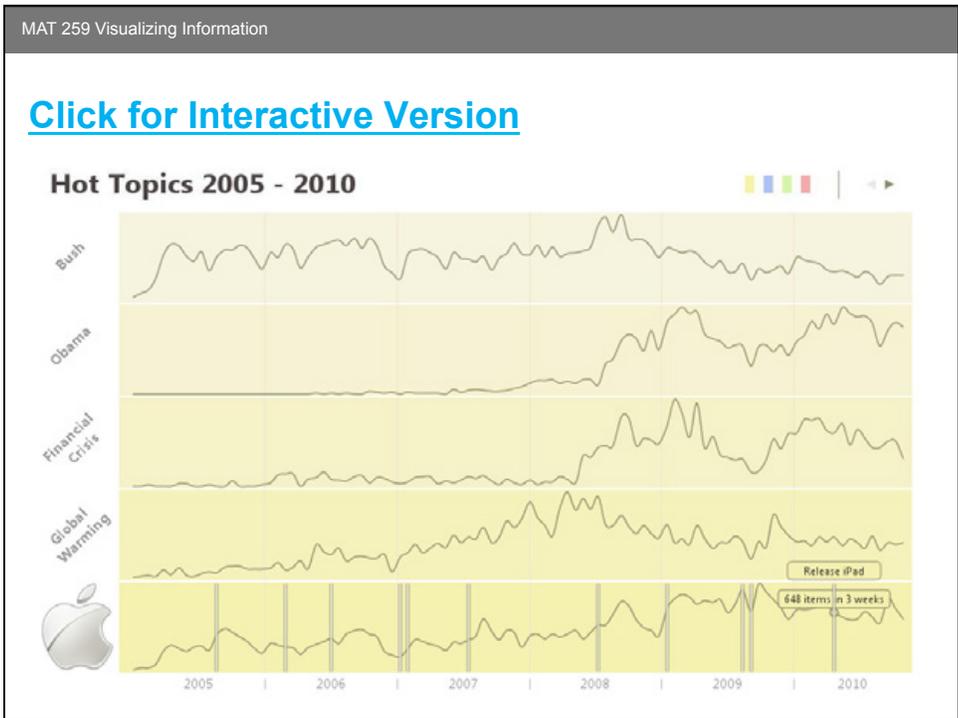
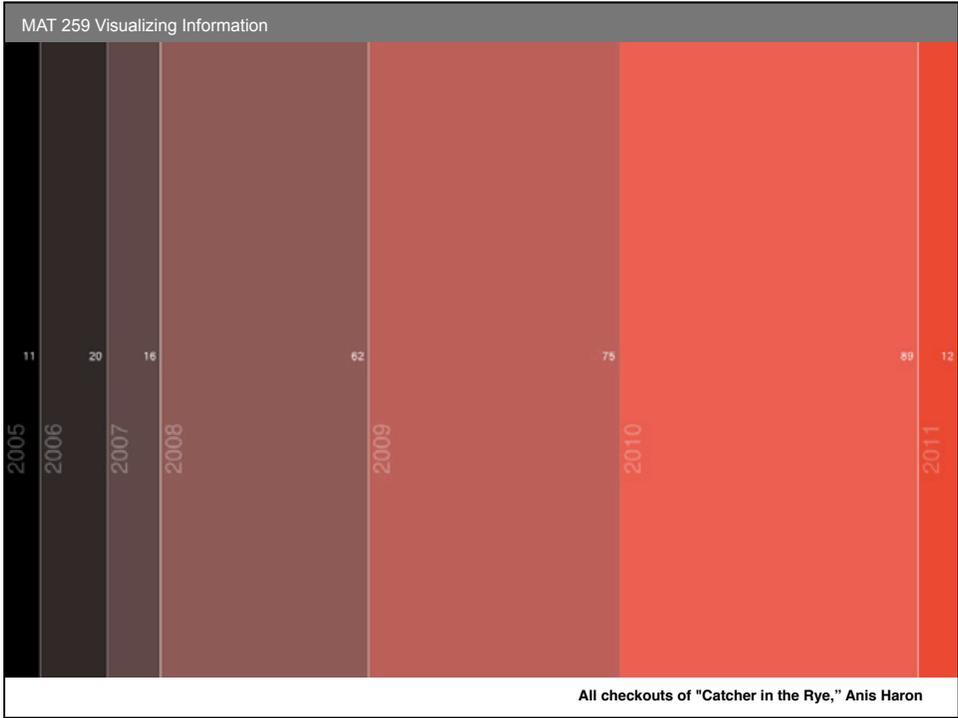
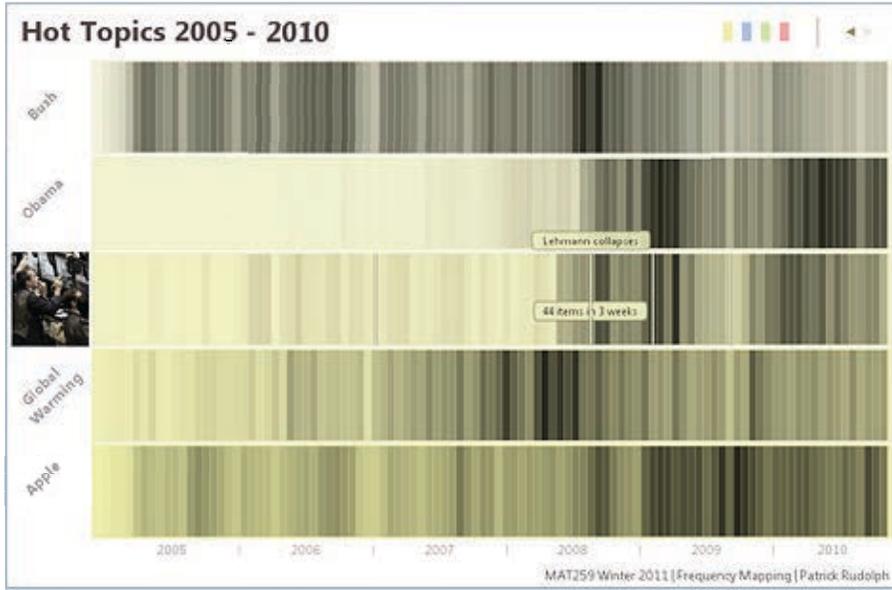


Organization of 2D Space

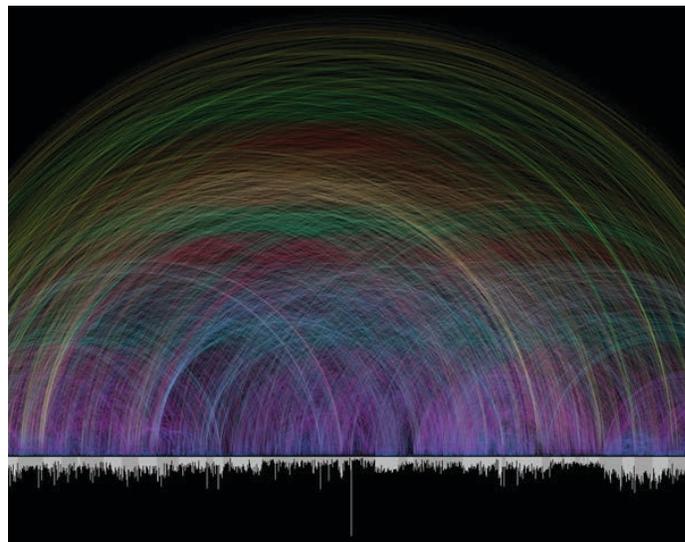
Linear Frequency is Mapped in 2D Space

- Linear frequency time series, bar charts, histograms, etc. feature 2 possible more sets of information
- Most data have multi-dimensional and multi-variate metadata that can be effectively charted
- Linear frequency may not fully describe multivariate data but...

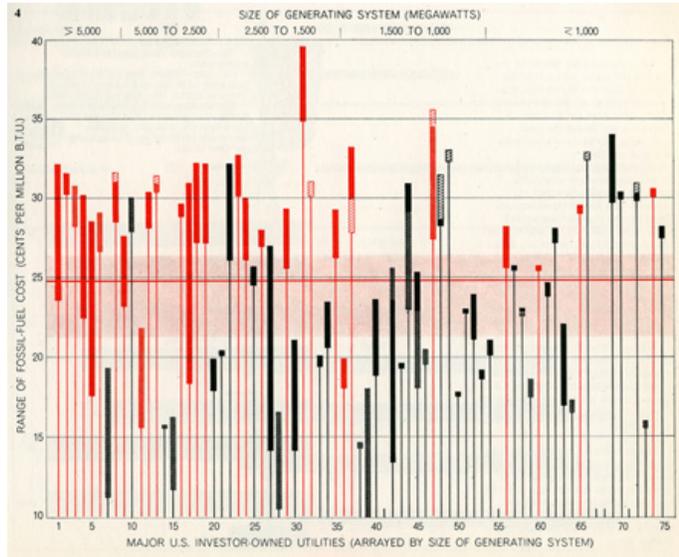




Arc Diagram: [Bible Studies](#)

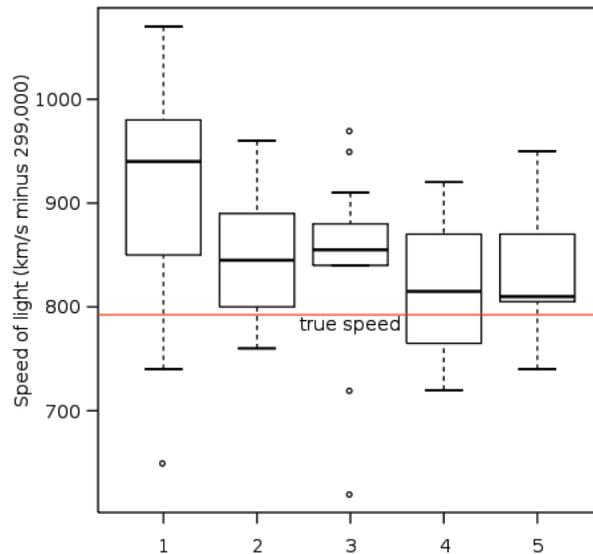


Histogram-like map with boxplot



Boxplot: Five Number Summary

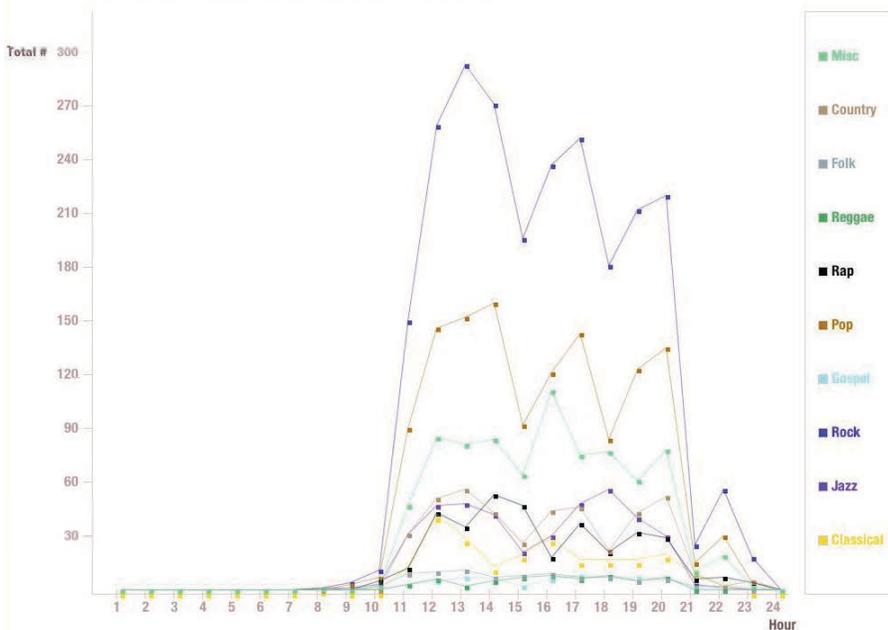
- Outliers
- Spread with
 - Upper quartile
 - Median
 - Lower quartile



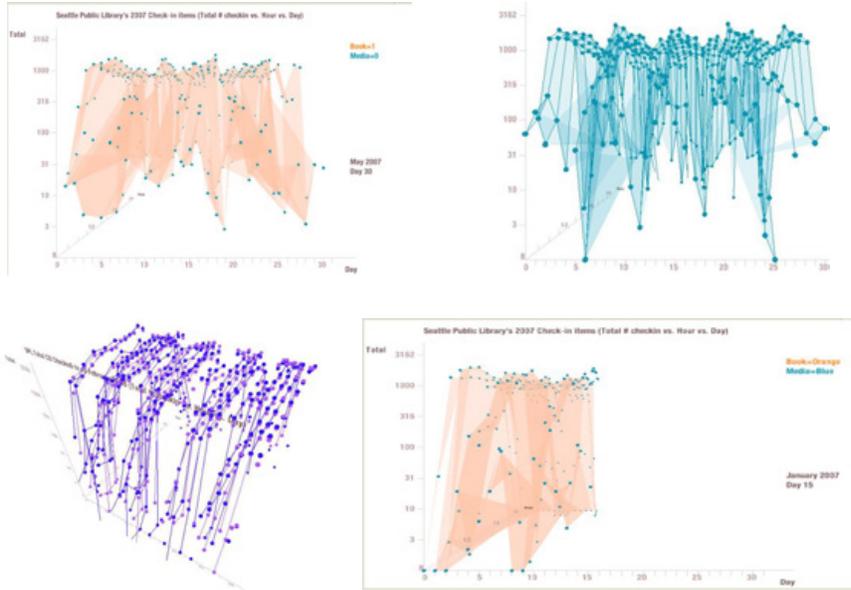
SPL has Multi-dimensional Data

ItemNumber: 1531202 // Unique to each specific item
 BibNumber: 2180049 // Unique to each bib record
 Ckodate: 2005-04-20
 Ckotime: 16:55:00
 Ckideate: 2005-05-06
 Ckitime: 18:21:00
 Collcode: nanf // where its located, what it is, etc.
 Itemtype: acbk
 Barcode: 0010045801205 // Like ItemNumber
 Title: *Untangling my chopsticks, a culinary sojourn in Kyoto*
 CallNumber: 641.5952 R358U 2003
 DeweyClass: 641.5952
 Keywords: Cookery Japanese, Japanese tea ceremony, Kyoto Japan Social life and customs, Food habits Japan Kyoto

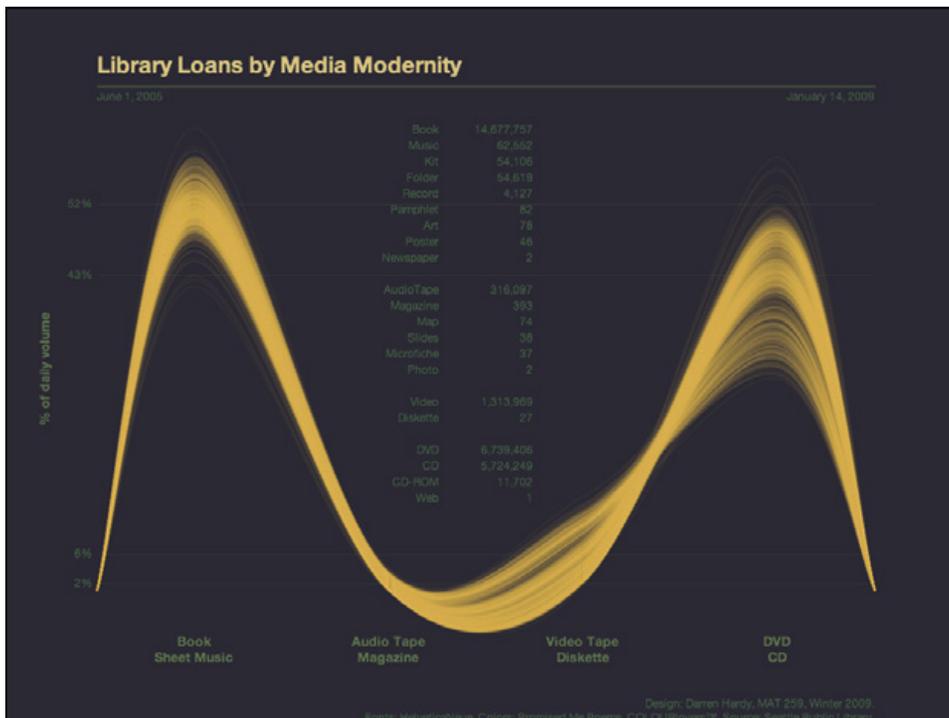
SPL Total CD Checkin on January 16 2008 (Total # checkin vs. Hour)



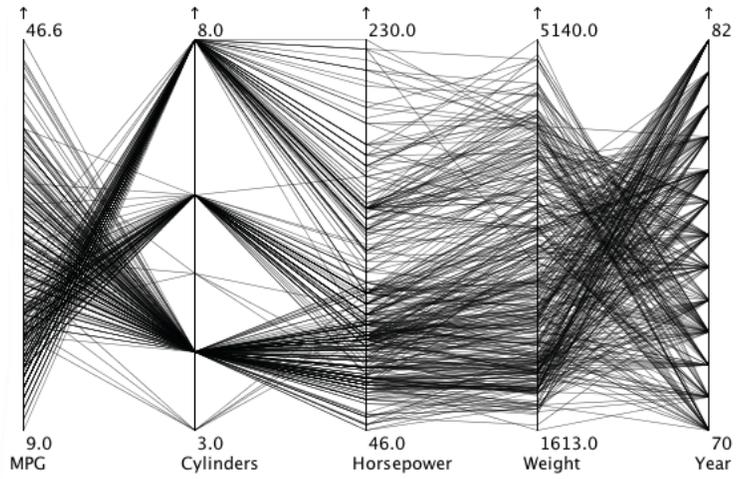
MAT 259 Visualizing Information



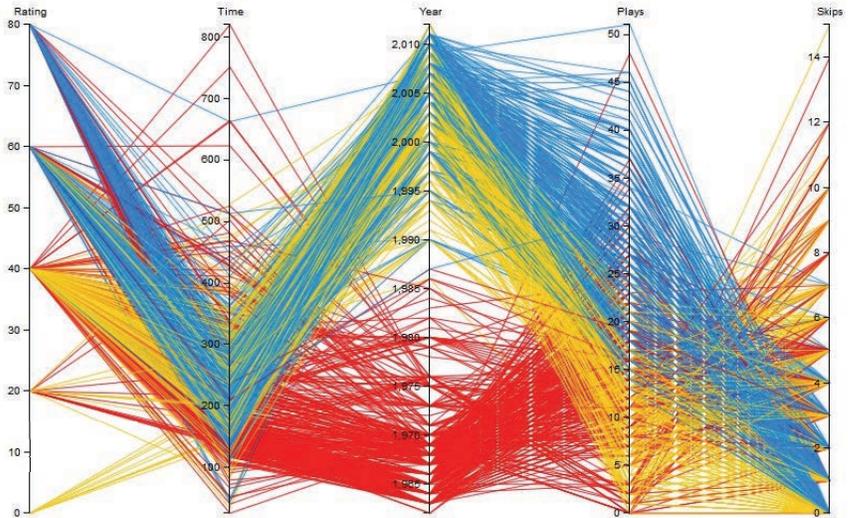
Analysis of check-out items in 2007, Yung-Ting Chuang



Parallel Coordinates: Multi-dimensional Data



Parallel Coordinates: Multi-dimensional Data

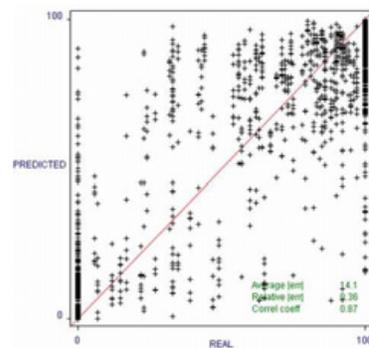
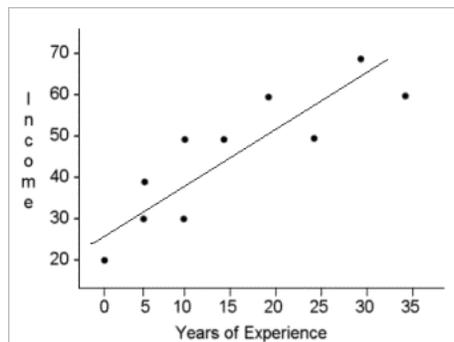


Scatter Plots

- A diagram using Cartesian coordinates to display values for two variables for a set of data
- The data is displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis
- Easy to identify outliers

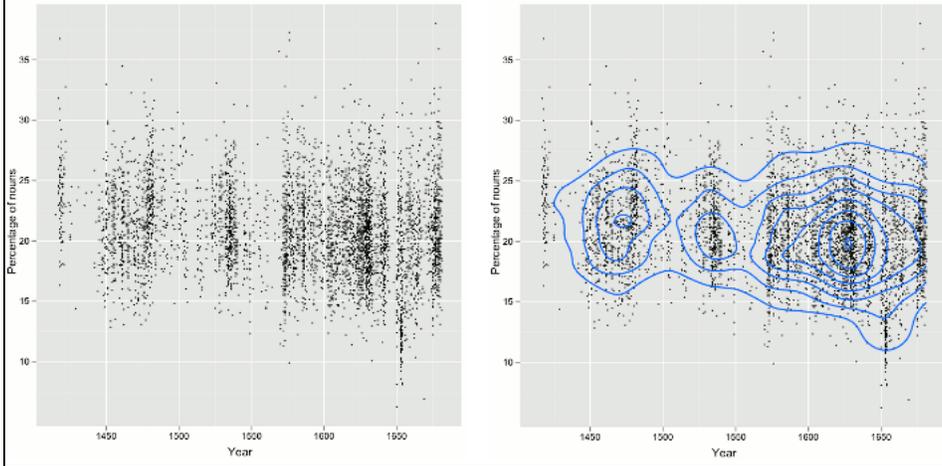
Scatterplot: Summary of a set of bivariate data

- Potential association between two variables



Scatterplot: Summary of a set of bivariate data

- Clustering to show change over time



Combine Scatterplot with 2D matrix

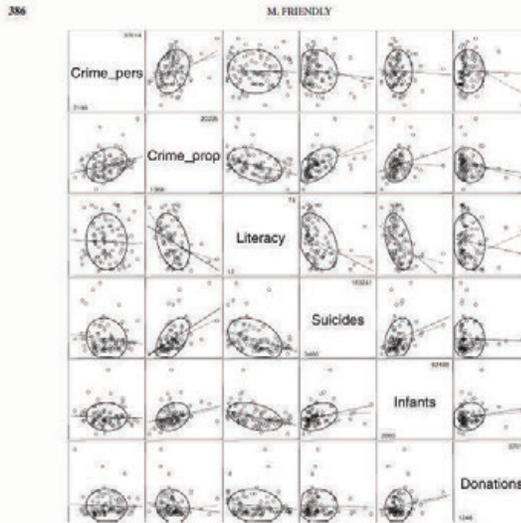


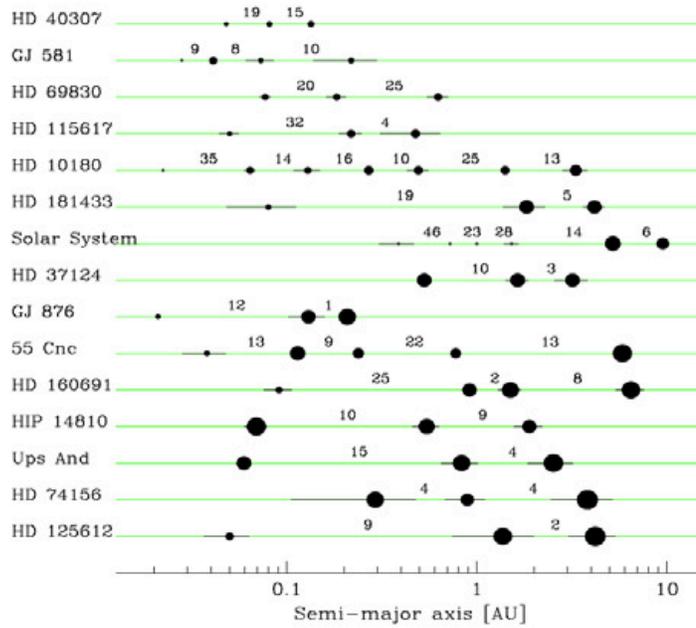
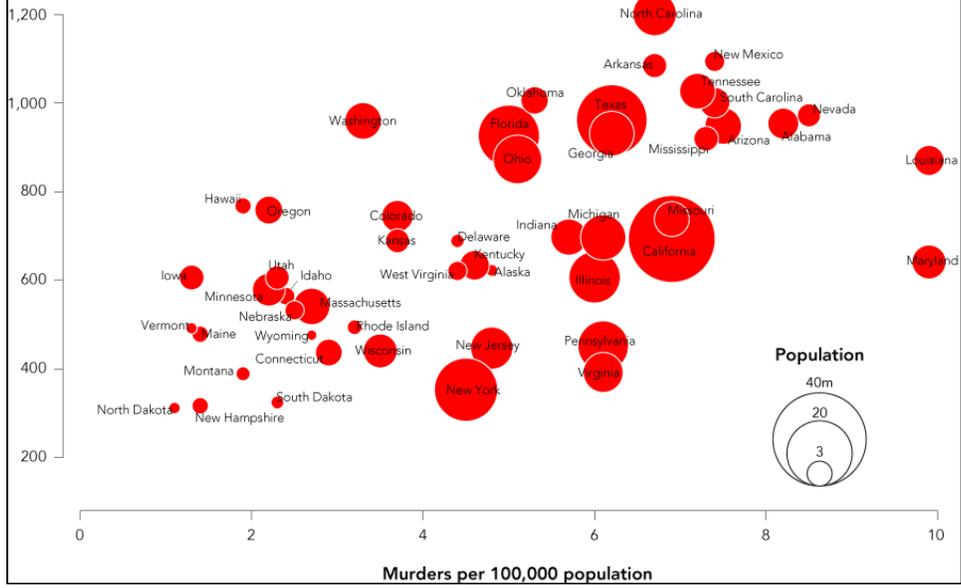
FIG. 13. Enhanced scatterplot matrix for crimes against persons, crimes against property, literacy, suicides, children born out of wedlock (enfants naturels) and donations to the poor. Each panel plots the row variable on the vertical against the column variable on the horizontal.

2S Spatial Maps

NY Times [Sector Snapshot](#)

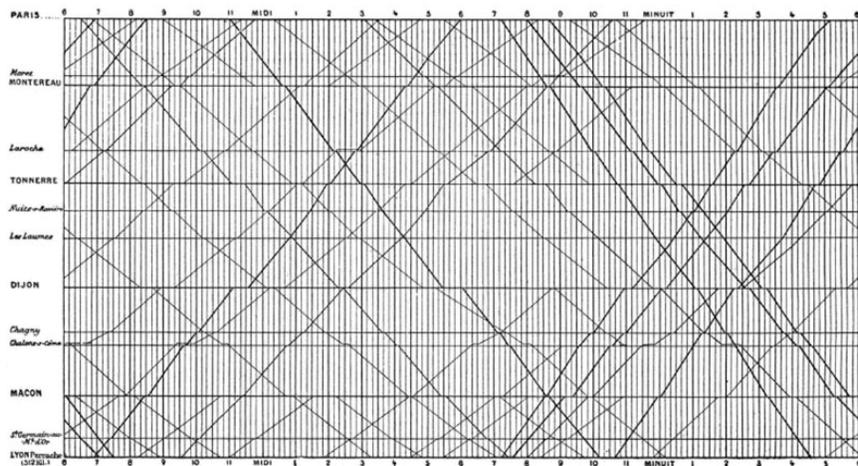


Burglaries per 100,000 population

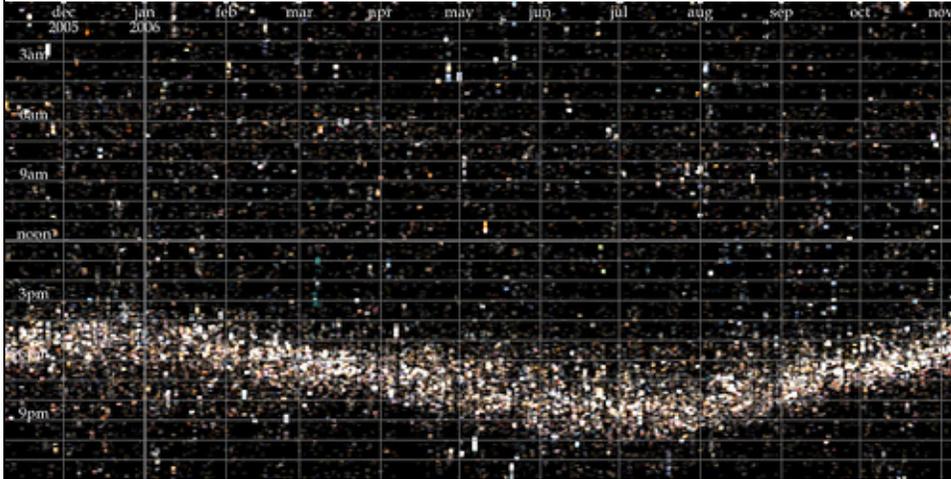


2S Spatial Maps

E.J. Marey Bivariate Data Train Schedule (1880s)



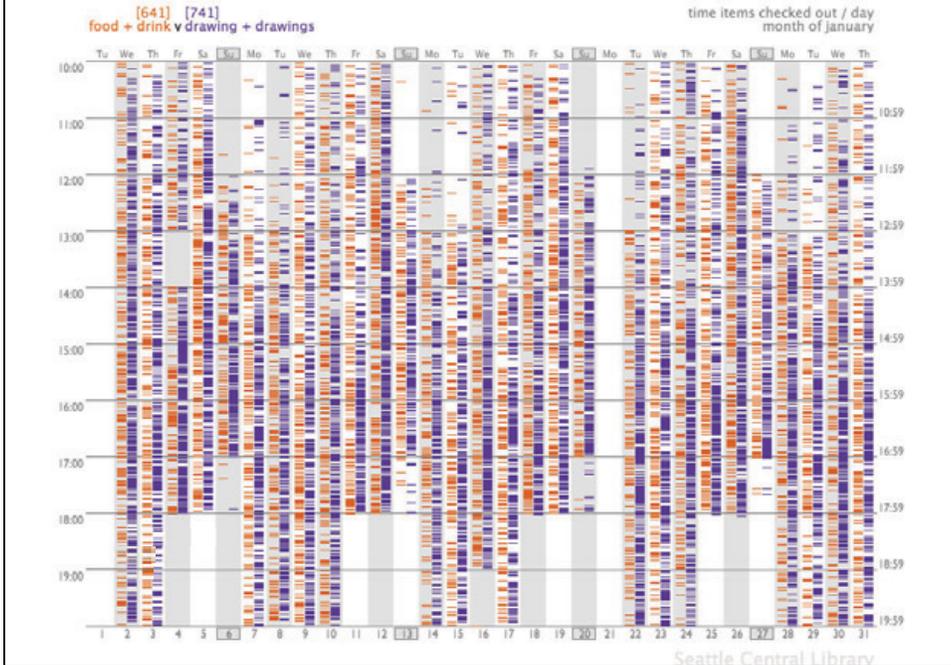
Time Graphs



George Legrady

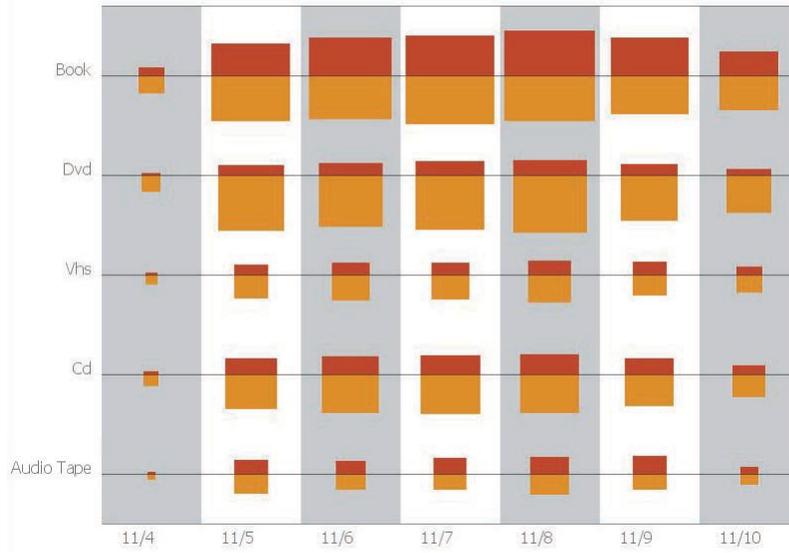
Winter 2006

25



MAT 259 Visualizing Information

Longer than average vs Shorter than average
Seattle Public Library

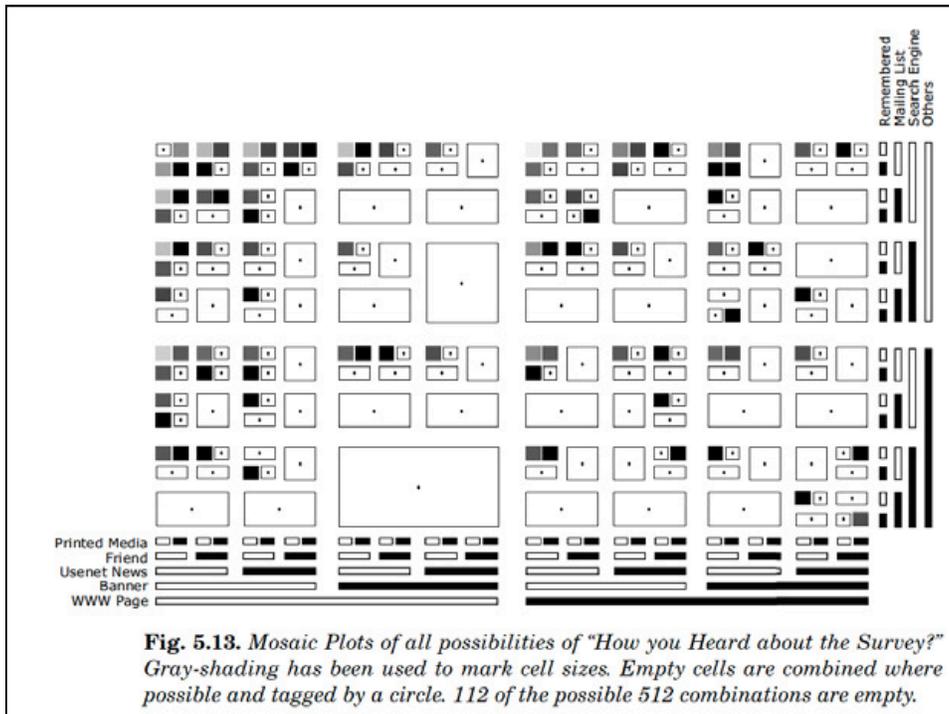


MAT 259 Visualizing Information

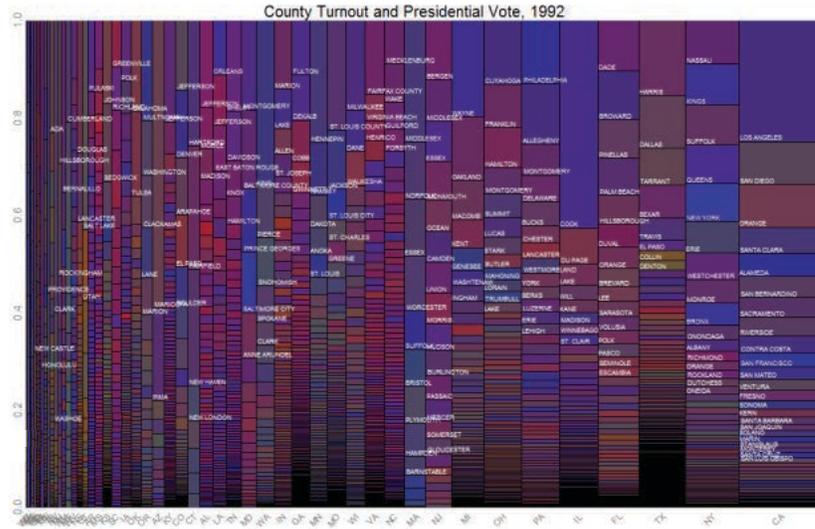


Mosaic Plots

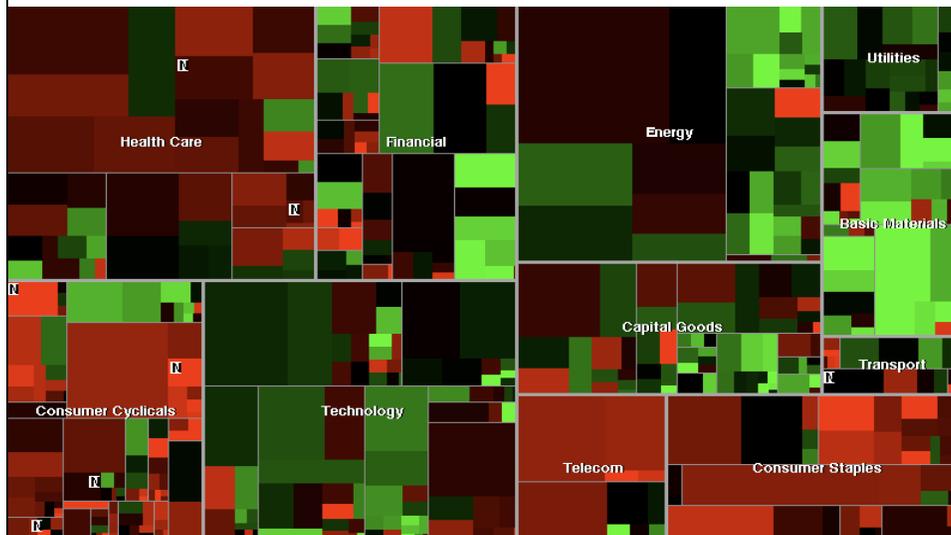
- A Graphical Display that visualizes the relationship among two or more categorical variables
- Categorical: No intrinsic ordering (Itemtypes)
- Ordinal: Clear ordering: CollCode
- Interval: Ordinal variable equally spaced (Dewey)



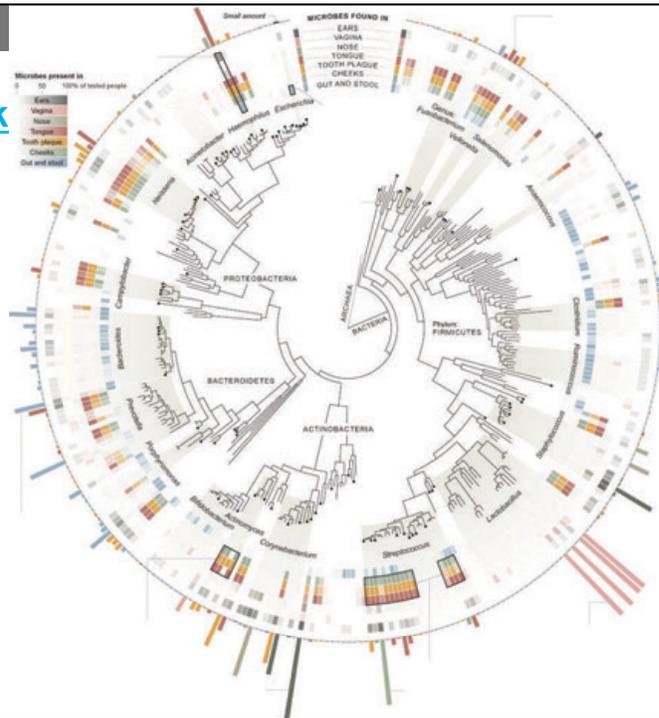
Dimensional Mosaic Plot: Spatially conveys 4 variables: xpos,ypos, height, width



TreeMap: SmartMoney (Schneiderman/Wattenberg)

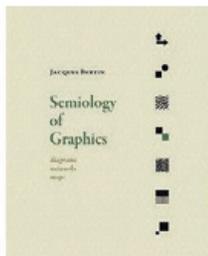


Visual Network



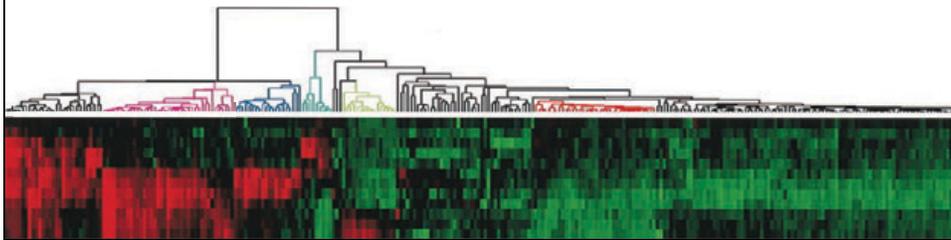
Bertin: Semiology of Graphics

- Cartographer: published 1967
- Theoretical foundation for Information Visualization
- **Information Visualization:** The visualization of abstract data
- **Semiology:** the study of signs and how they convey meaning
 - What are the basic units by which meaning is created in a visual system?

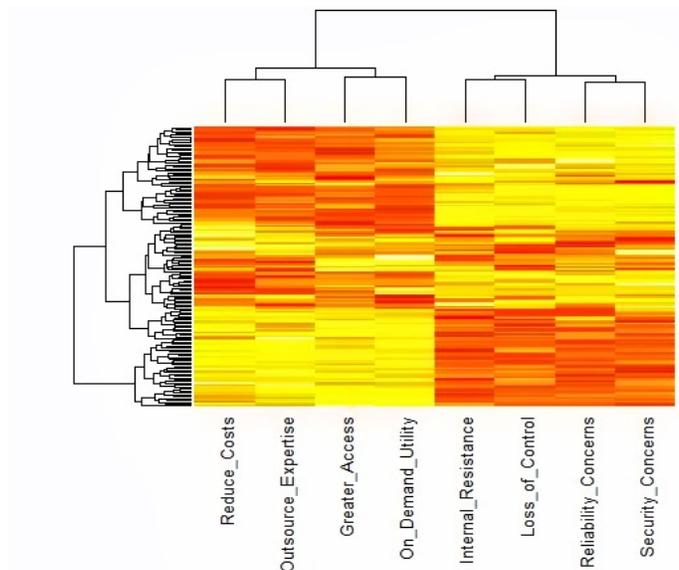


Bertin: Reorderable Matrix

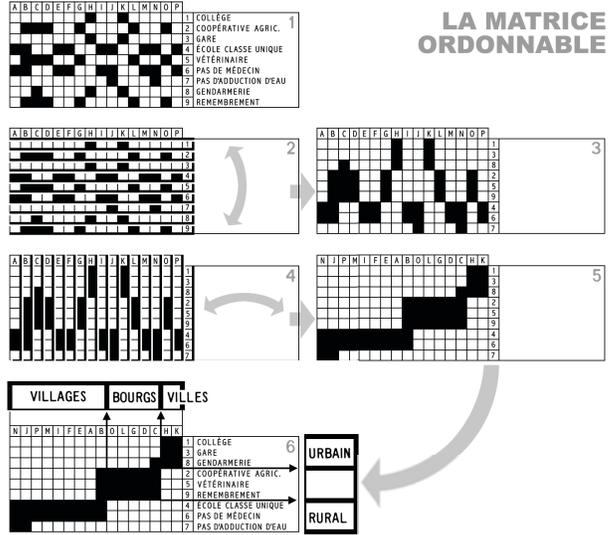
- Data are often presented in a table or chart whose rows and columns are intrinsically unordered, but which are arranged in an order which *conceals* patterns, rather than *reveal* them.
- Bio-informatics use re-ordering to make patterns more visible



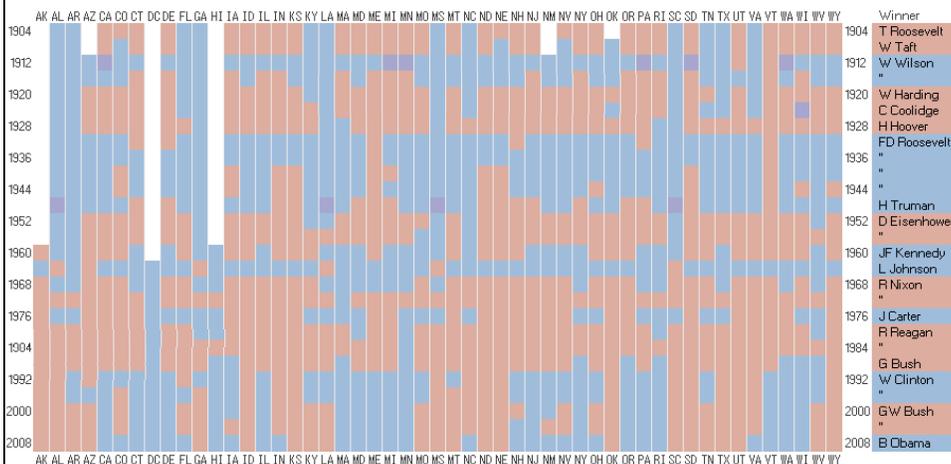
Labeling Issues



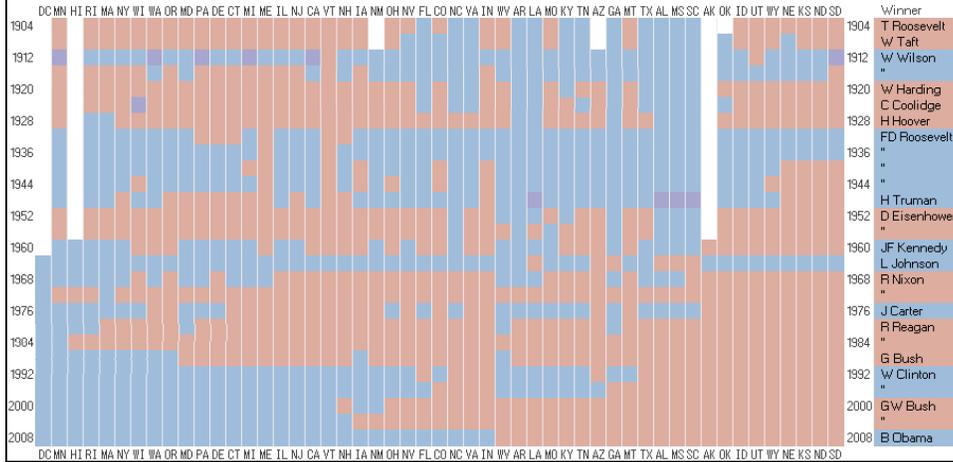
Bertin: Reorderable Matrix



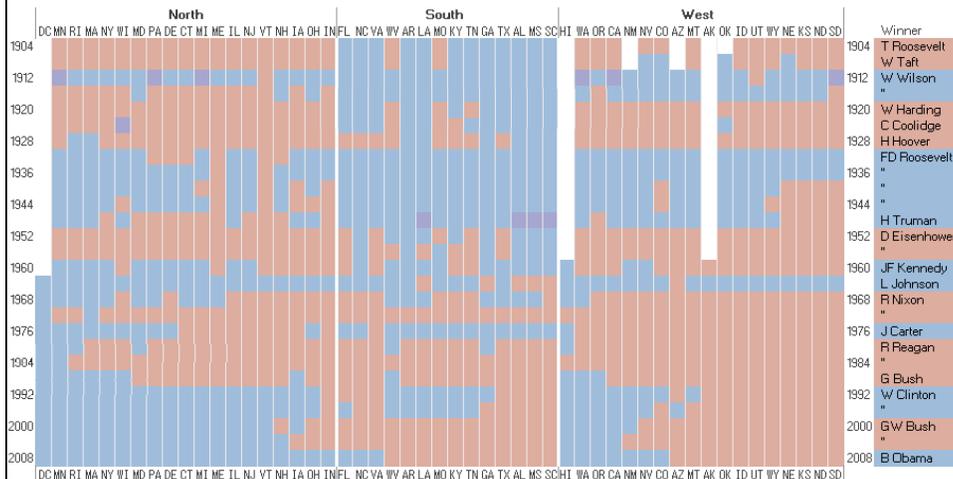
US Political History: Alphabetical



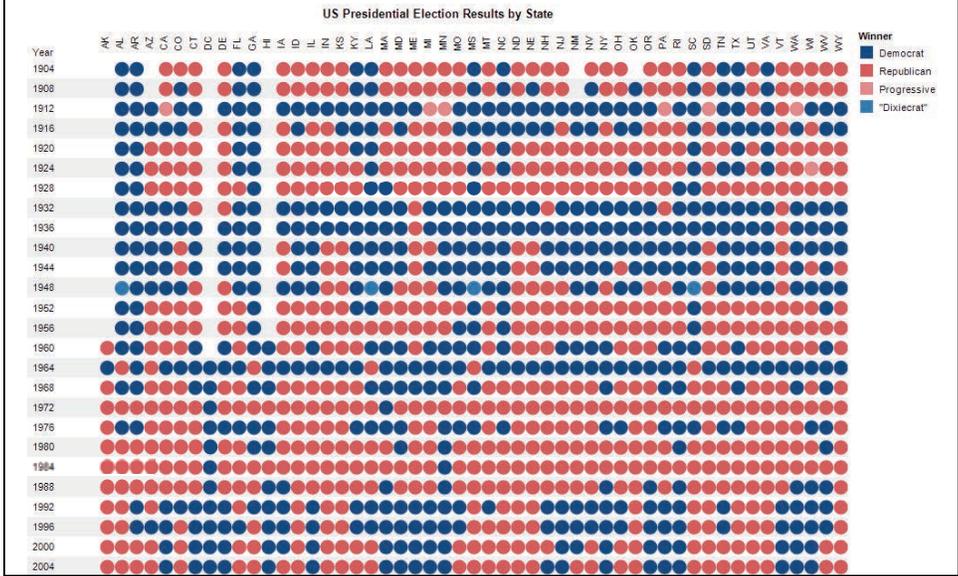
US Political History: Most recent results



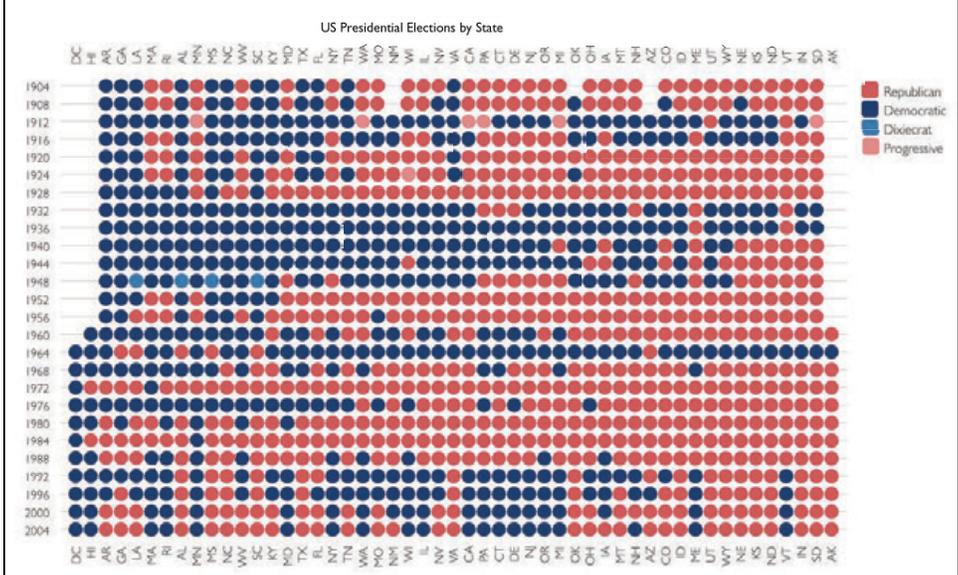
US Political History: 3 regions



Kosara: US Political History



Bertin: Reorderable Matrix



US Political History

