

INFM 603: Information Technology and Organizational Context

Session 9: Visualization



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University of Maryland

Thursday, November 6, 2014

Visualization

- Why visualizations?
 - Human perceptual skills are remarkable
 - Human image storage storage is fast and vast
- What are visualizations for?
 - A good visualization tells a story
 - A great visualization delivers insight
- Science as well as an art...

Raw Ingredients

- Types of data
 - Categorical data
 - Ordinal data
 - Numerical data
- Ways of representing data
 - Height
 - Width
 - Thickness
 - Area
 - Angles
 - Size
 - Shape
 - Color



Panda Viewing
Sun - 5:30pm

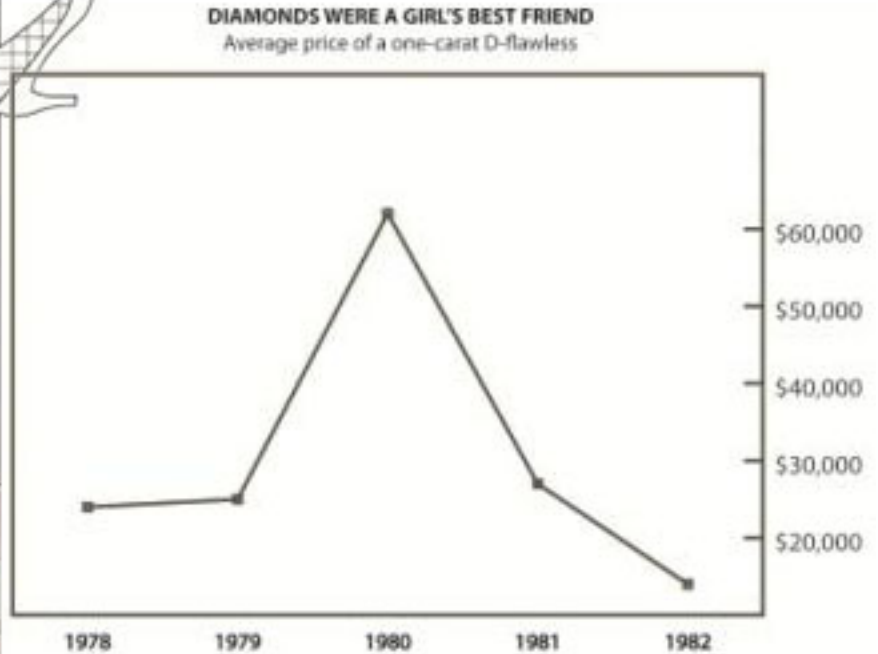
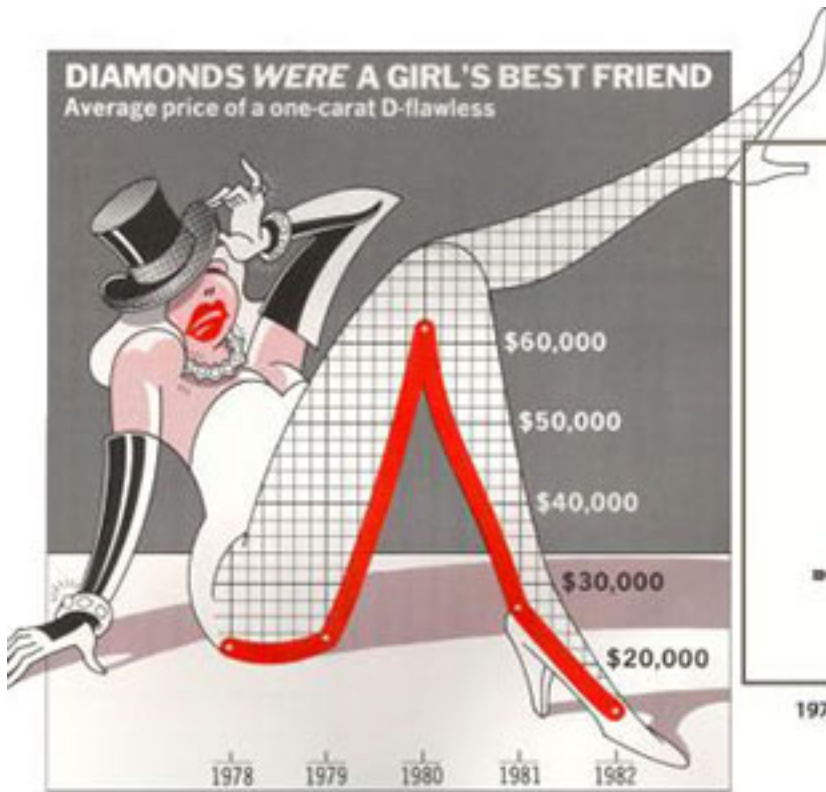


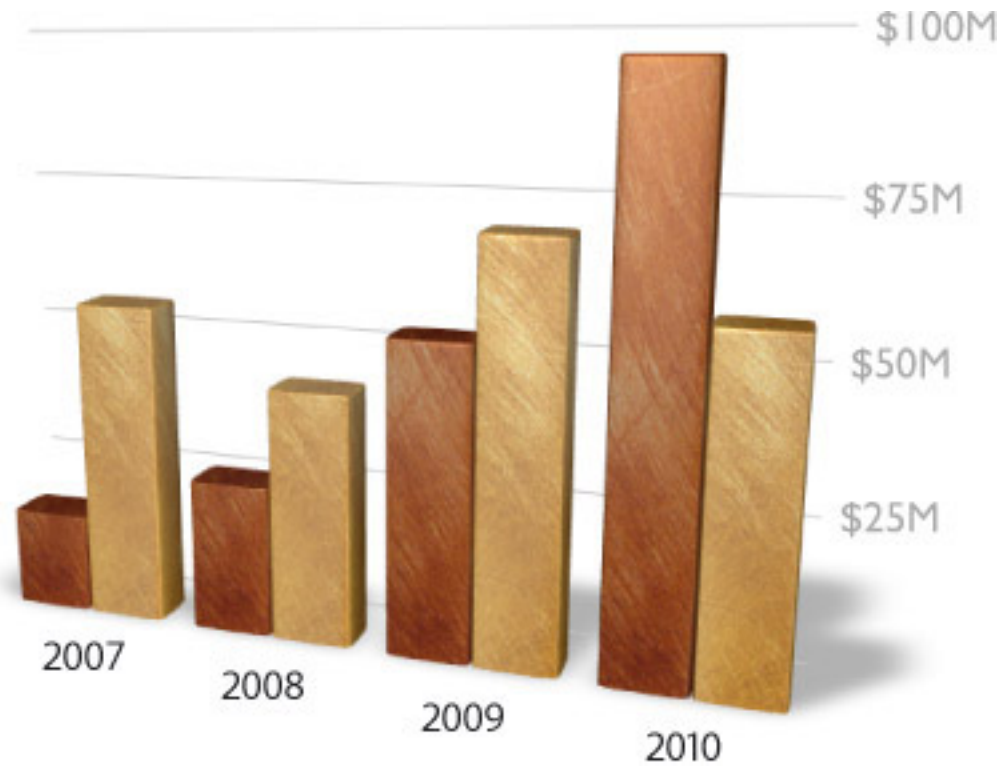
Static vs. Interactive

- Interactive visualizations allow users to “explore” the data
 - Overview
 - Zoom and filter
 - Details-on-demand
- Brushing and linking is a powerful technique

Info Porn

- Informative visualizations vs. info porn
- Beware of infographics and chart junk

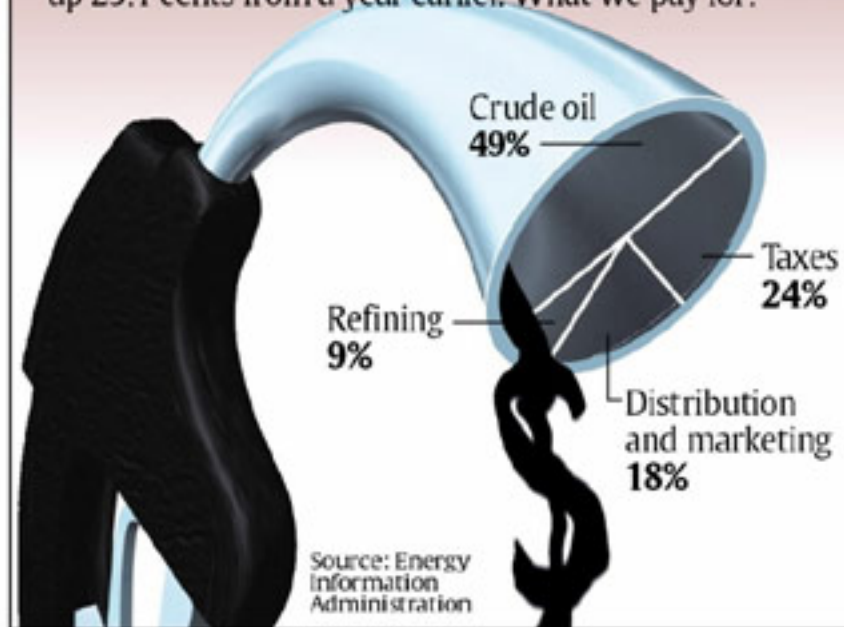




USA TODAY Snapshots®

What gas bucks buy

The average price of regular gas climbed to \$1.85 per gallon as of Jan. 24, up 3.4 cents from a week earlier and up 23.1 cents from a year earlier. What we pay for:



By Shannon Reilly and Marcy E. Mullins, USA TODAY

TRACK & FIELD: THE BEST RESULTS

Technical innovations, rule changes and the professionalization of sports brought new records in the 20th century. How much longer can athletes keep improving?

100 METERS

+19%
+11%

THE LAST RECORD WAS SET IN 1968 BY FLORENCE GRIFFITH-JOYNER

USAIN BOLT PULVERIZED RECORDS IN 2008. WILL HIS RECORD EVENTUALLY BE BEATEN?

RACE TIME
THE GRAPHIC SHOWS THE EVOLUTION OF THE 10 BEST 100M PERFORMANCES

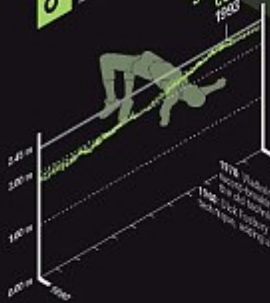


HIGH JUMP

+30%

PERFORMANCE HAS LEVELLED SINCE THE 1990s

2.45 m JAVIER SOTOMAYOR CUB 1993

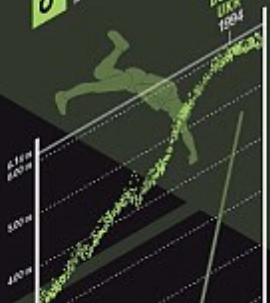


POLE VAULT

+71%

PERFORMANCES HAVE DECLINED SINCE 2000

6.14m SERGEY BUBKA UKR 1984



10.65 DONALD LIPPINCOTT USA 1912

13.69s FLORENCE GRIFFITH-JOYNER USA 1988

9.95s JIM THOMAS USA 1966

9.85s BEN JOHNSON USA 1988

9.79s MAURICE GREEN USA 1993

9.74s ASAFU POWELL JAM 2007

9.58s USAIN BOLT JAM 2008

1900-1910: The first 100m race was held in 1900. The first 100m pole vault was held in 1912.

1913-1914: Sergey Bubka set the world record.

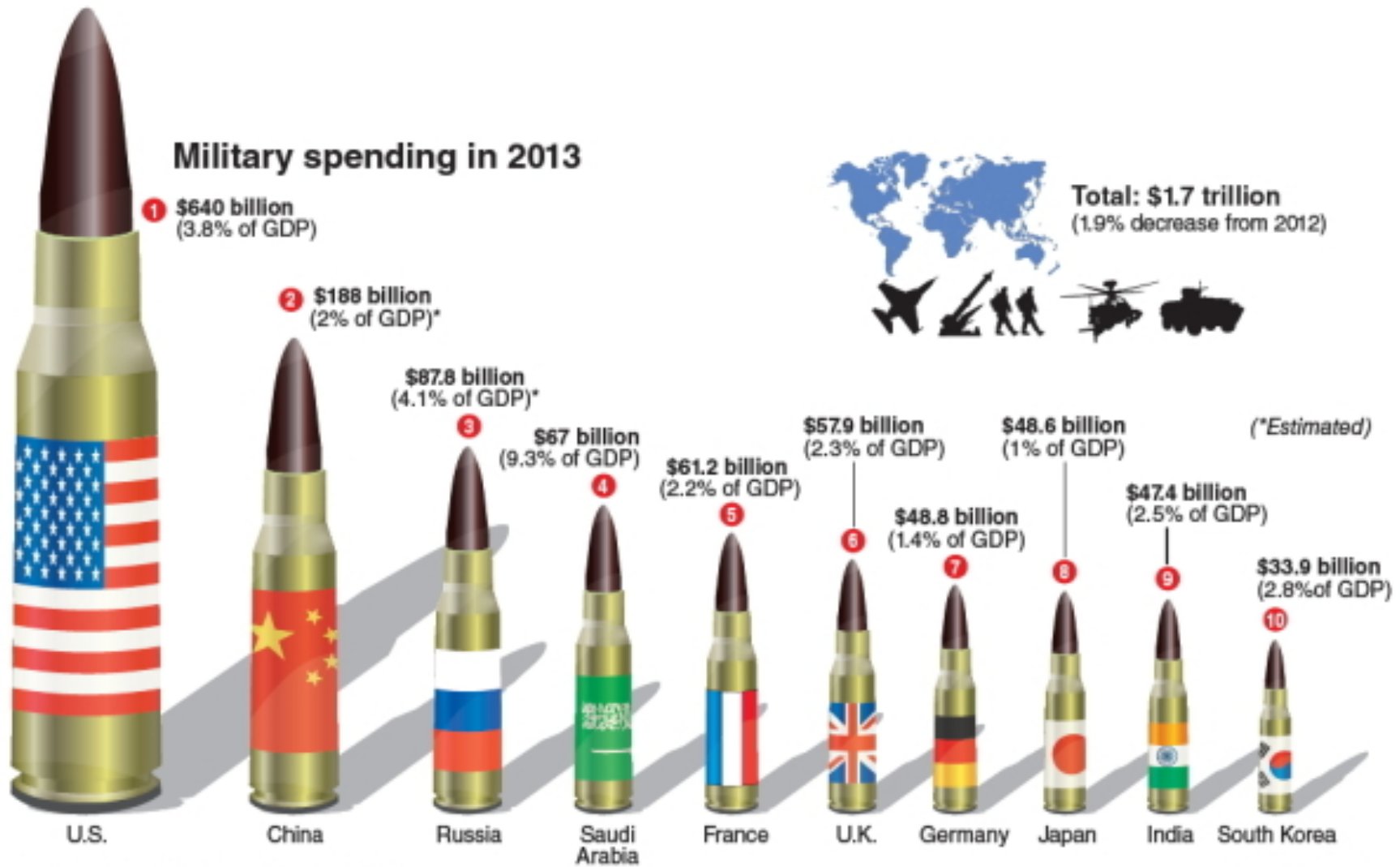
1900-1910: Full-time athletes began to emerge, and the first 100m race was held in 1900. The first 100m pole vault was held in 1912.

1900-1910: The first 100m race was held in 1900. The first 100m pole vault was held in 1912.

1900-1910: The first 100m race was held in 1900. The first 100m pole vault was held in 1912.

http://junkcharts.typepad.com/junk_charts/music/
Compare: [New York Times interactive visualization](#)

Military spending in 2013

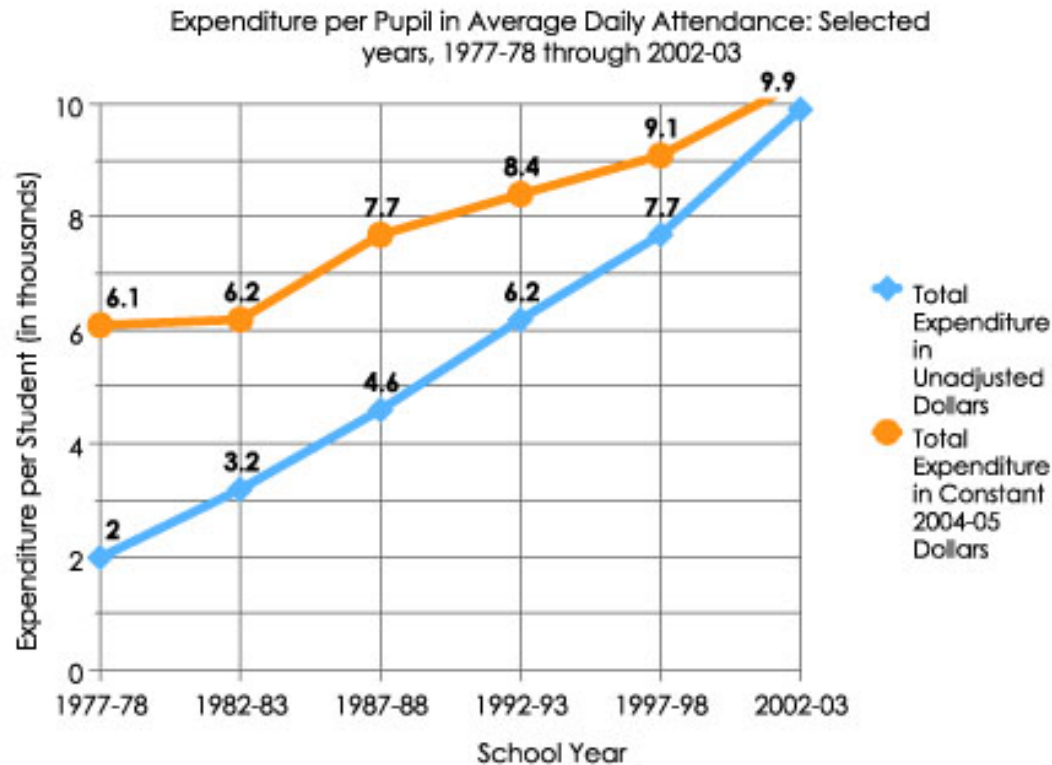


Source: Stockholm International Peace Research Institute

Graphic by Han Chang-duk

Line Graphs (+ Variants)

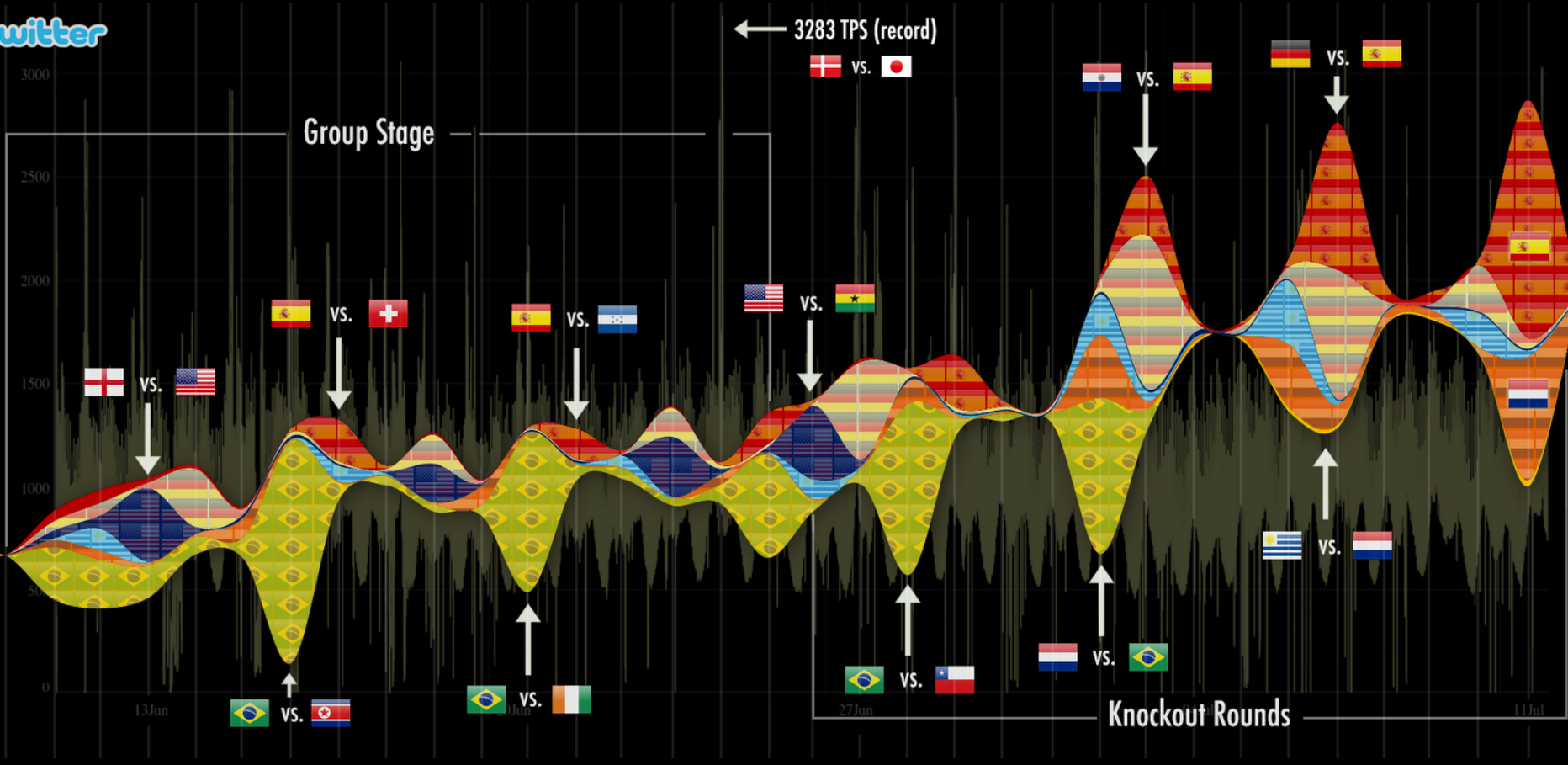
- Suitable for what types of data?
- What makes a good line graph?



The NCES Common Core of Data (CCD) 2004-2005

Stacked Graphs

- Multiple time-series data “stacked” on top of each other
 - Useful for showing aggregates
- Sometimes called “stream graphs”

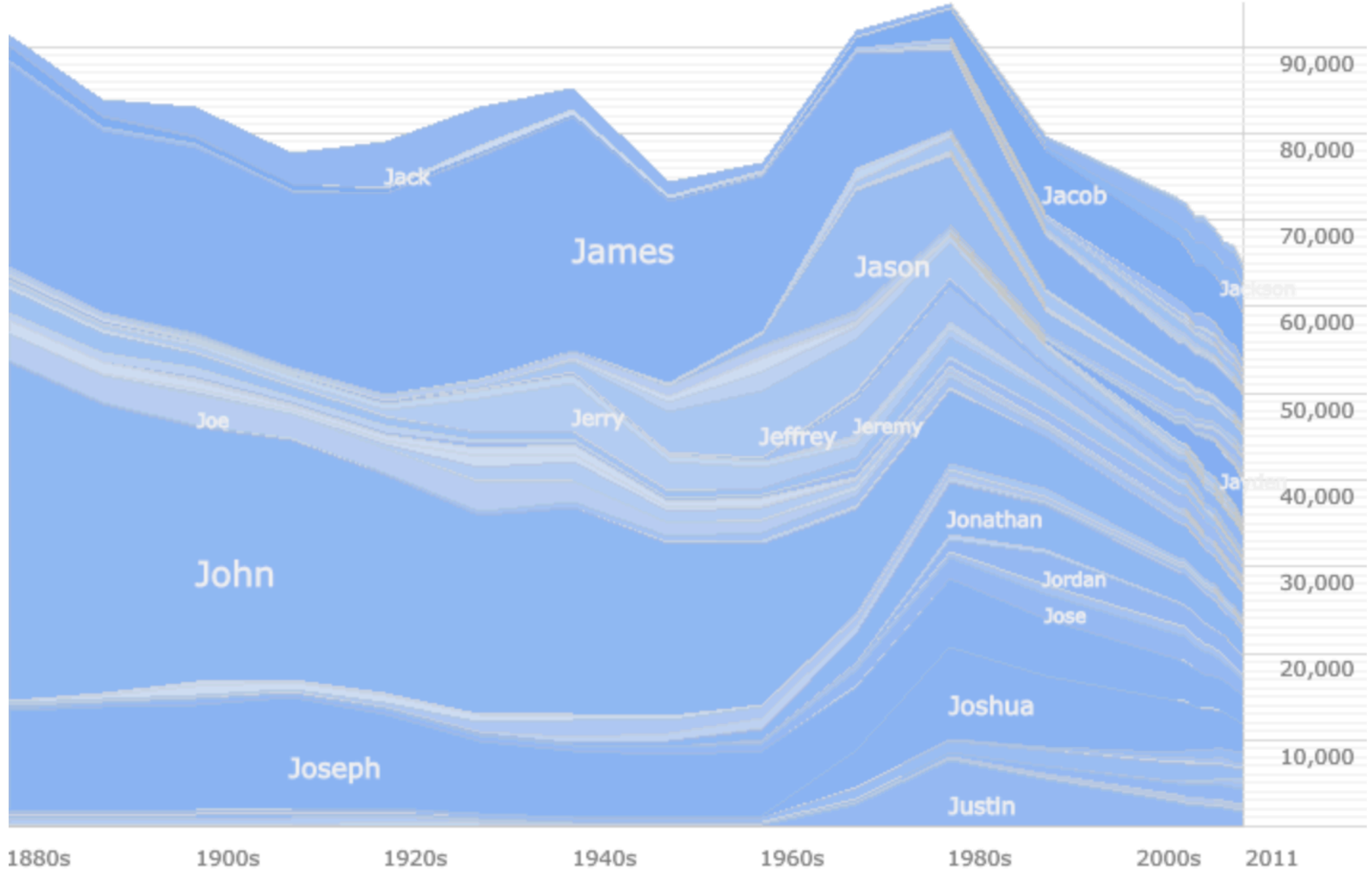


Baby Name >

Both Boys Girls

2010 rank: boys	1000	500	100	25	1
girls	1000	500	100	25	1

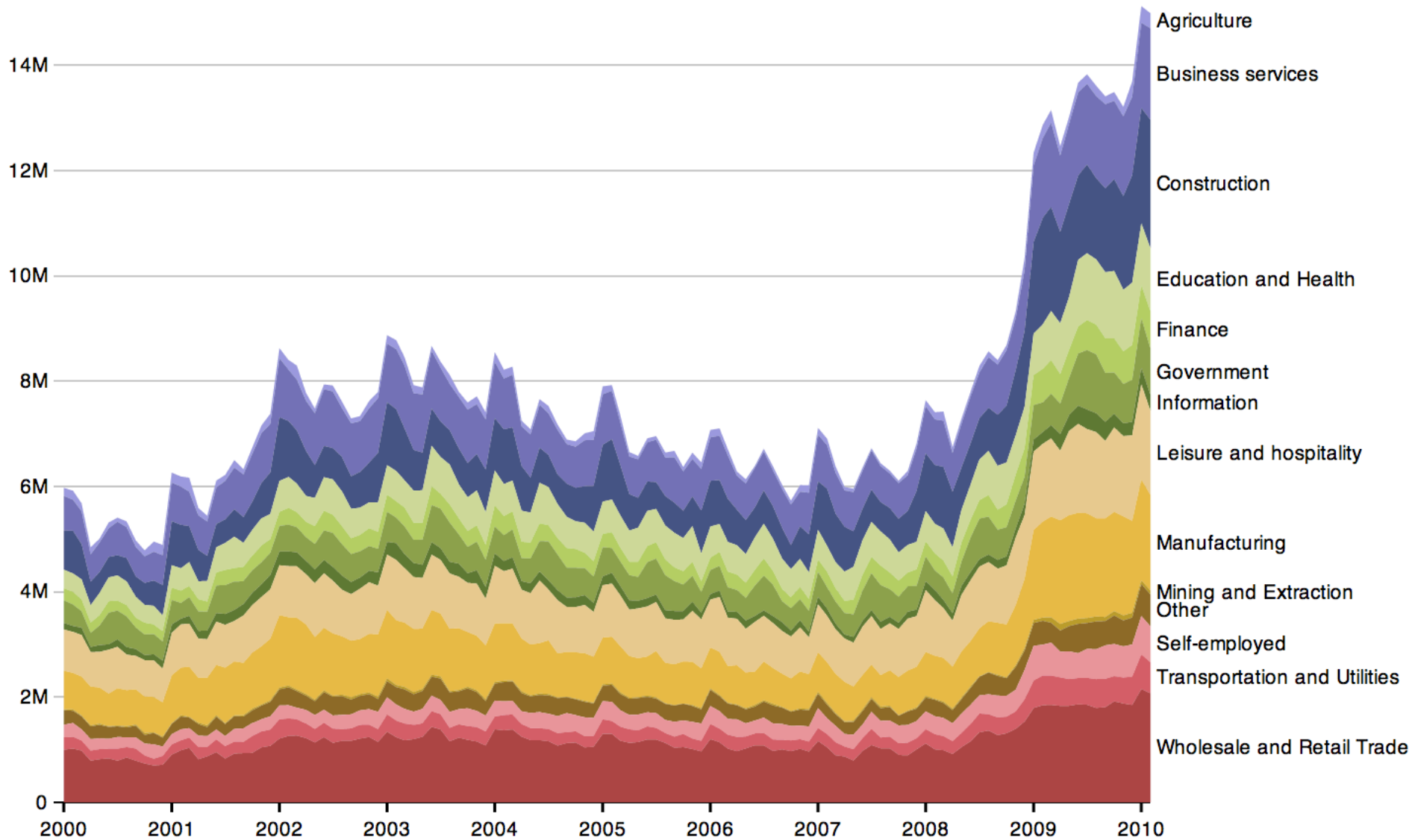
Names starting with 'J' per million babies



<http://www.babynamewizard.com/voyager#>

Stacked Graph of Unemployed U.S. Workers by Industry

View:



Total counts of unemployed persons per industry, 2000-2010.

Source: [U.S. Bureau of Labor Statistics](http://www.bls.gov)

<http://hci.stanford.edu/jheer/files/zoo/>

Unemployment Rate of U.S. Workers by Industry, 2000-2010



Agriculture



Business services



Construction



Education and Health



Finance



Government



Information



Leisure and hospitality



Manufacturing



Mining and Extraction



Other



Self-employed



Transportation and Utilities



Wholesale and Retail Trade

Unemployment rates of U.S. workers per industry.

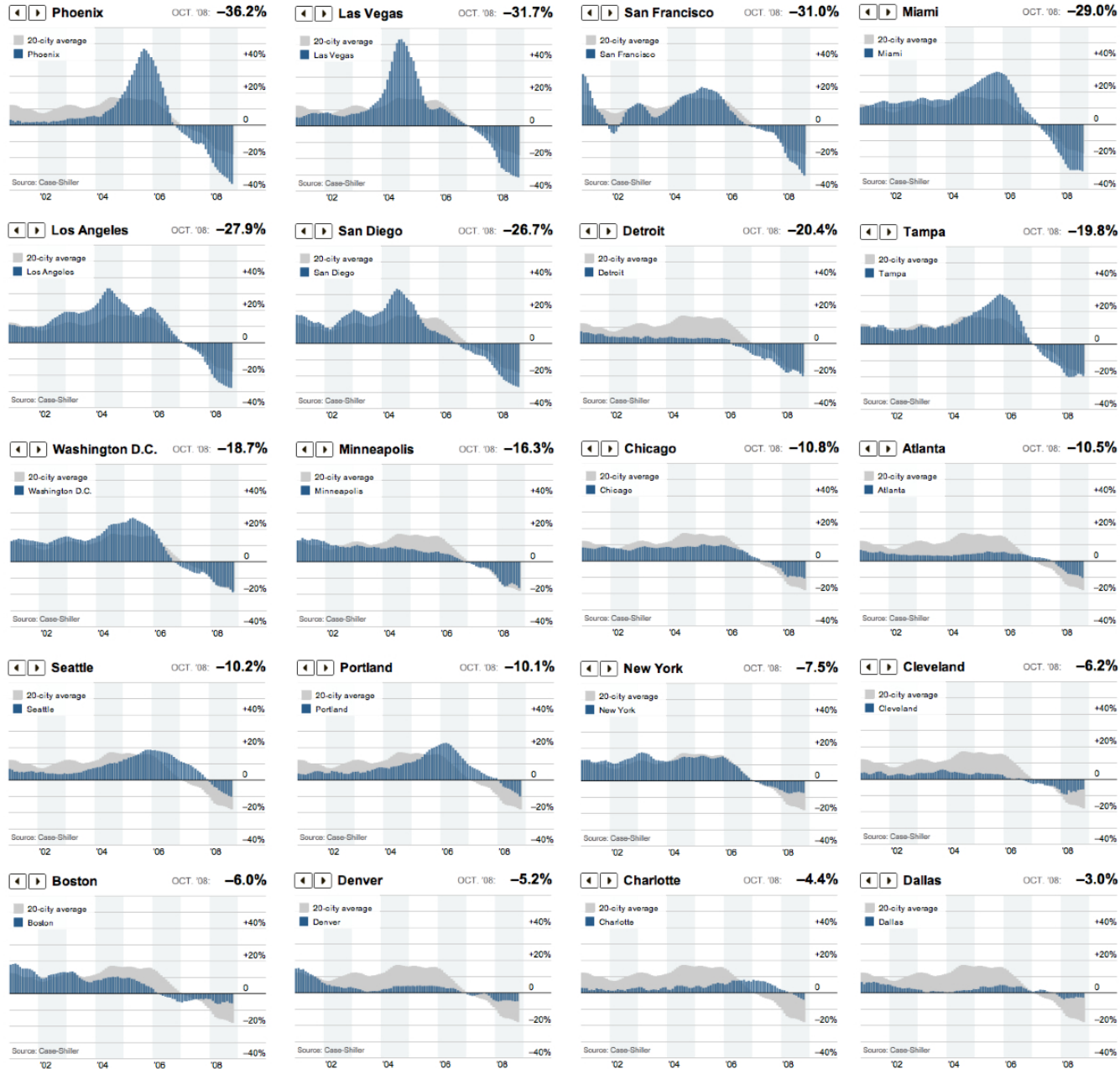
Source: [U.S. Bureau of Labor Statistics](http://www.bls.gov)

Small Multiples

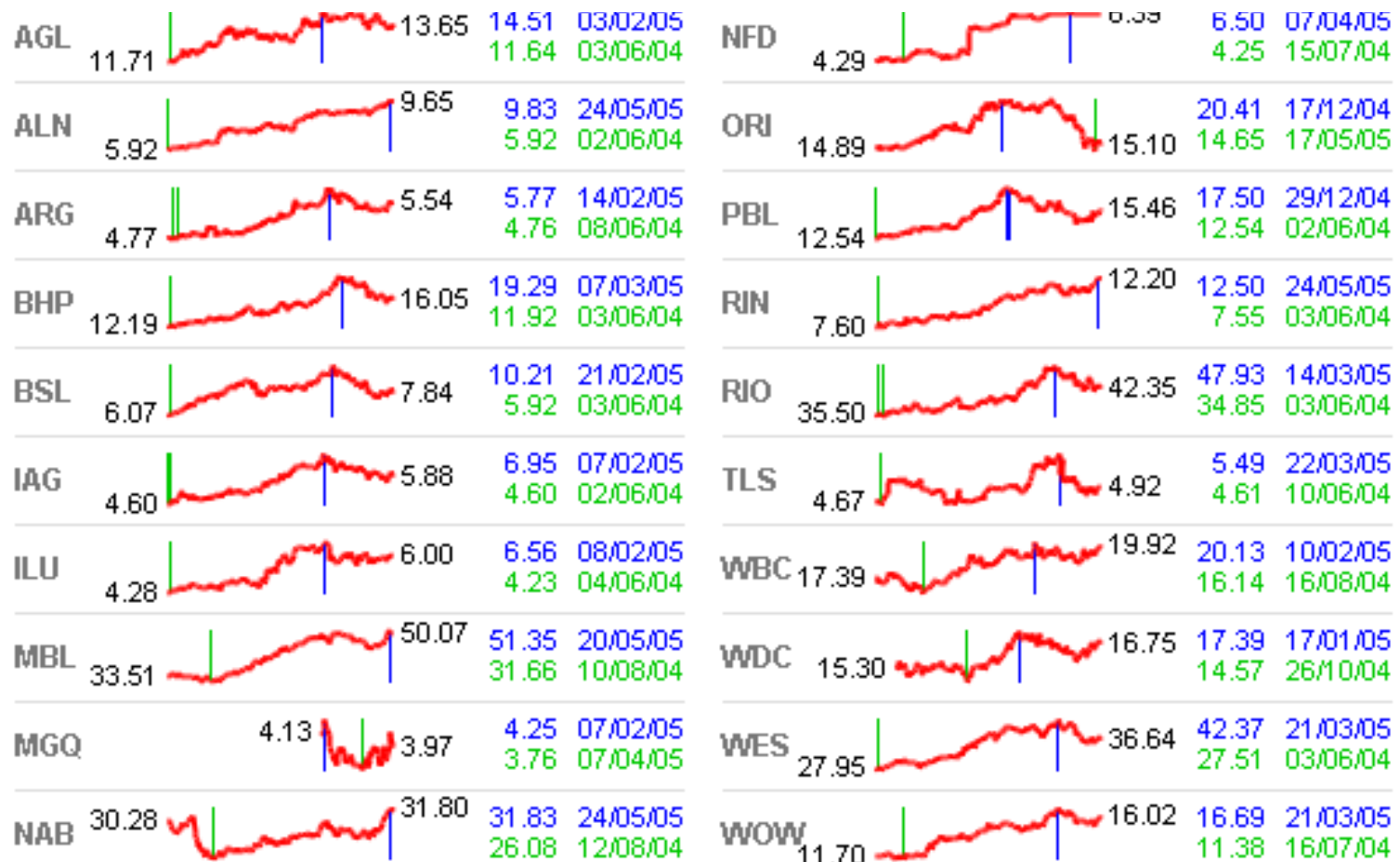
- Multiple small graphs arranged in a grid
- Advantages and disadvantages?

Change in Home Prices (year over year)

From New York Times Economix blog

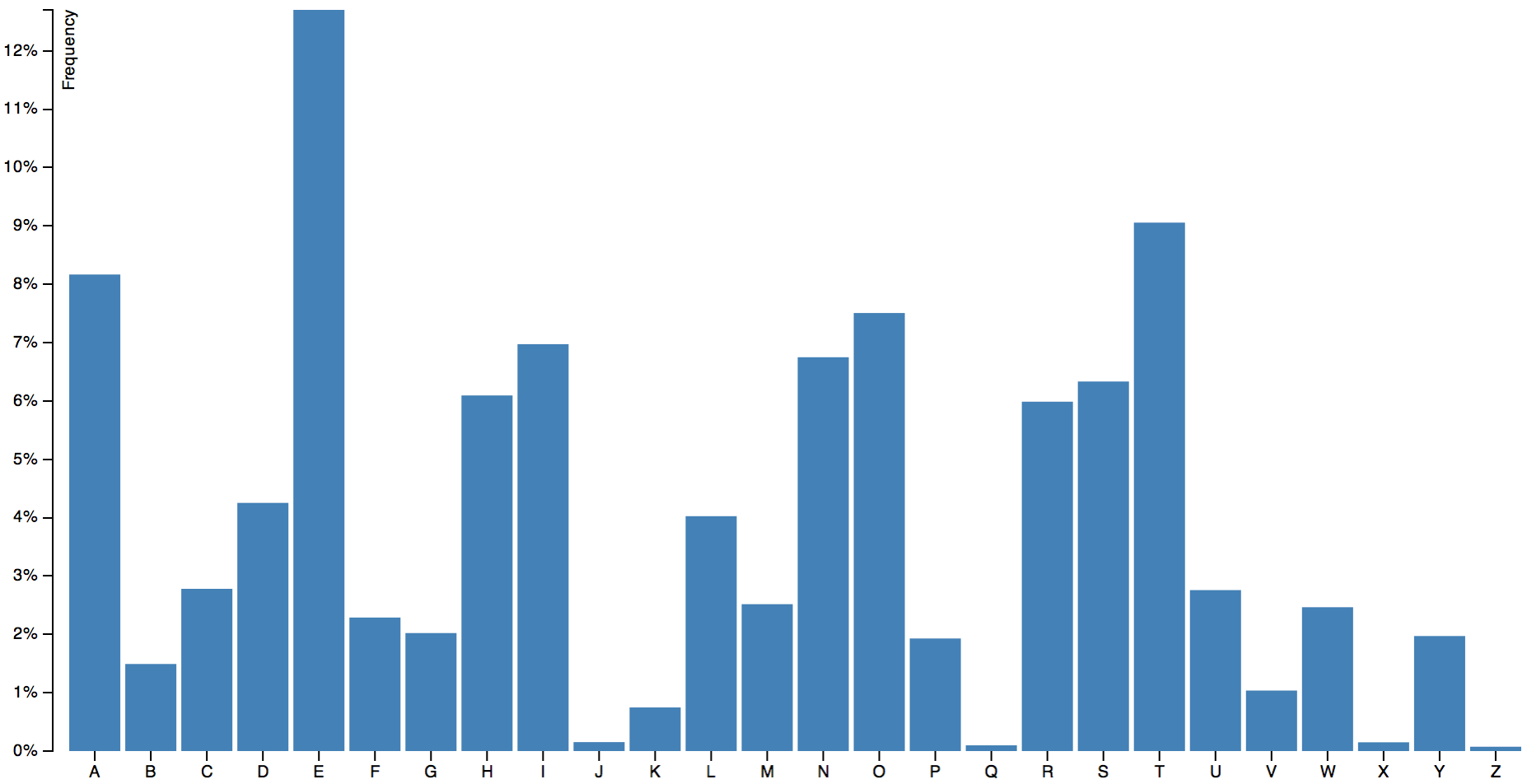


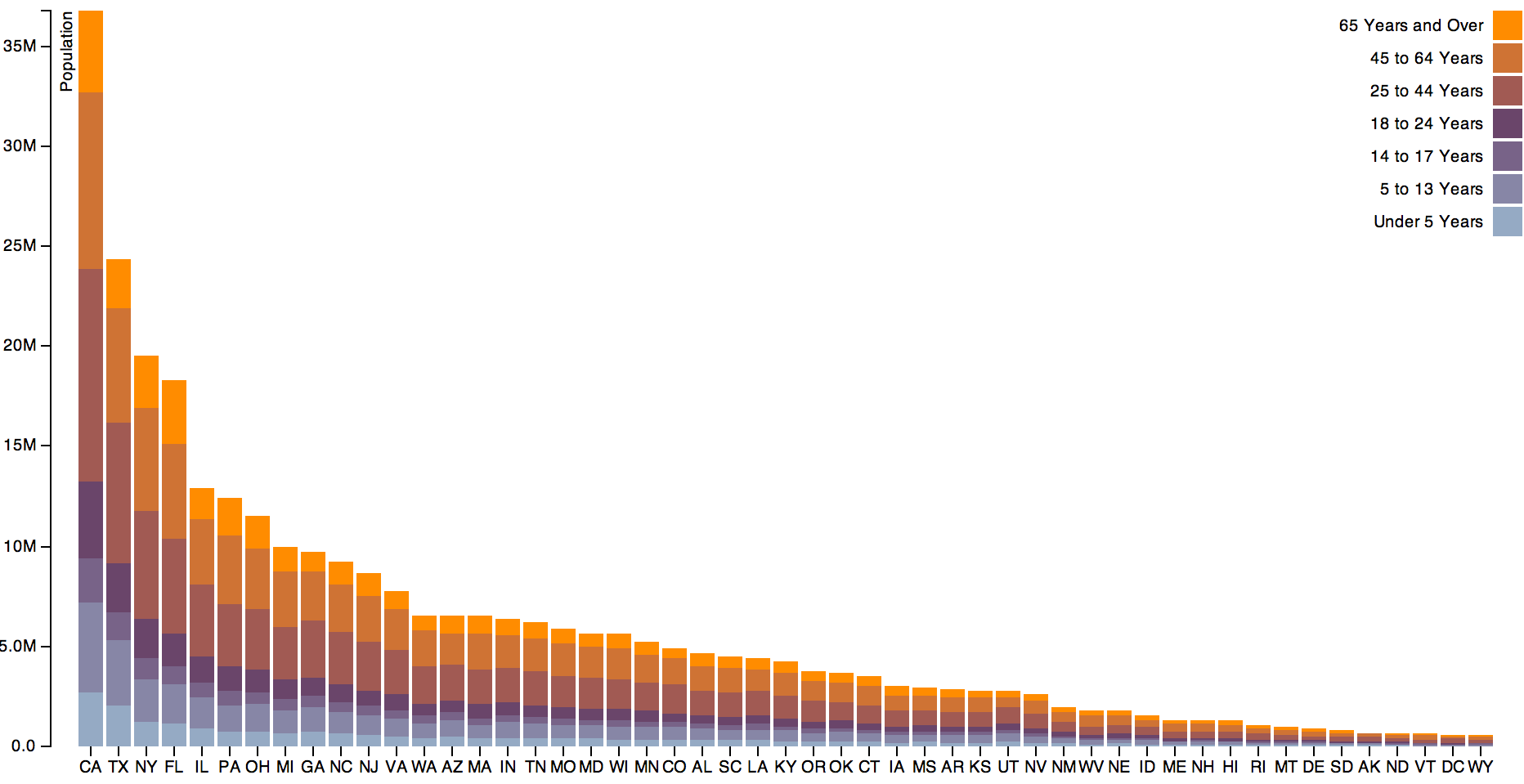
Spark Lines

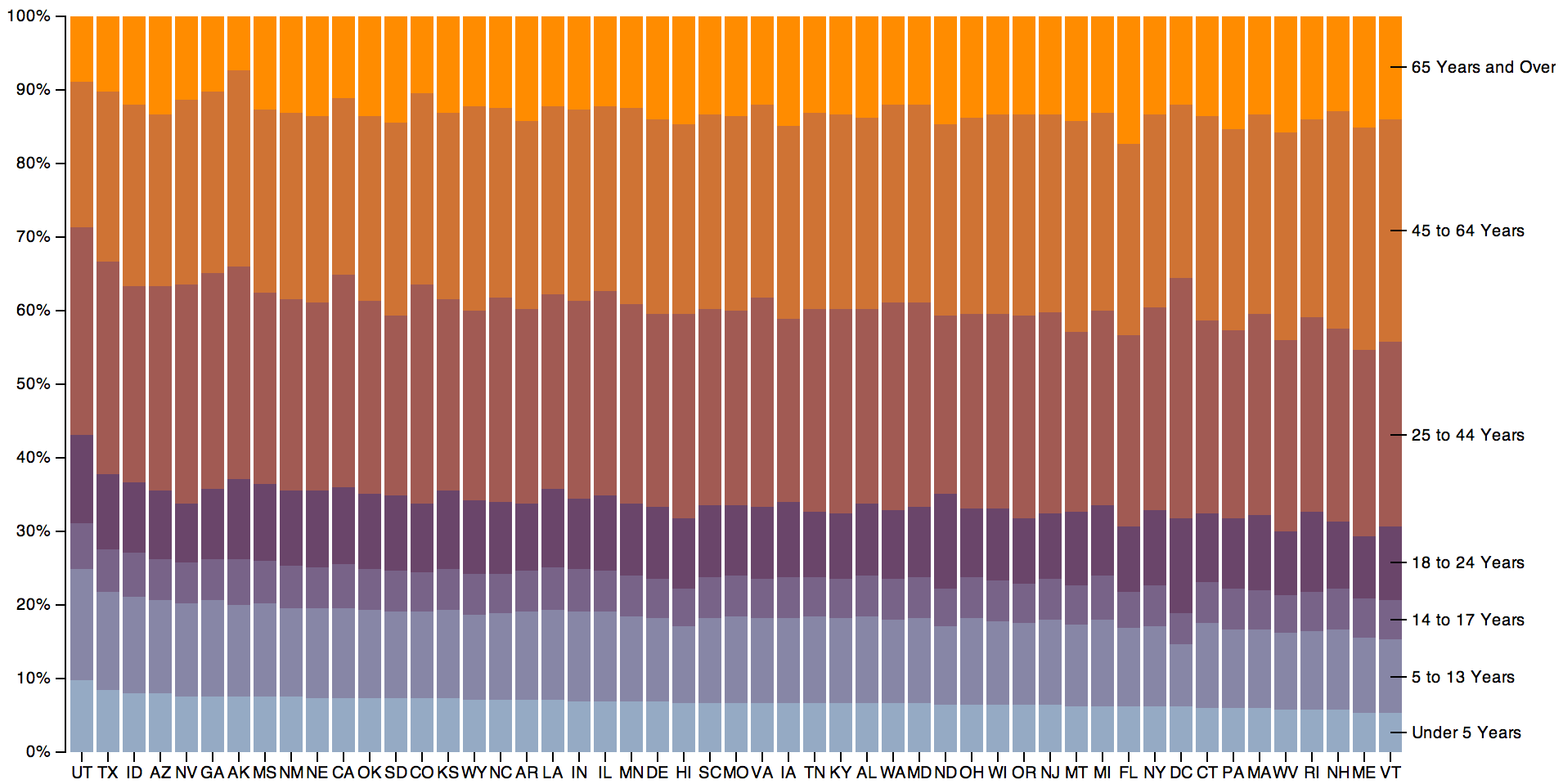


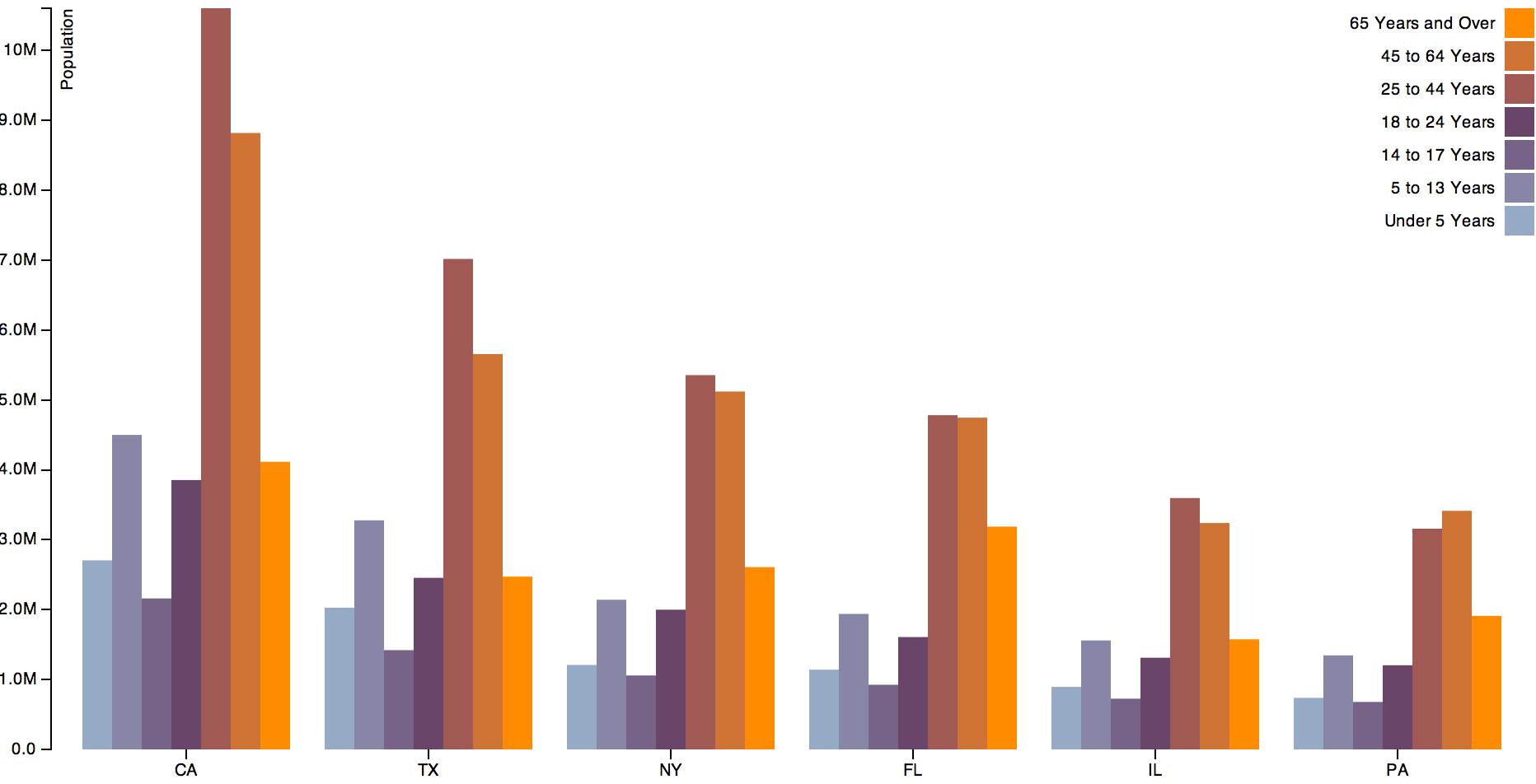
Bar Graphs (+ Variants)

- Suitable for what types of data?
- Following examples from d3.js



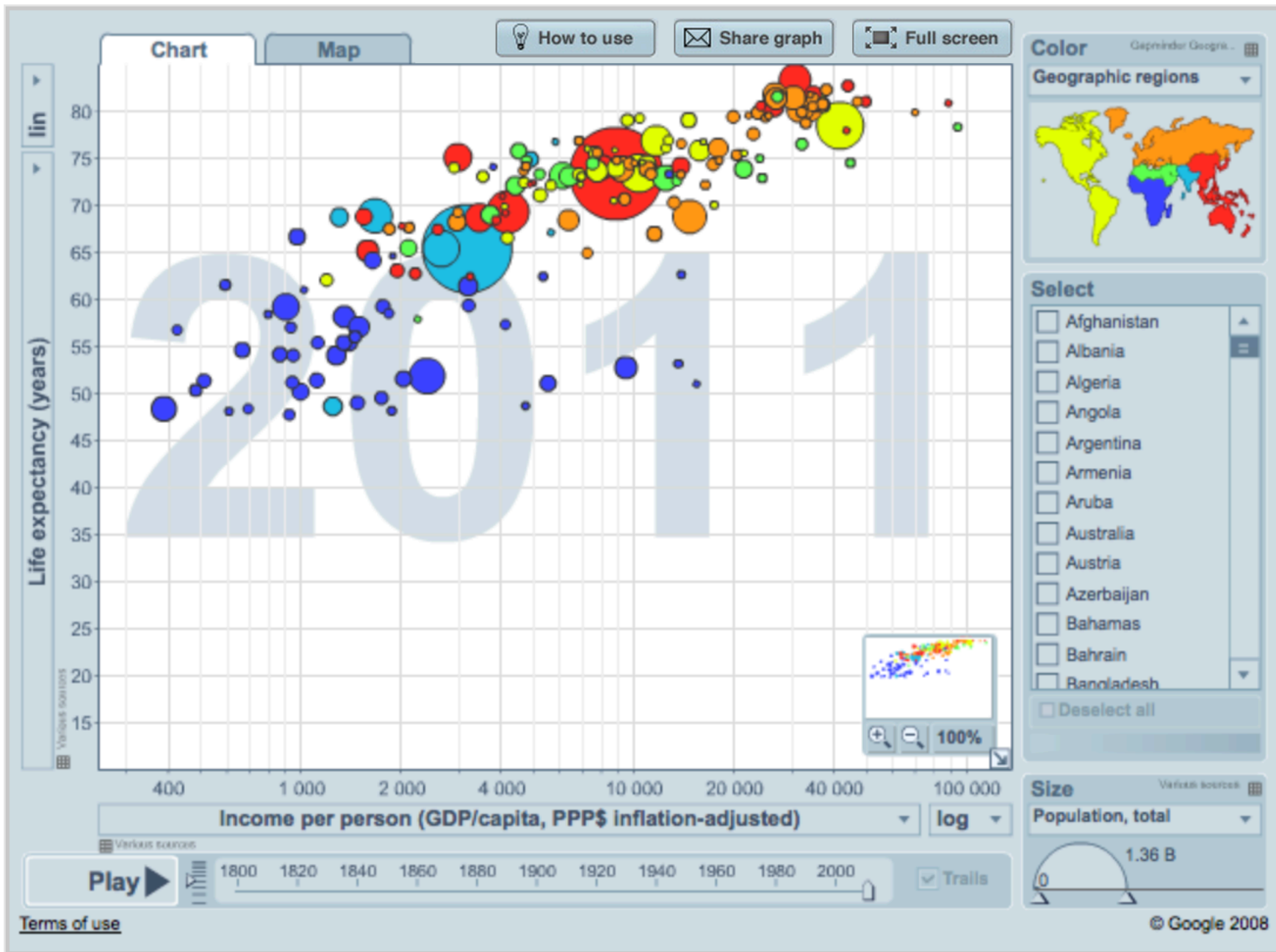






Scatterplots

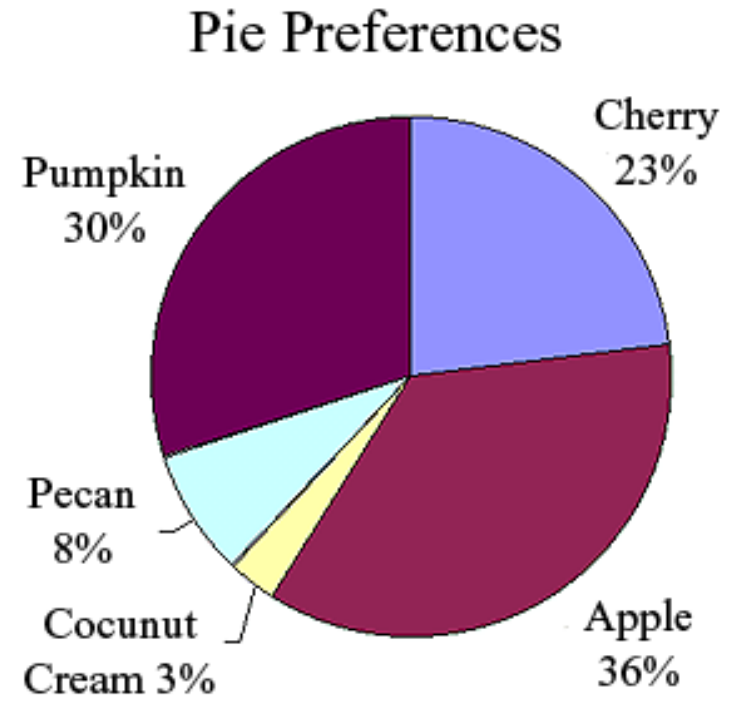
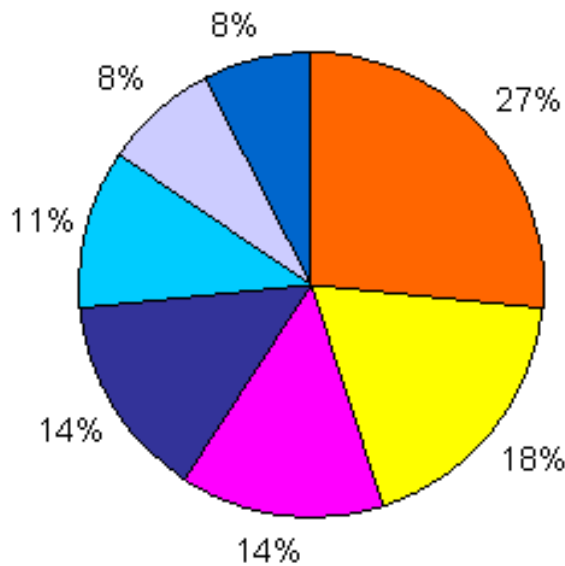
- Suitable for what types of data?
- Note availability of other ways to encode data at points



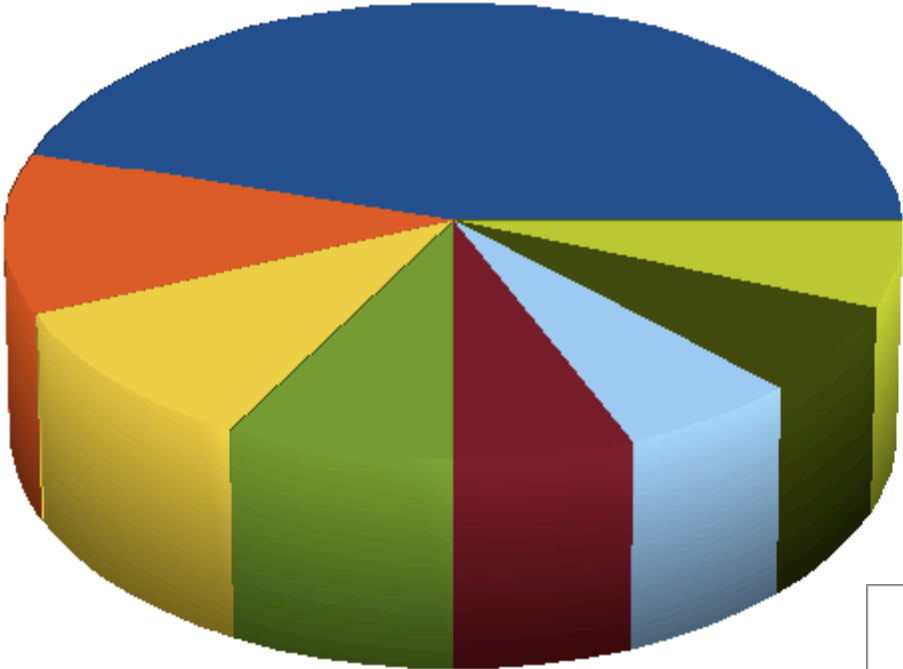
<http://www.gapminder.org/>

Pie Charts (+ Variants)

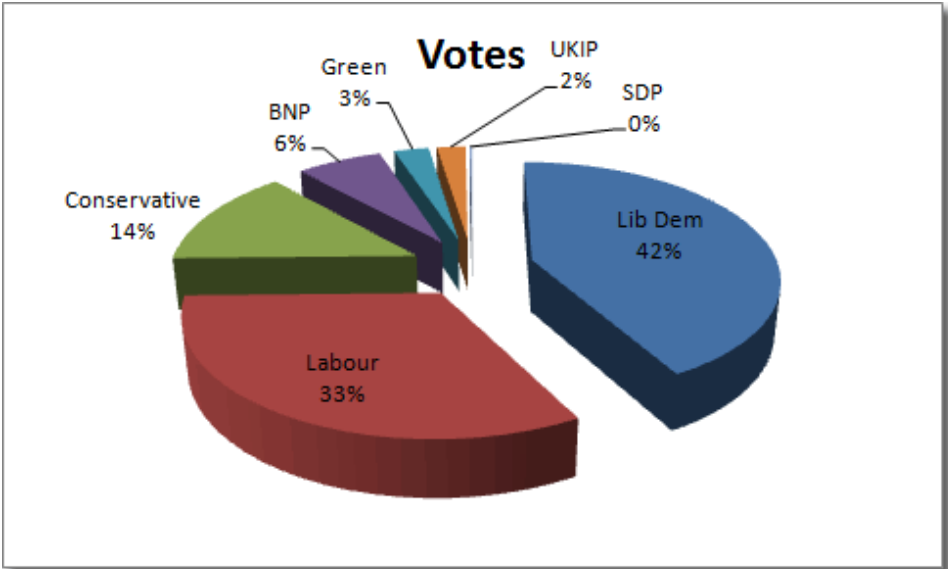
- Suitable for what types of data?
- Different ways for labeling



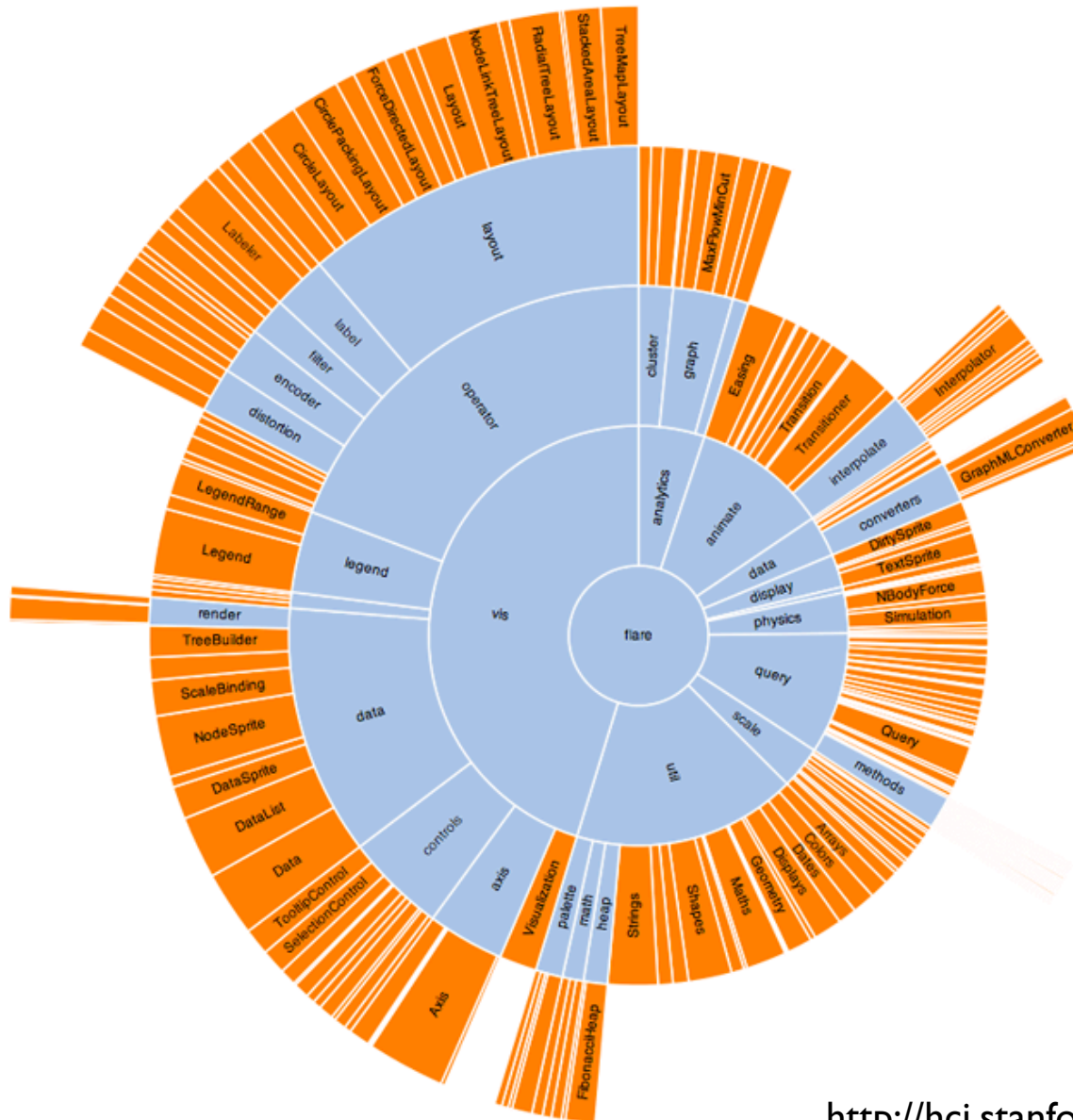
More Chart Junk



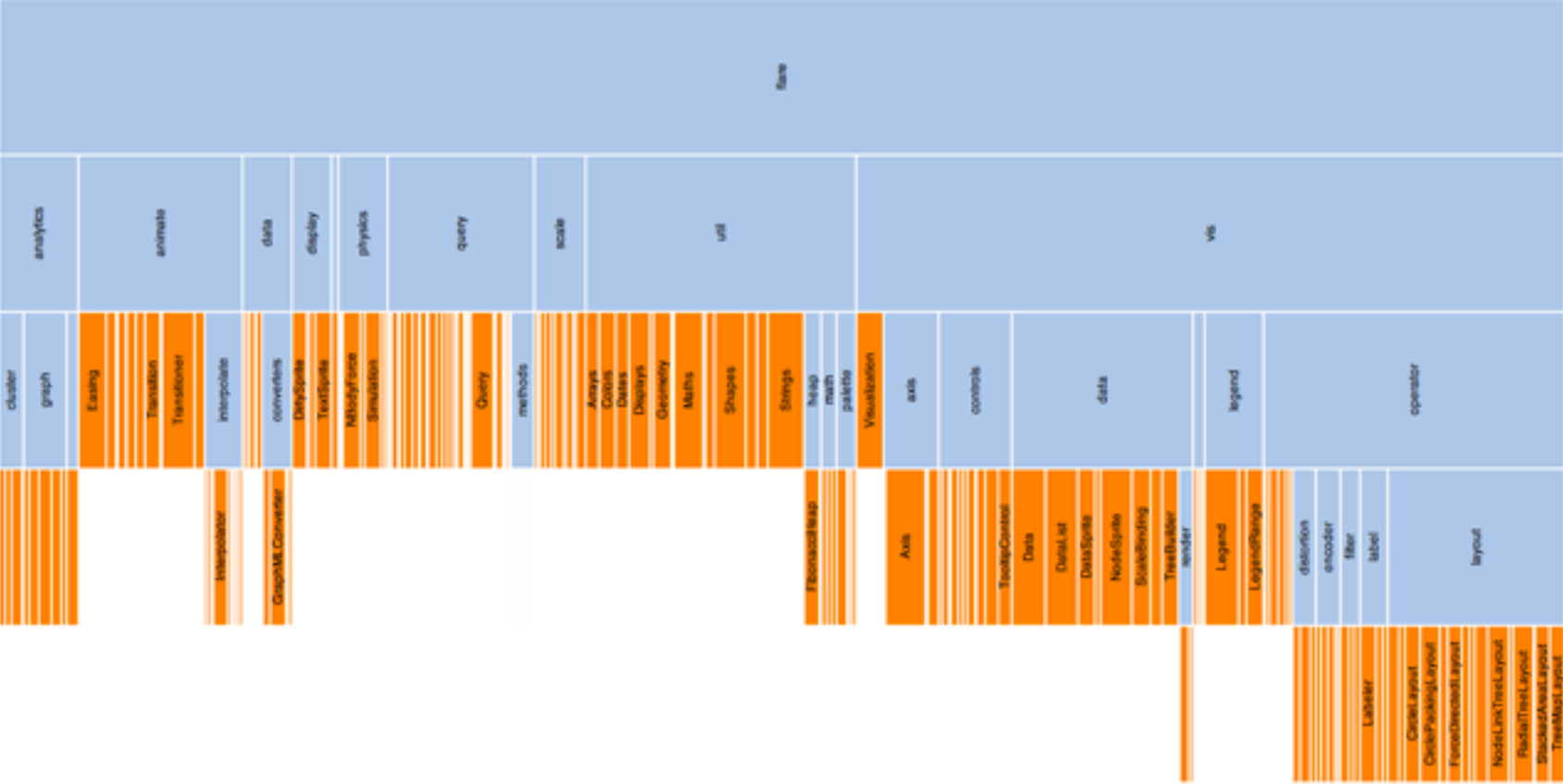
- MySpace
- Facebook
- Orkut
- hi5
- Xanga
- Live Spaces
- Classmates.com
- Bebo



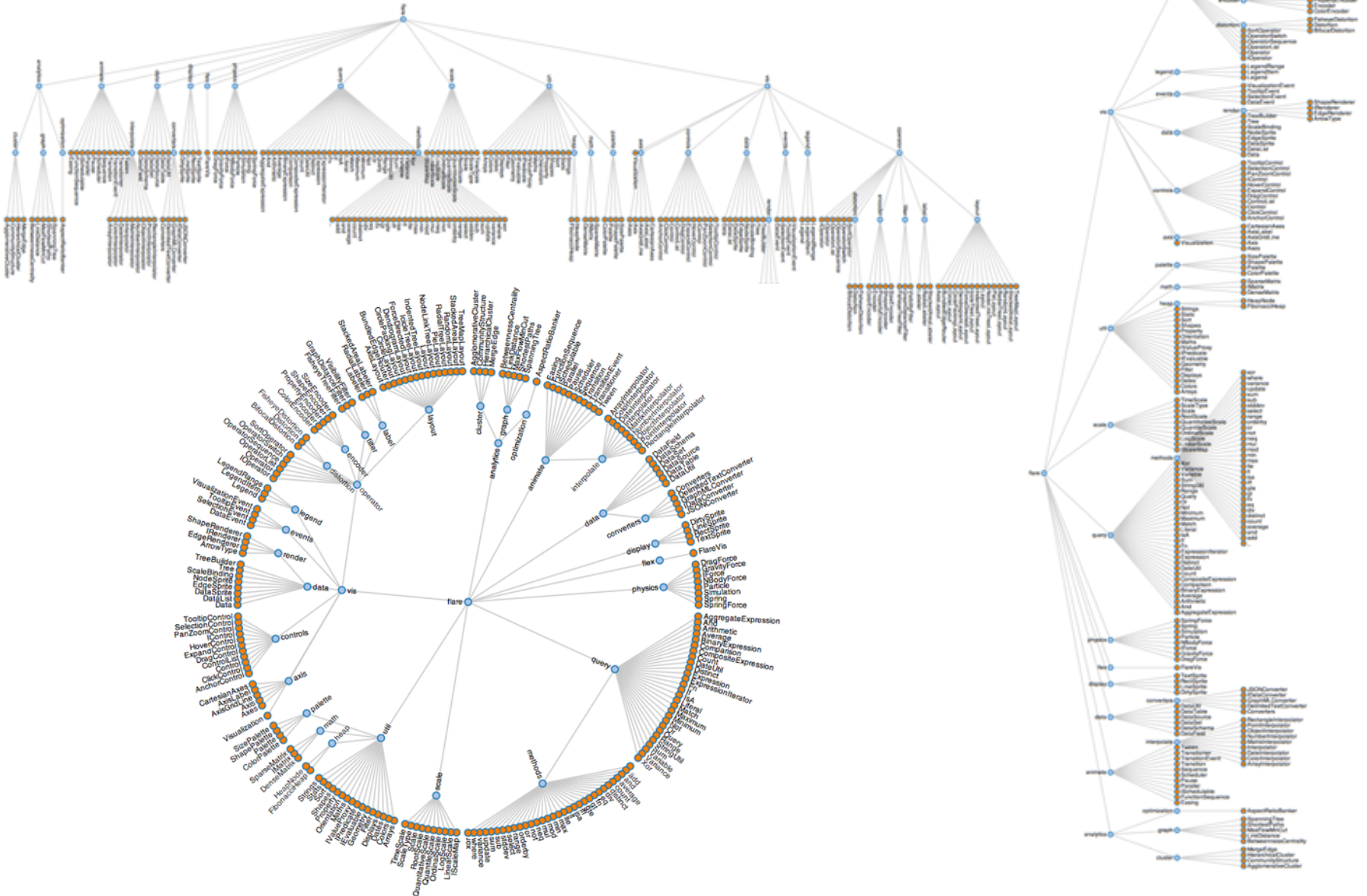
Sunburst Trees



Icicle Diagrams

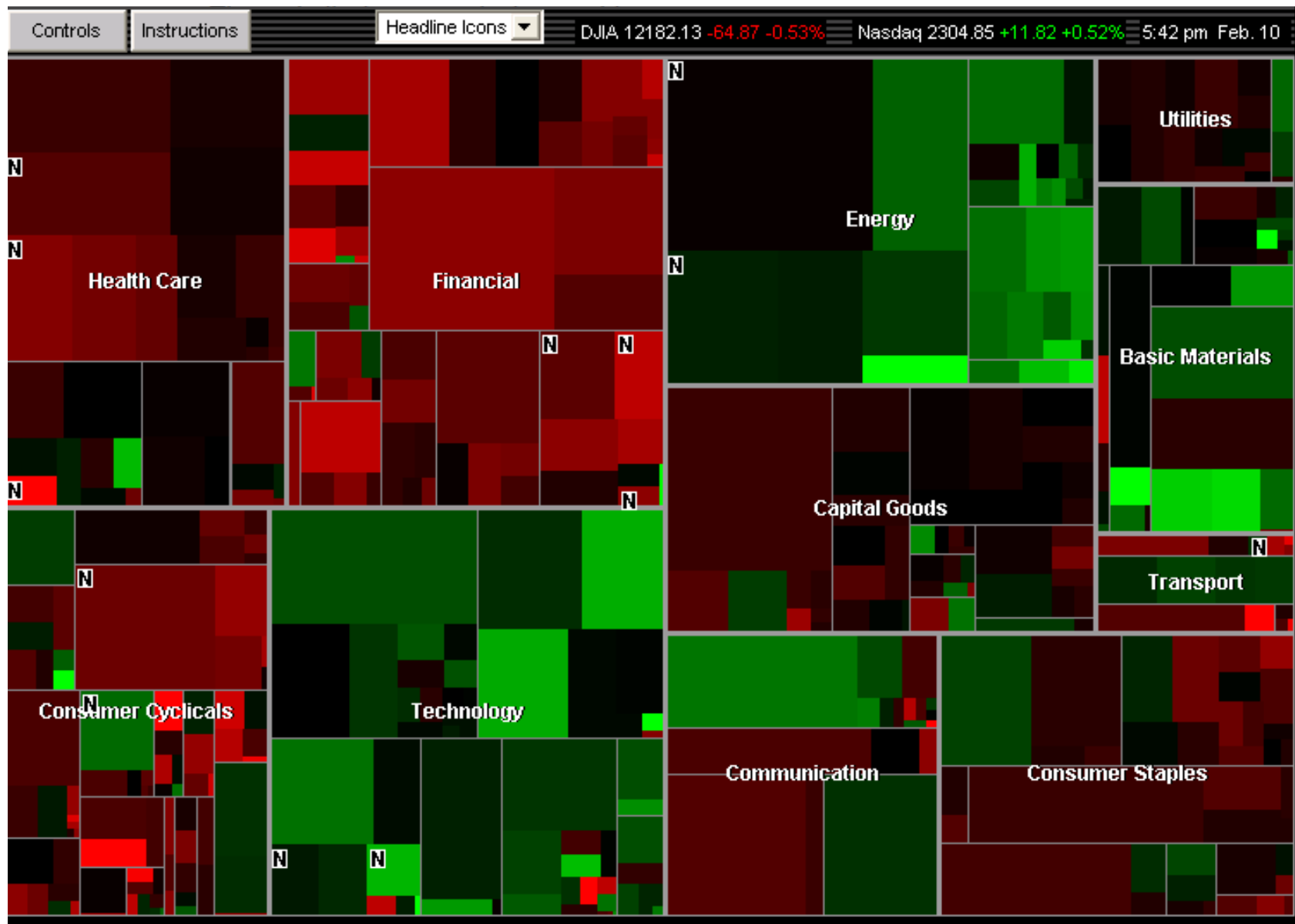


Visualizing Hierarchies

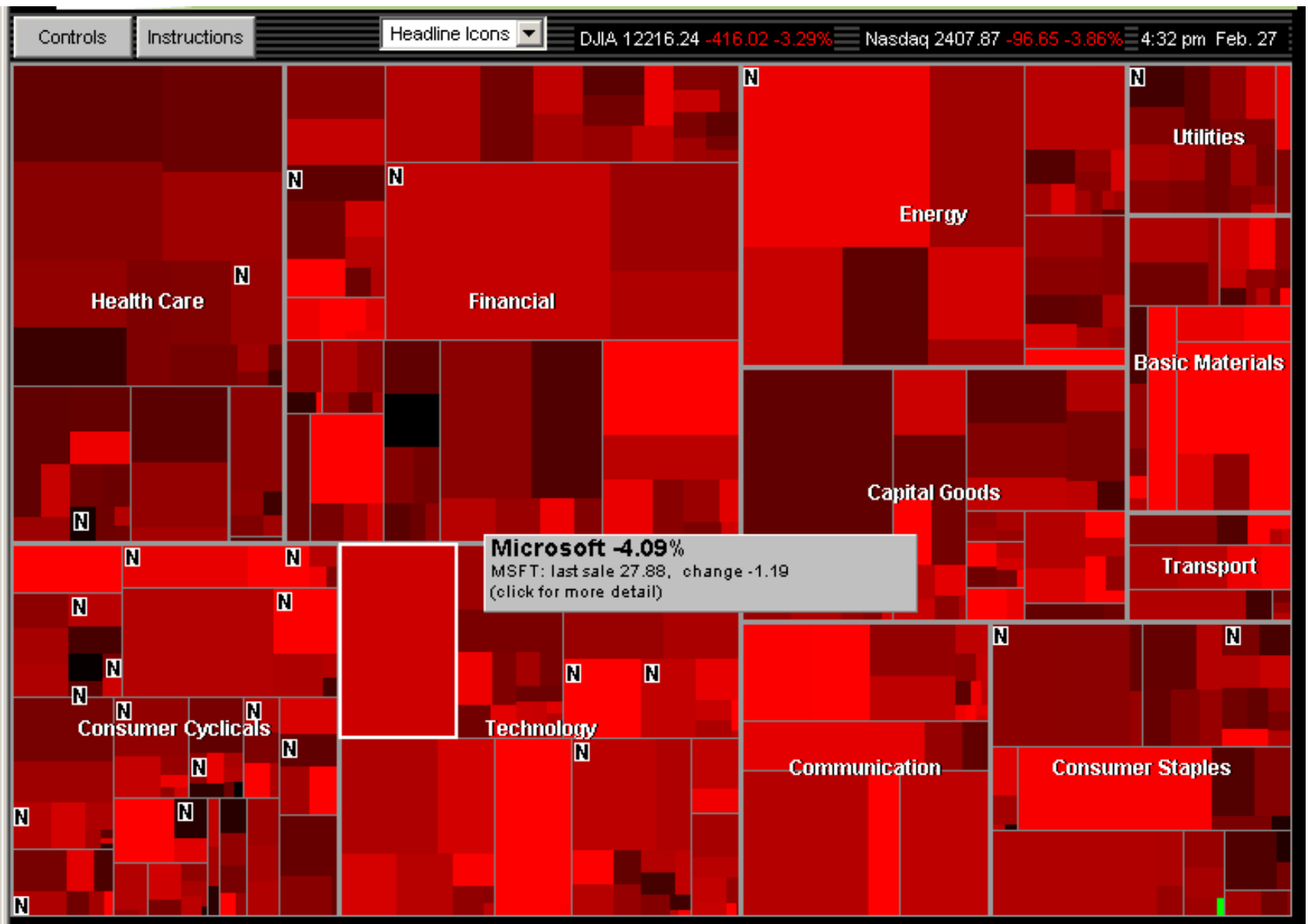


TreeMaps

- Useful for representing hierarchical relationships
- Two mechanisms for coding information:
 - Size and Color
 - Physical location of boxes not usually meaningful
- Requires learning to read

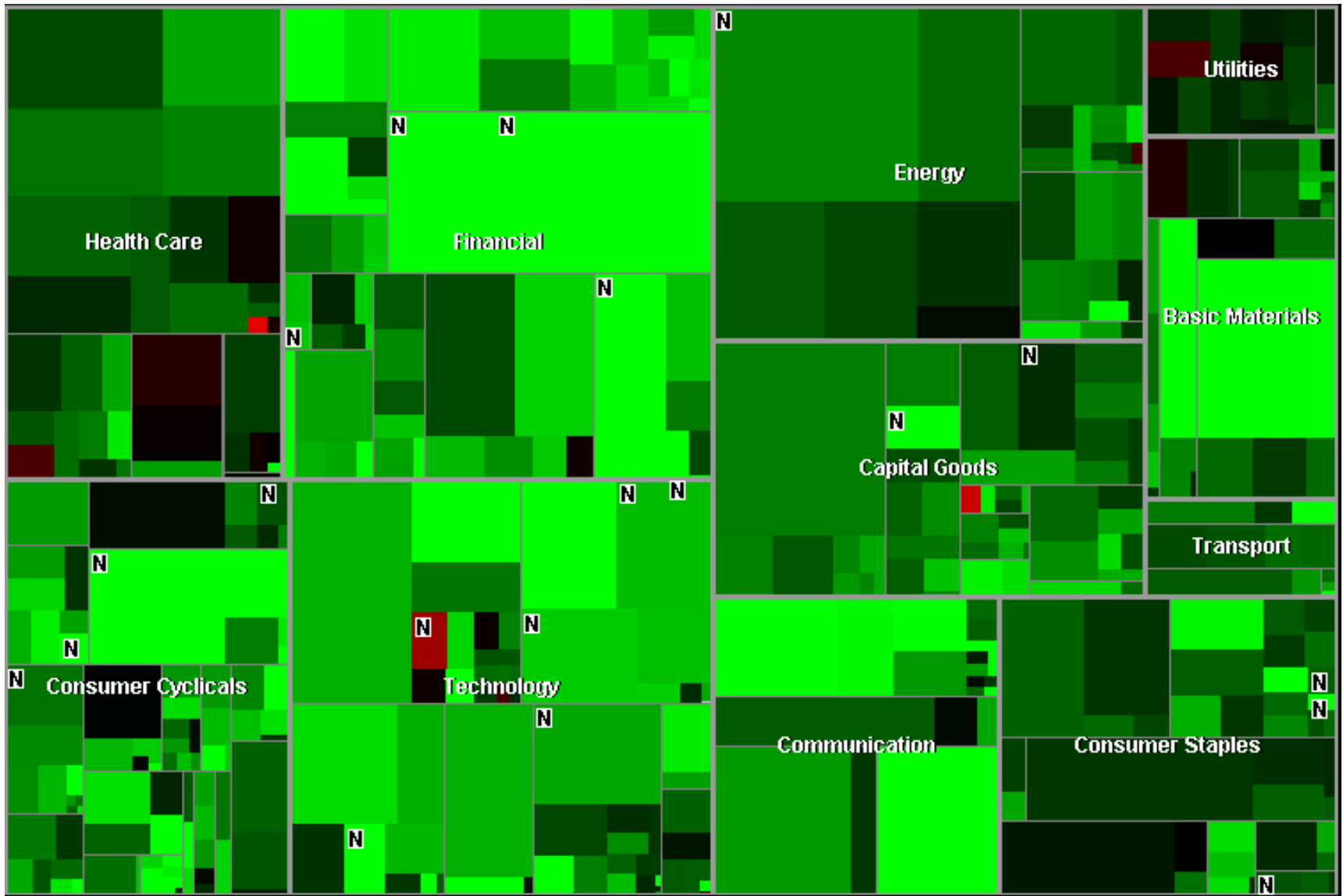


<http://www.smartmoney.com/map-of-the-market/>



Market mixed, February 8, 2008:

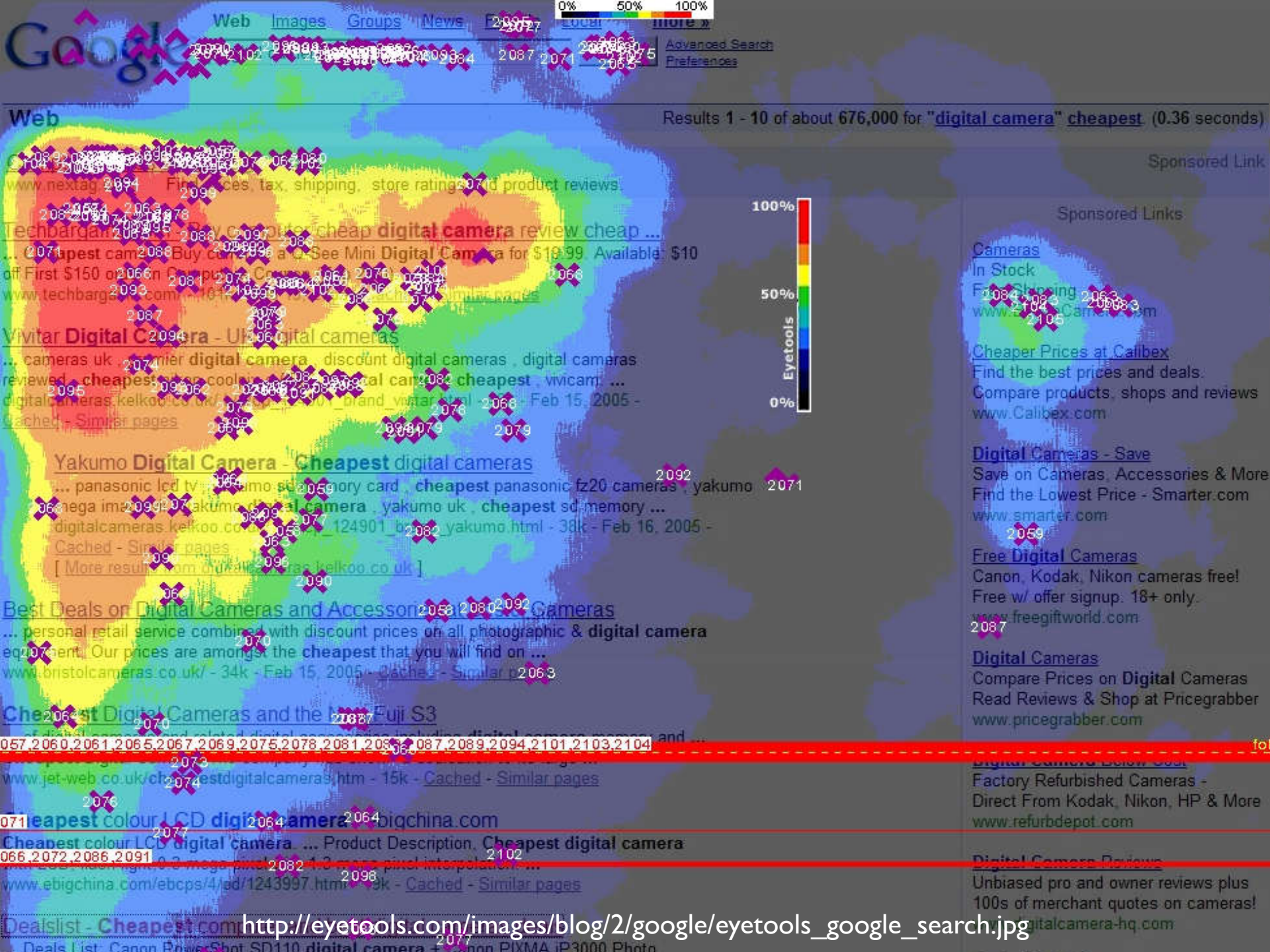
Energy & Technology up Financial & Health Care down



Market rises 319 points, November 13, 2007:
Five exceptions

Heatmaps

- Data represented in a matrix
- Matrix values are color coded



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[Cheapest colour LCD digital camera](#)

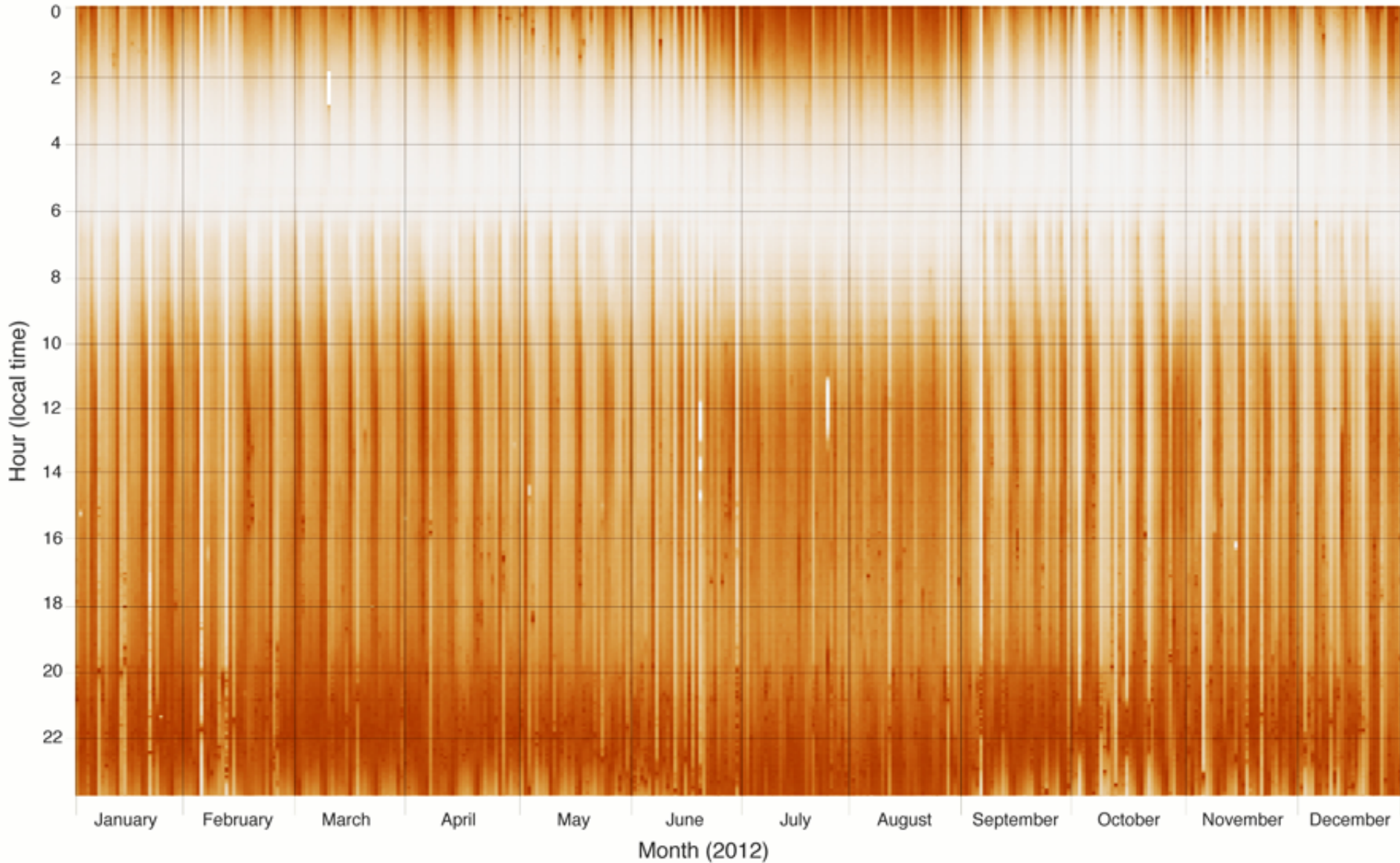
[www.techbarga.com](#) Product Description, Cheapest digital camera

[www.techbarga.com](#) Similar pages

[Dealslist - Cheapest.com](#)

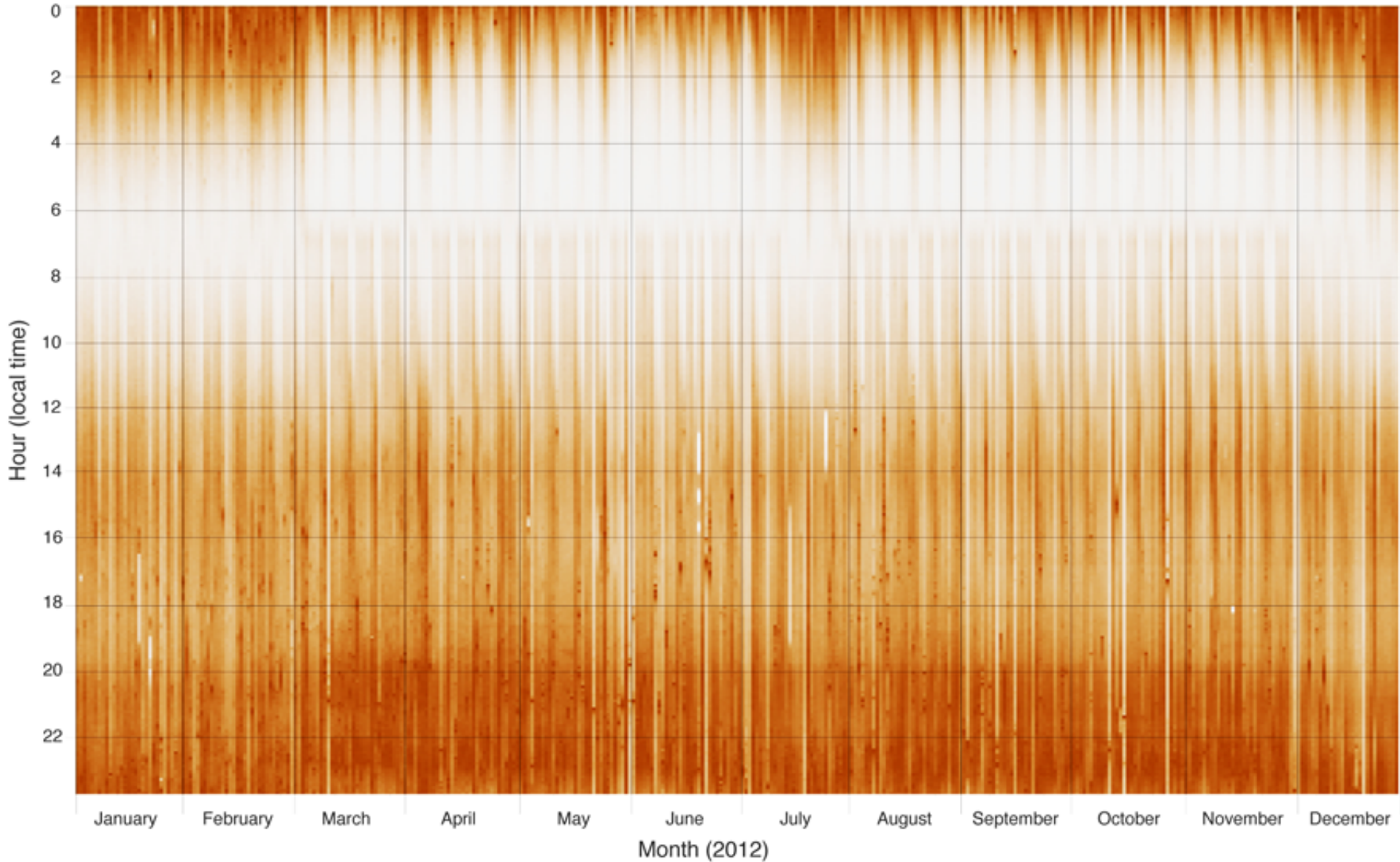
[Deals List: Canon Power Shot SD110 digital camera + Canon PIXMA iP3000 Photo](#)

Tweet Activity (New York City, New York, US)



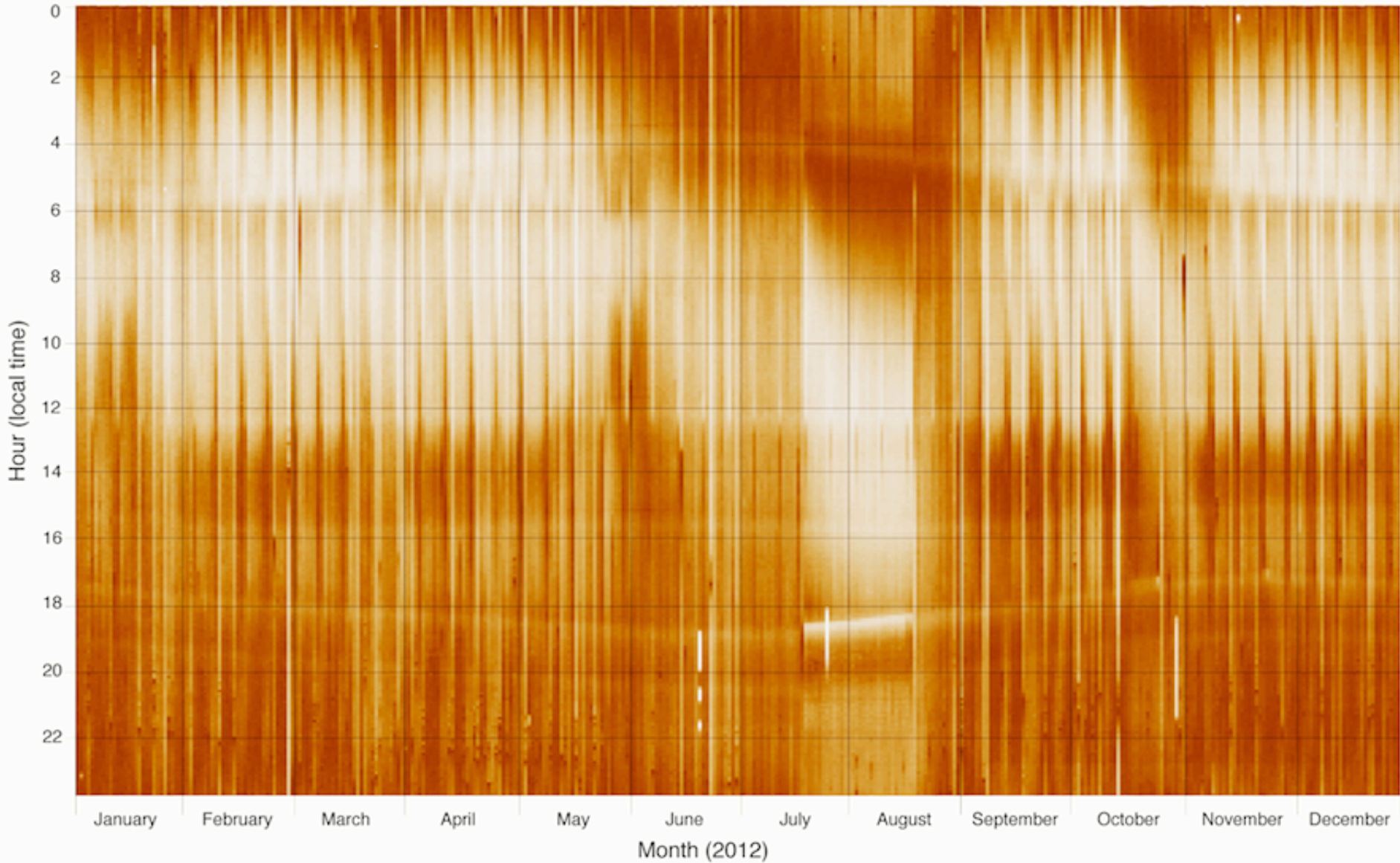
Miguel Rios and Jimmy Lin. Visualizing the “Pulse” of World Cities on Twitter. ICWSM 2013.

Tweet Activity (Buenos Aires, Argentina)



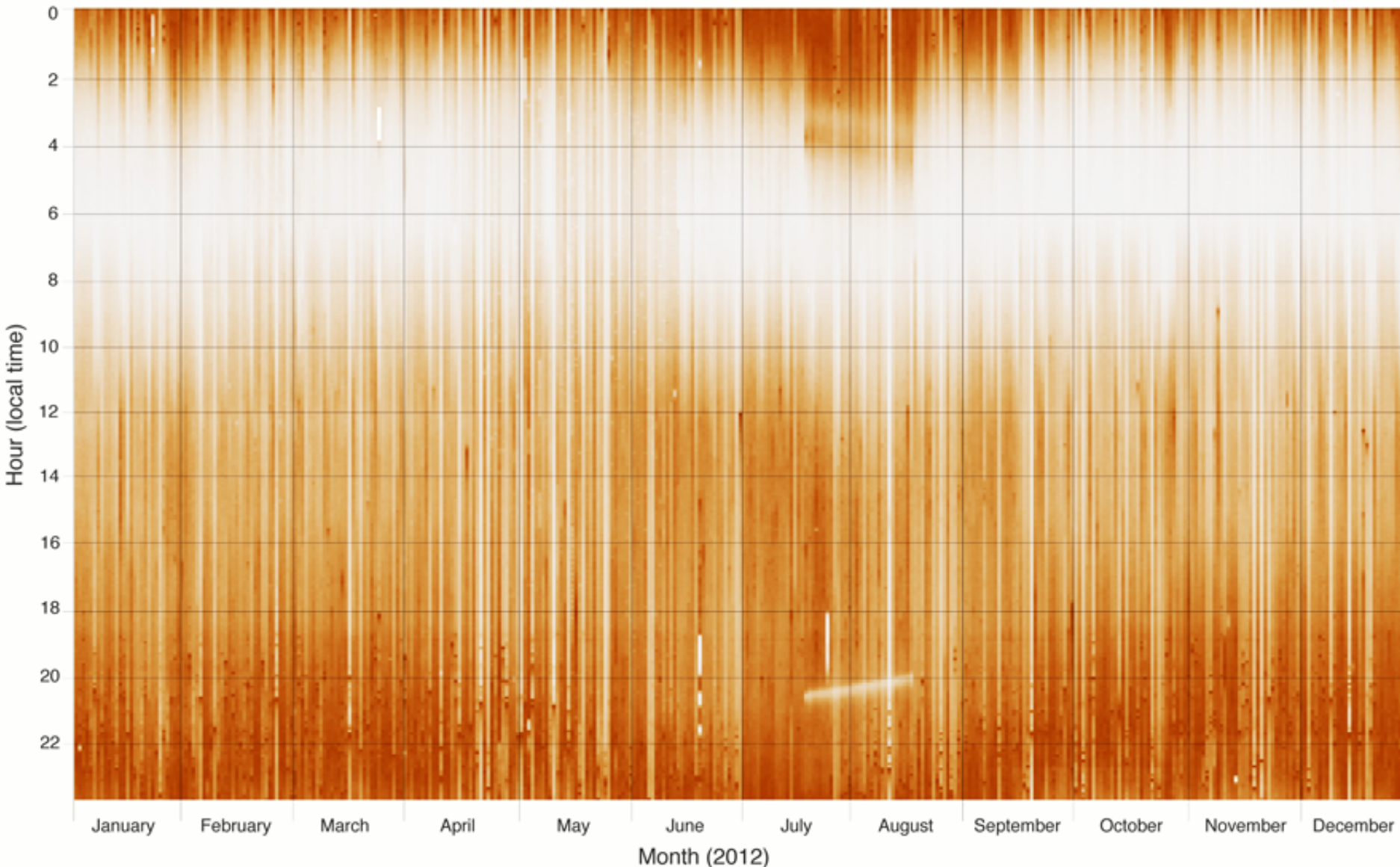
Miguel Rios and Jimmy Lin. Visualizing the “Pulse” of World Cities on Twitter. ICWSM 2013.

Tweet Activity (Riyadh, Saudi Arabia)



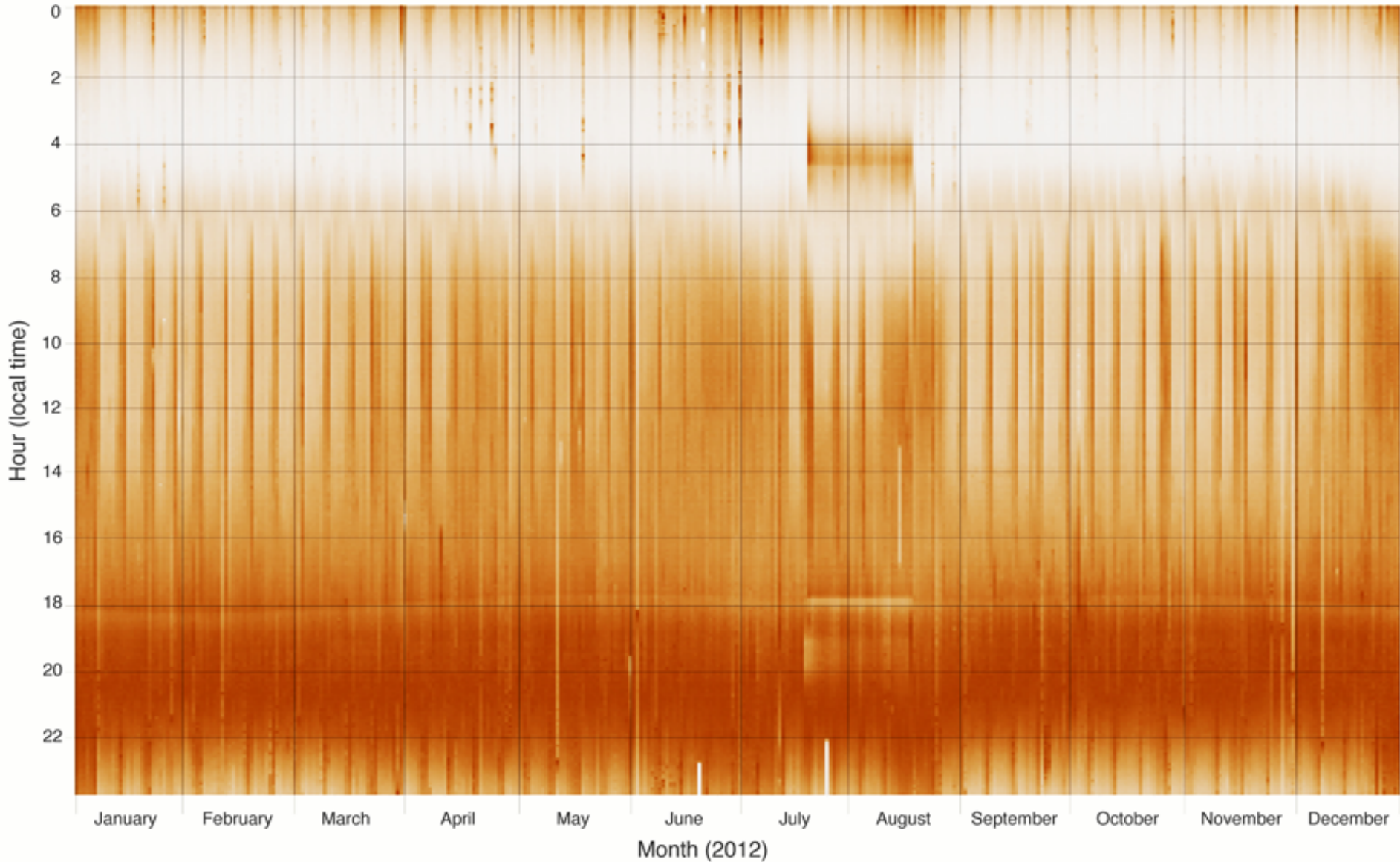
Miguel Rios and Jimmy Lin. Visualizing the “Pulse” of World Cities on Twitter. ICWSM 2013.

Tweet Activity (Istanbul, Turkey)



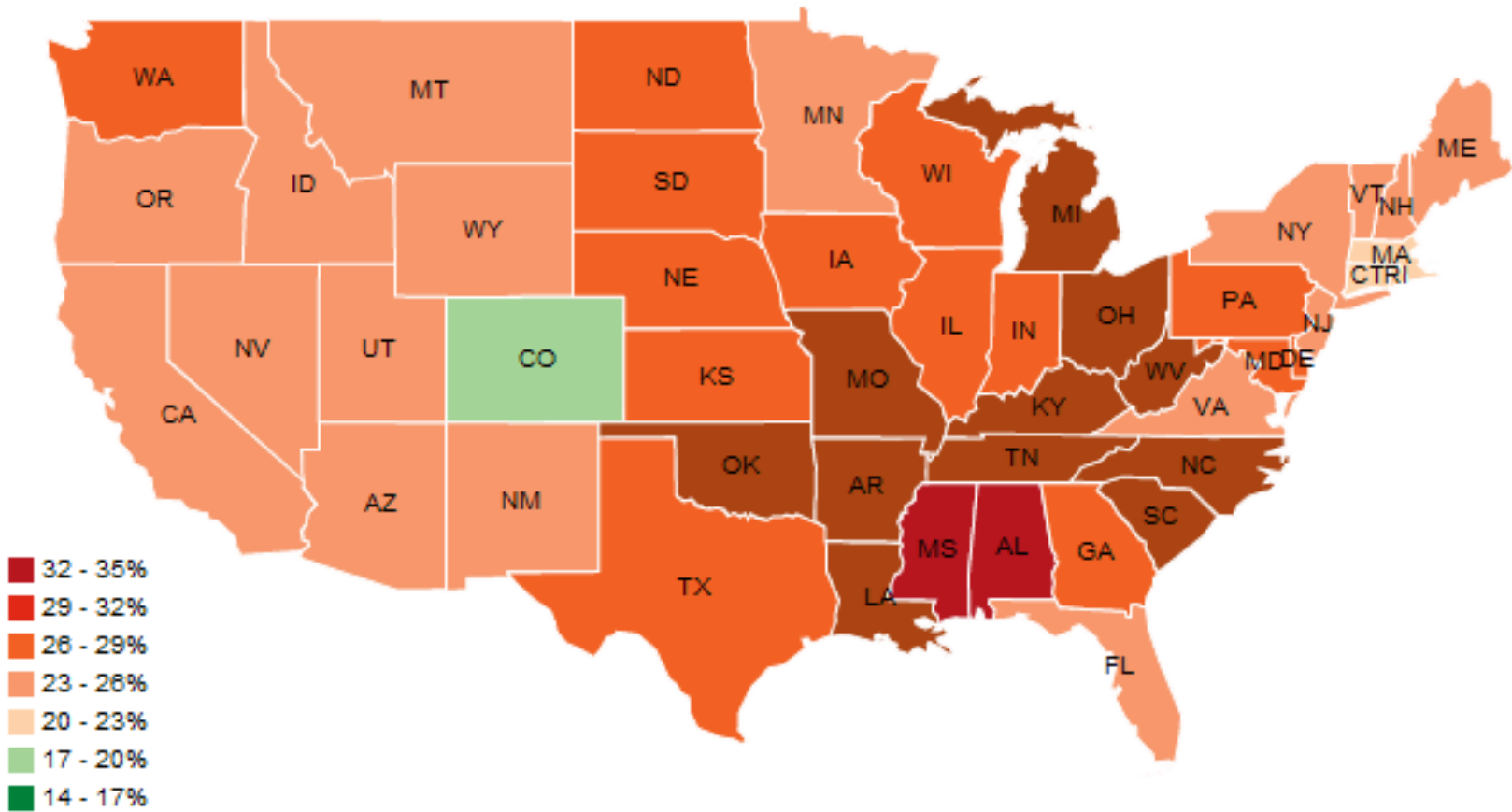
Miguel Rios and Jimmy Lin. Visualizing the “Pulse” of World Cities on Twitter. ICWSM 2013.

Tweet Activity (Jakarta, Indonesia)

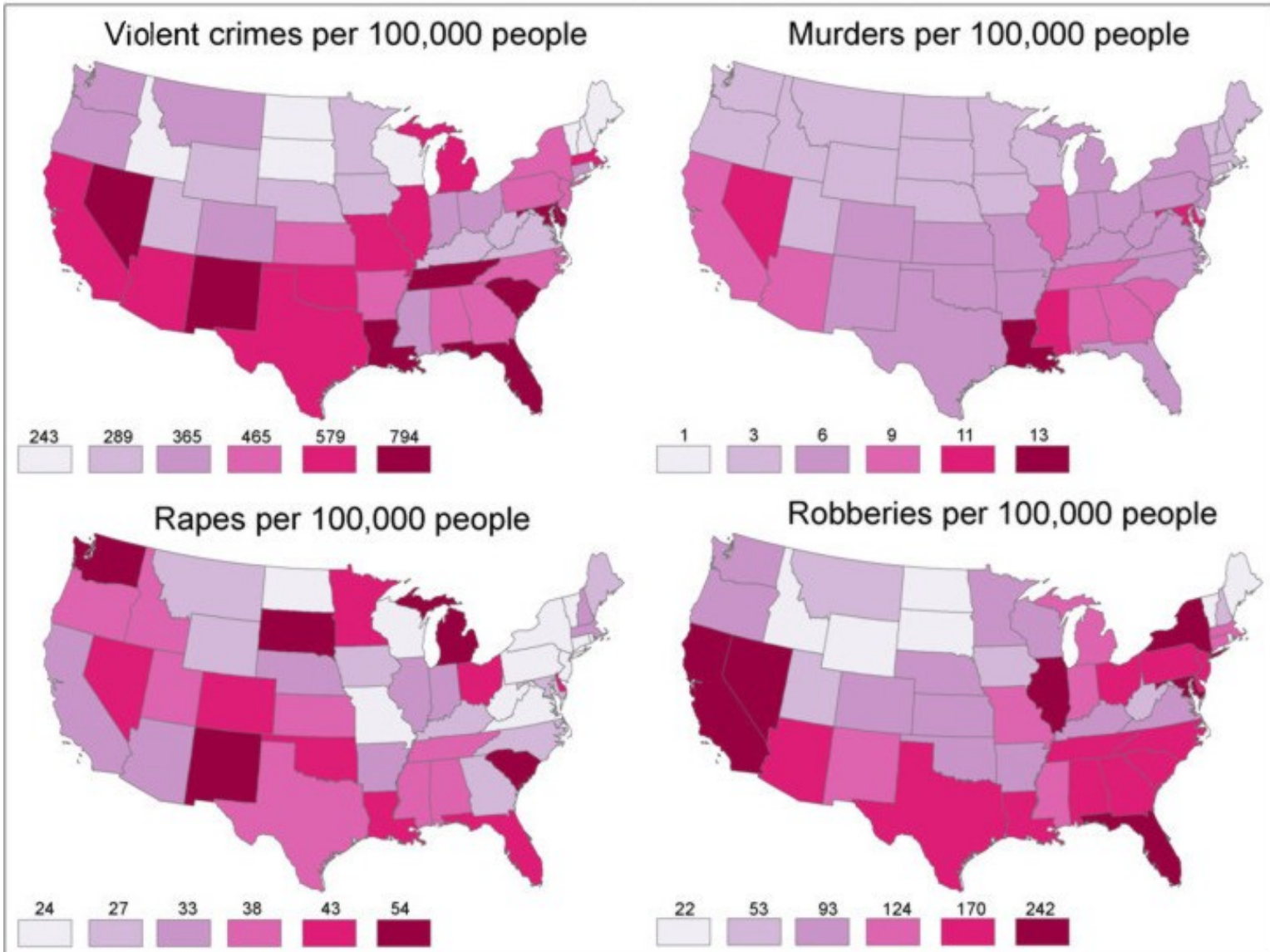


Miguel Rios and Jimmy Lin. Visualizing the “Pulse” of World Cities on Twitter. ICWSM 2013.

Choropleth Maps

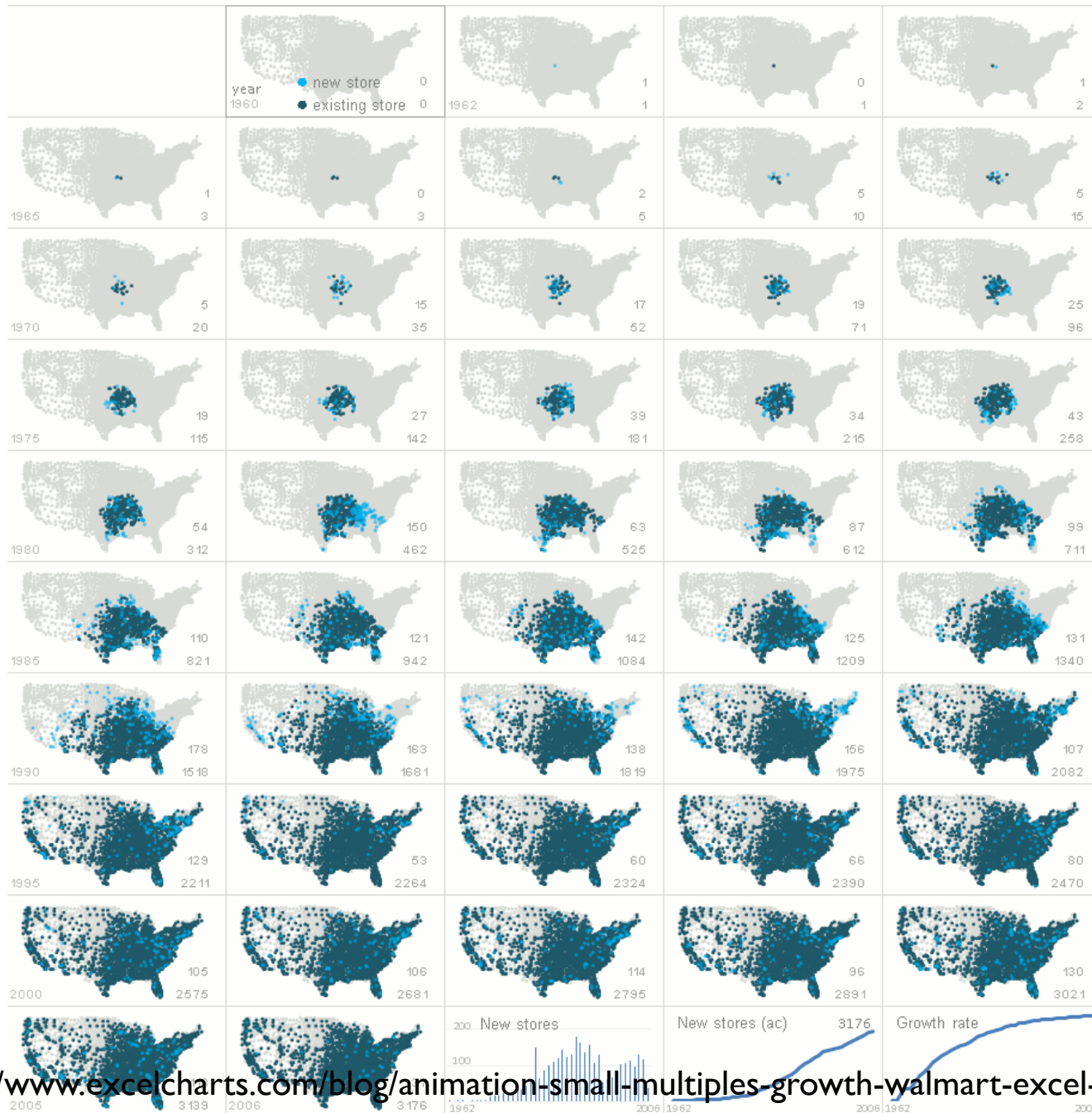


Crime Rates in the US - 2003



Source: *Crime in the United States, 2003, FBI, Uniform Crime Reports*

Growth of Walmart

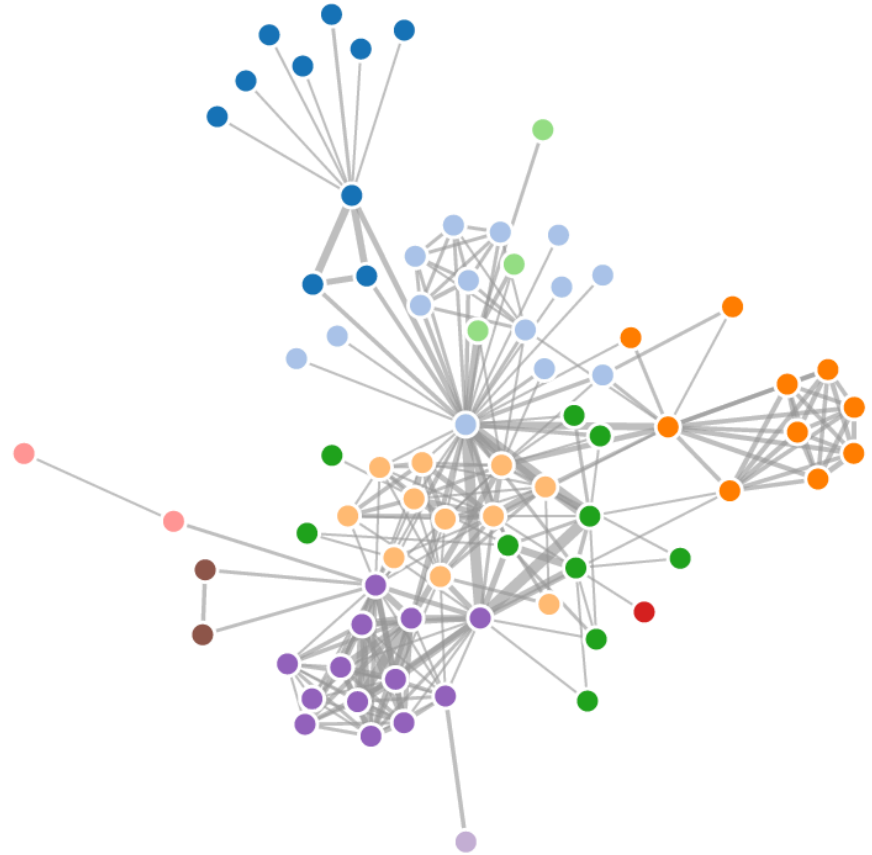


Small Multiples vs. Animations

- Advantages and disadvantages?

Visualizing Networks

- Types of networks: social networks, interaction networks, biological networks, computer networks, etc.
- Standard algorithm uses force-directed layout





Panda Viewing
Sun - 5:30pm

