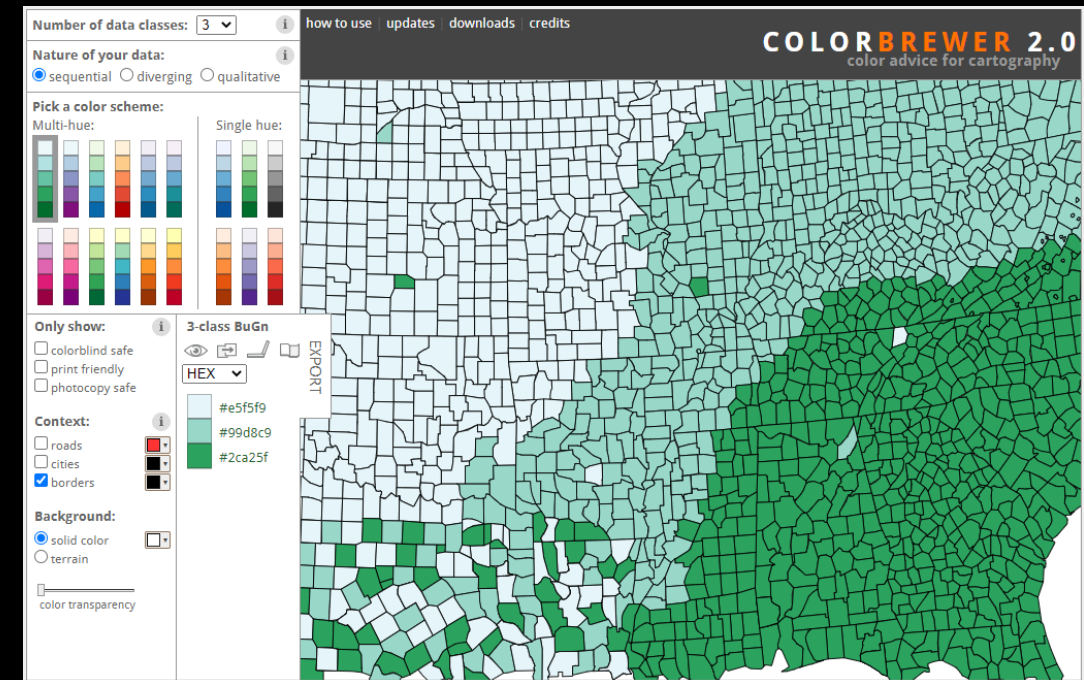
- More options, shows several different types of visualization

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

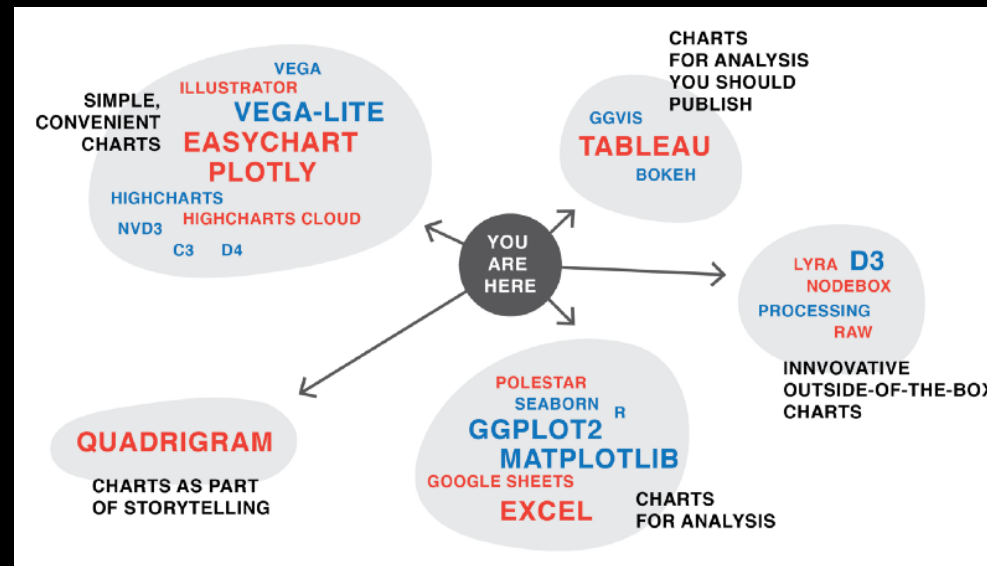
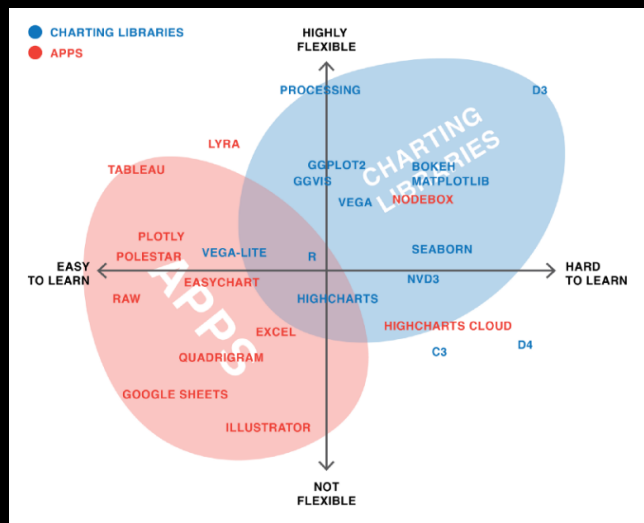
Visualizing Data - <https://www.visualisingdata.com/resources/>
120+ visualization tools

Sage Research Methods – Visualization Tools

[https://methods-sagepub-com.ezproxy.lib.ucalgary.ca/Search/Results?products=\[24\]&contentTypes=Tools%20Directory](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!

JDLBROSZ@UCALGARY.CA

By John Brosz, PhD
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