D3.js - An Introduction

By Ramesh Sampath

Agenda

- What’s D3
- D3 Examples
- Build some visualizations
- Resources

What is D3

- Data Driven Documents
- An General purpose visualization Library written in JS
- Started at Stanford Visualization Group (Jeff Heer, Mike Bostock and many others)
- Open Source

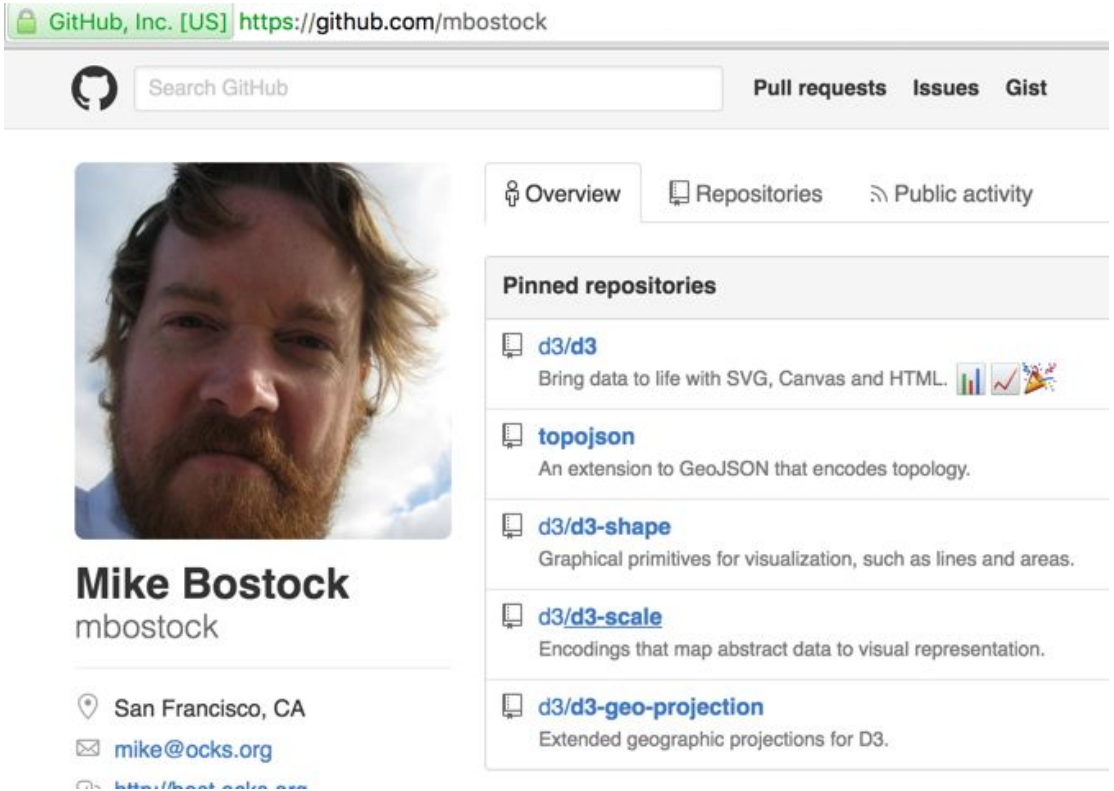
What is D3

“D3.js is a JavaScript library for manipulating documents based on data. D3 helps you bring data to life using HTML, SVG, and CSS. D3’s emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation” - Source d3js.org

What is D3

A Labor of Love by Mike Bostock

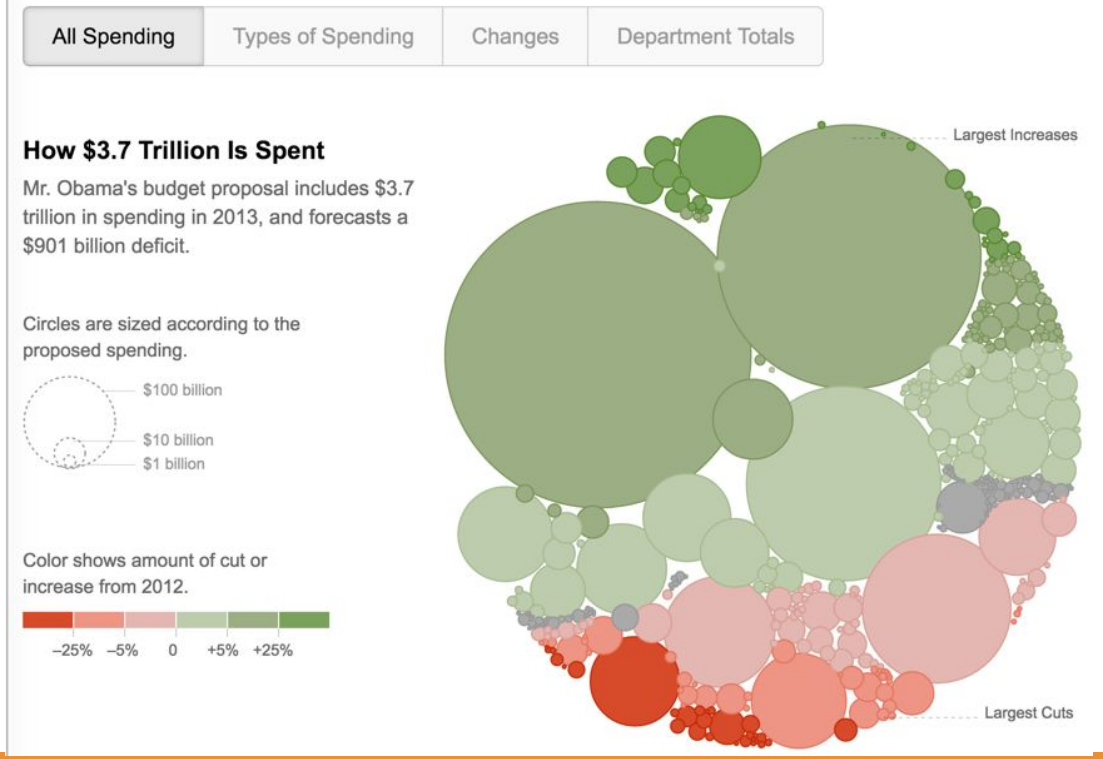
Follow him: @mbostock



Examples

Four ways to slice Obama's Budget (2012)

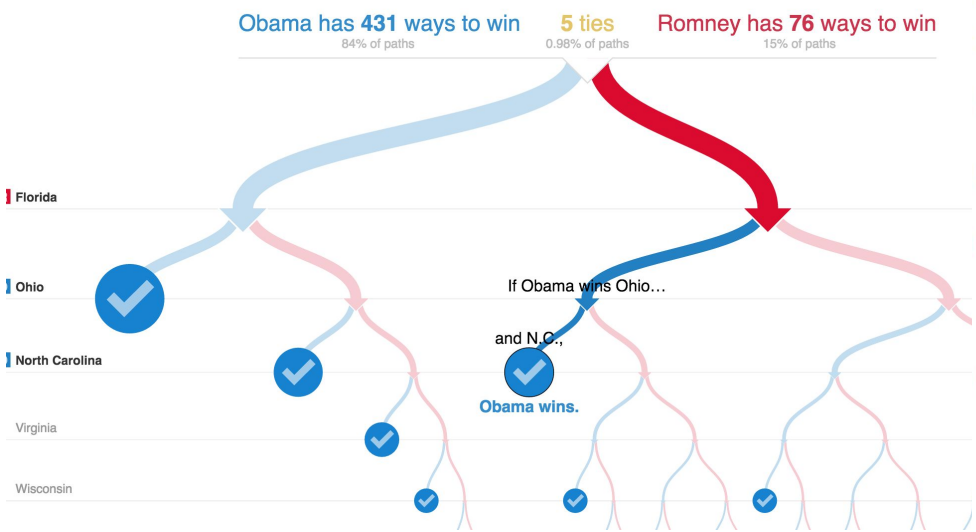
http://www.nytimes.com/interactive/2012/02/13/us/politics/2013-budget-proposal-graphic.html

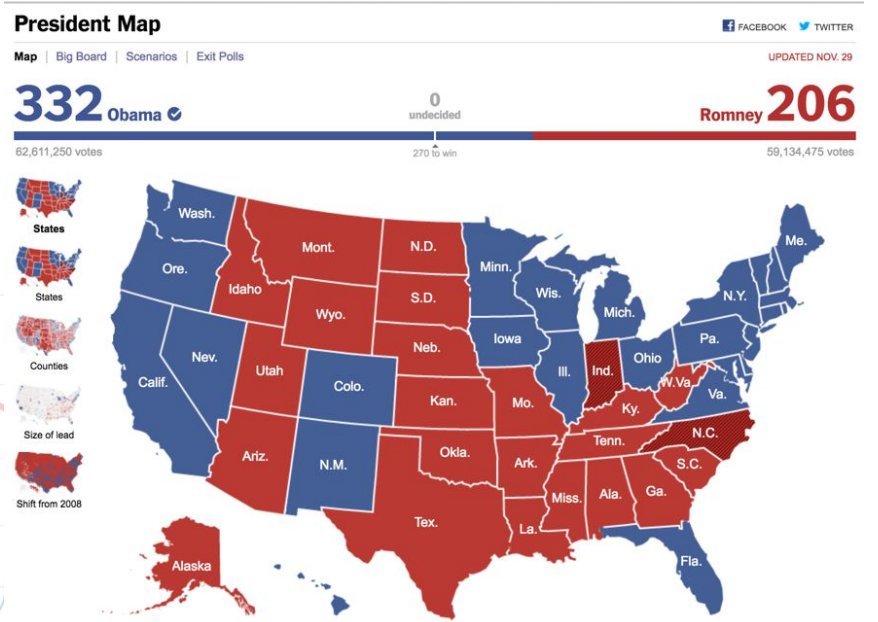


Elections 2012

http://elections.nytimes.com/2012/results/president

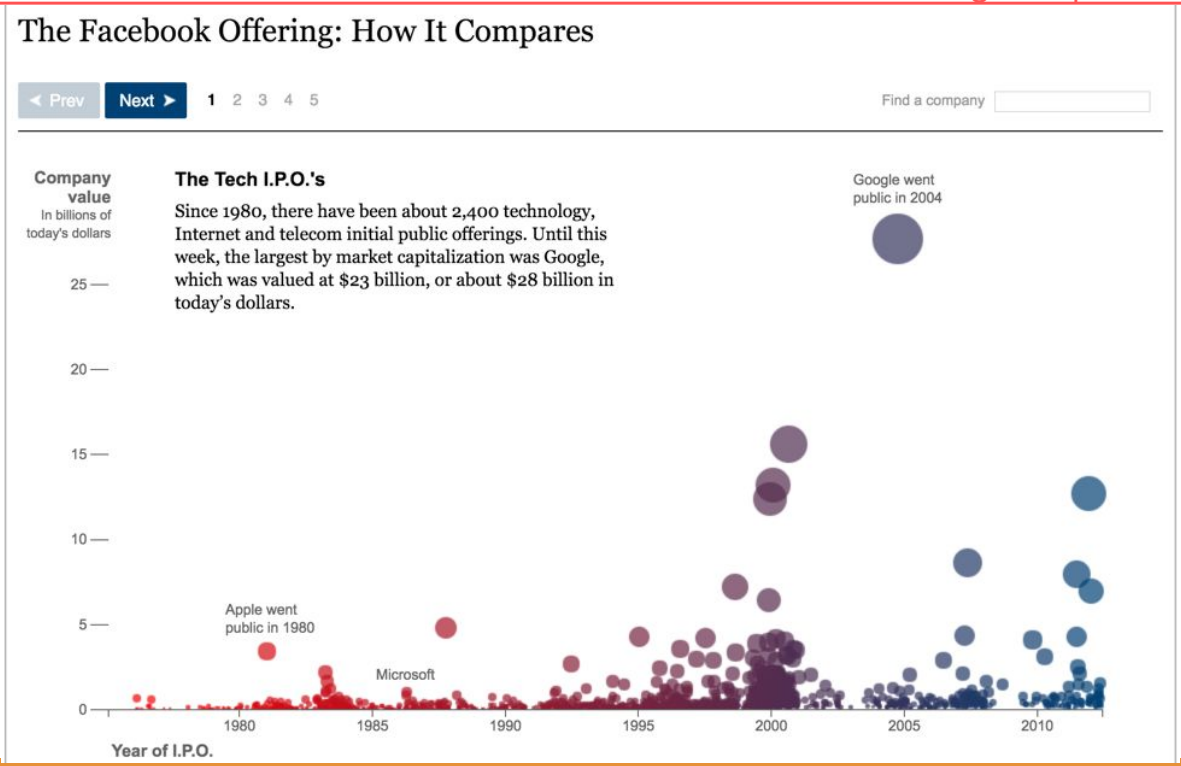
http://www.nytimes.com/interactive/2012/11/02/us/politics/paths-to-the-white-house.html?_r=0





Facebook IPO

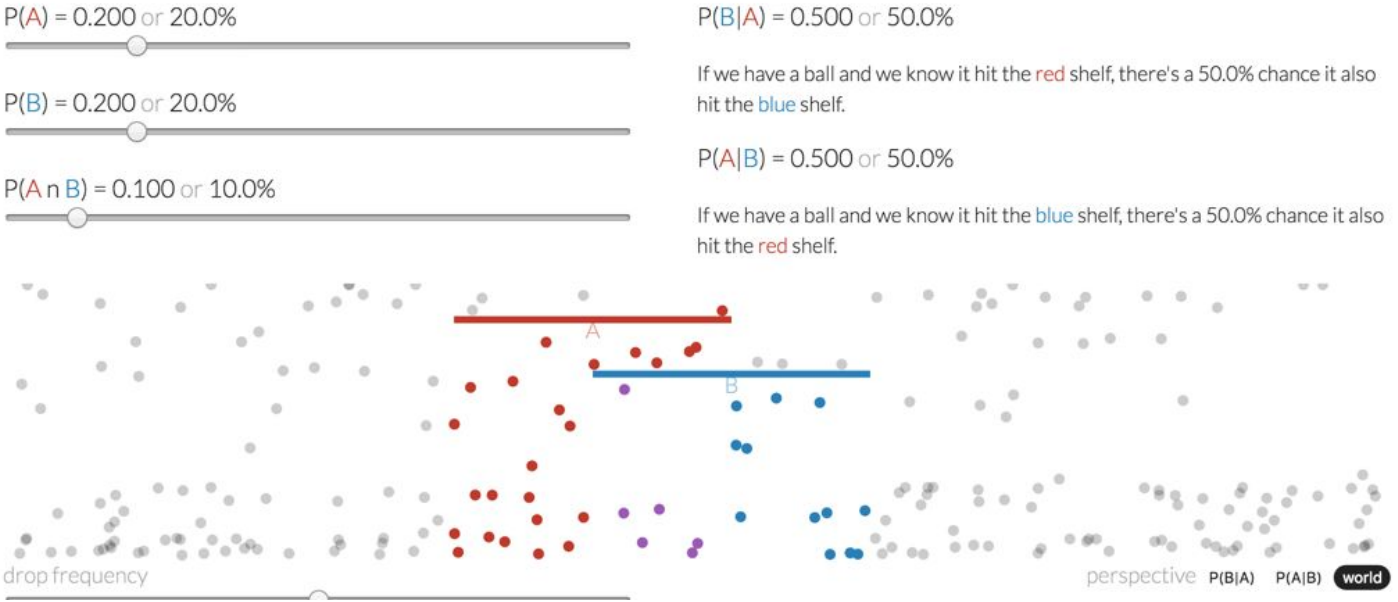
http://www.nytimes.com/interactive/2012/05/17/business/dealbook/how-the-facebook-offering-compares.html



Explained Visually

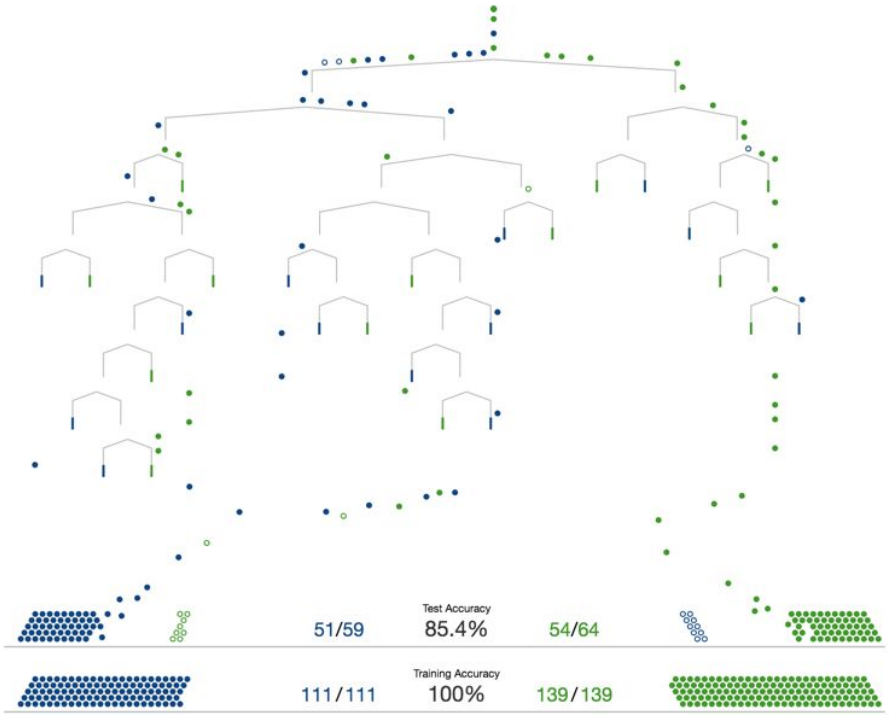
http://setosa.io/ev/conditional-probability/

$$P(B|A) = \frac{P(A|B)P(B)}{P(A)}.$$



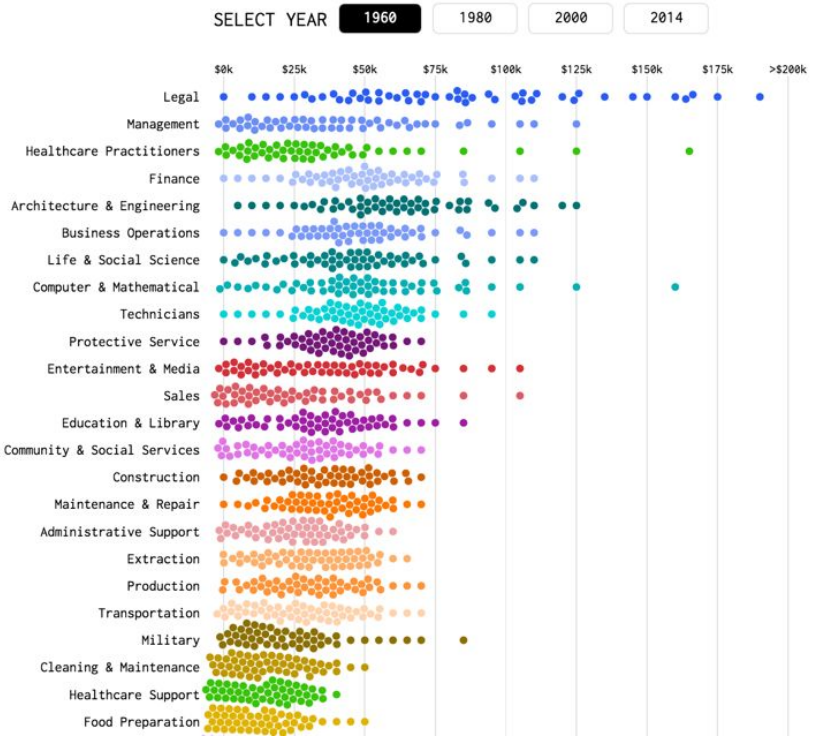
Visual Introduction to ML

http://www.r2d3.us/visual-intro-to-machine-learning-part-1/



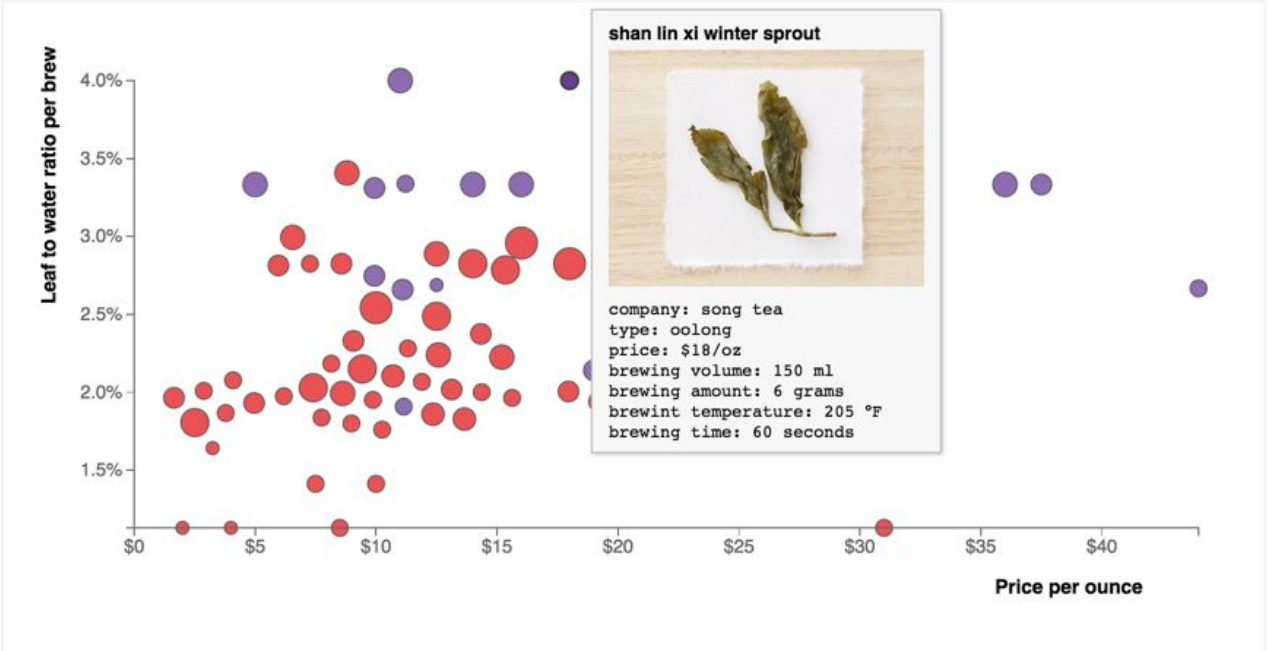
Income Changes by Profession

http://flowingdata.com/2016/06/28/distributions-of-annual-income/



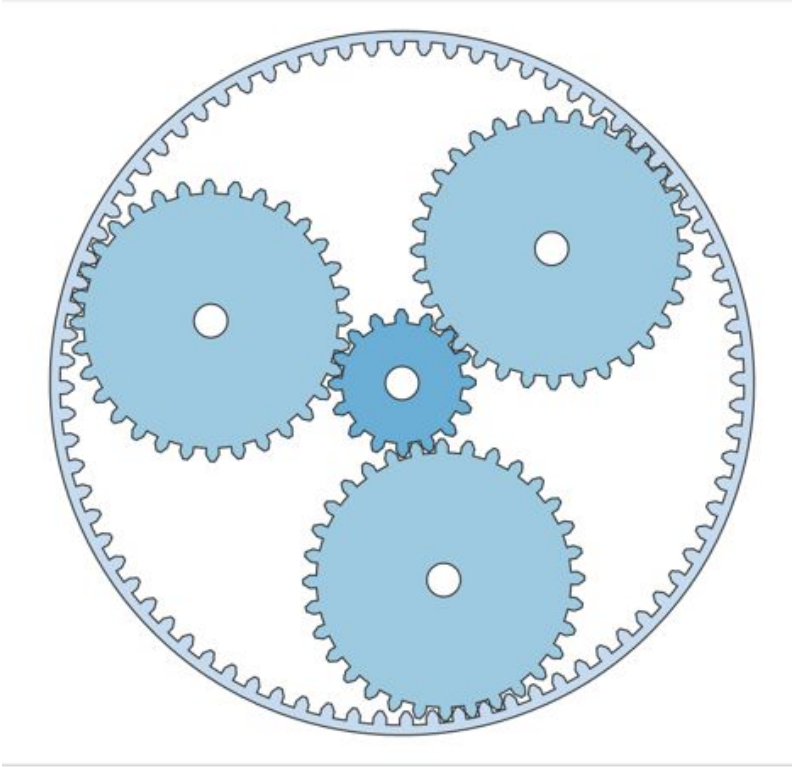
Teaswarm

https://bl.ocks.org/dhoboy/ccafe73e24cf9c36353f2641a4469314



Epicyclic Gearing

https://bl.ocks.org/mbostock/1353700



More Select Examples

- https://bost.ocks.org/mike/nations/
- https://bl.ocks.org/mbostock/346f4d967650b27c0511
- https://bl.ocks.org/kerryrodden/7090426
- Bostock Blocks - http://bl.ocks.org/mbostock
- Tons more at https://bost.ocks.org/<github_handle>

Design Process

- http://chartsnthings.tumblr.com
- http://kpq.github.io/chartsnthings/

What’s D3

JS library for manipulating documents based on data. D3 helps you bring data to life using HTML, SVG and CSS.

Data to Visual Elements on the HTML Document

Before we can get started with D3...

WEB Standards

- HTML - Content, CSS - Style
- JS - Dynamic Scripting
- Data Visualization
  - Canvas - Paint shapes
  - SVG - DOM Shape elements
  - Web GL - 3D (Not going to talk about it)

Let’s learn some JS

http://jsbin.com/

Build SVG by Hand

- Step 0 https://jsfiddle.net/sampathweb/79sxsc69/1/

Reference:

- http://www.w3schools.com/graphics/svg_intro.asp
- https://developer.mozilla.org/en-US/docs/Web/SVG/Element

Getting Started with D3

Creating SVG

```
svg = d3.select("#chart").append("svg")
```

Creating SVG

```
svg = d3.select("#chart").append("svg")
```

Selecting Elements

.selectAll(selector)

.select(selector)

Selects Elements on HTML Document

Append Elements

.append(element**)**

Appends an Child element on the page

Setting Attributes

.attr(properties**)**

Set Properties for the selected element

Setting Style

.style(properties**)**

Set Style properties (CSS) for the selected element

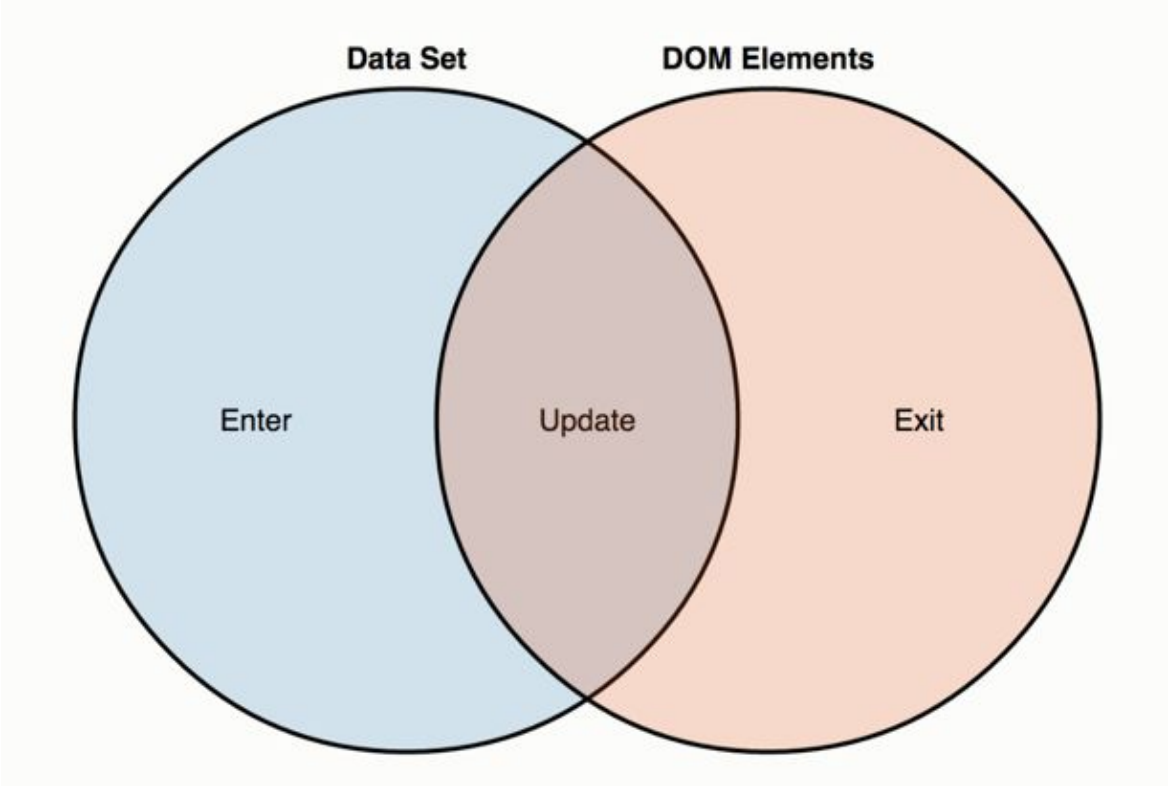
Chaining

```
var chart = d3.select("#chart")
    .append("svg")
    .attr("width", 450)
    .attr("height", 300);
```

D3 - Practice

- https://jsfiddle.net/sampathweb/9mavumdj/4/
- Selections https://jsfiddle.net/sampathweb/fxuooutu/3/

D3 Data Join



D3 Data Join

.data()

Binds Data to DOM Elements

.enter()

.enter()

Add new Elements to DOM

.exit()

.exit()

Removes existing elements from DOM

D3 Enter / Update / Exit Pattern

- Binding Data & Enter Selection https://jsfiddle.net/sampathweb/uomdc945/5/
- Updating Data https://jsfiddle.net/sampathweb/cmj1p2r0/3/
- Transition https://jsfiddle.net/sampathweb/dh7g3k6k/3/
- Transition & Reset: https://jsfiddle.net/sampathweb/qgfa5yxf/1/
- Interactions with CSS: https://jsfiddle.net/sampathweb/ruj4rzn7/1/
- Interactions with D3: https://jsfiddle.net/sampathweb/0hnd241r/2/

D3 Selections & General Update Pattern

- Three little circles
- How selections work
- Thinking with joins
- General Update Pattern
- General Update Pattern II
- General Update Pattern III
- Transitions

There’s Lot more to D3

- Scale
- Axis
- Layouts
- Maps
- Canvas Rendering
- And many more...

D3 Examples Gallery

- https://d3js.org
- https://github.com/d3/d3/wiki/Gallery
- http://bl.ocks.org/

D3 Community

- http://blockbuilder.org/ (Blocks Editor)
- http://kpq.github.io/ (NY Times)
- http://christopheviau.com/d3list/ (Alternative D3 Gallary)
- https://www.jasondavies.com/ (Maps)
- http://www.meetup.com/Bay-Area-d3-User-Group/ (Bay Area D3 Meetup)

Alternatives

- plot.ly
- Bokeh Plotting Library
- plottablejs.org
- Tableau
- Many more

But nothing beats the amazing library of examples in D3.

Will you love D3?

- Maybe?
- Some people love d3, others find it too cumbersome
- Find Examples posted by Mike or others
- Ask questions, it’s a supportive community

Just the Beginning ....

of your Data Visualization Journey