# D3.js

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# What is d3.js?

d3: Data Driven Documents

- Javascript library that allows for dom manipulation based on data
- Provides data manipulation and transformation functions
- Provides a toolkit to abstract mathematical based operations to an extent

"D3 is not a monolithic framework that seeks to provide every conceivable feature. Instead, D3 solves the crux of the problem: efficient manipulation of documents based on data."

# Background Info: Image Formats

Joint Photographic Experts Group (JPEG)

- generally smallest in size for image files but it comes with cons

- uses lossy compression, which means there is loss of data

- best for photos where there are no crisp lines or text.

Portable Network Graphics (PNG)

- allow for crisp lines and text best

- allow for transparency
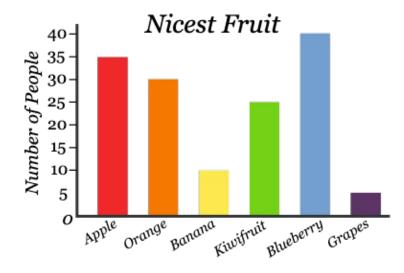
- still lossy compression

Scalable Vector Graphics (SVG)

- drawn from mathematically declared shapes and curves, not pixels

- resolution independent because you provide 'steps' for how an image should be created given a viewport

- best for logos or shapes, not necessarily images of people or posters

# Breaking Down Bar Charts

- Axis
- Scale
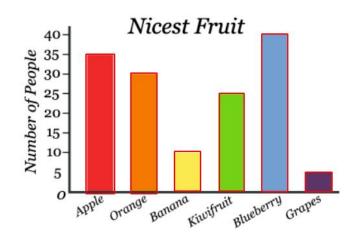- Bars
- Labels

# Axis + Scale

Essence of any
axis in an image is
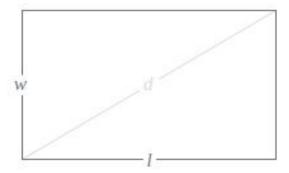that the pixels
map to some
quantity measure
in the chart

# Bars

Thinking about a bar in a bar chart, it's really multiple rectangles well placed
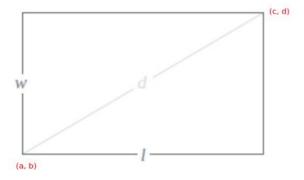


Nicest Fruit

# Rectangles

To form a rectangle, you don't need 4 points, instead you can use 2 points
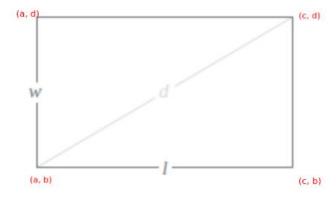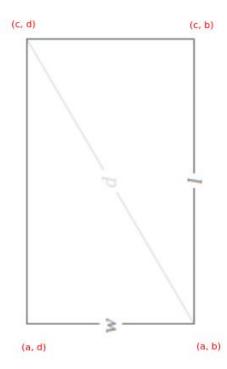
# Rectangles

Choose 2 points lying on a diagonal

# Rectangles

The other 2 points can be determined using the x and y values of collinear points on each 'axis' (width vs length in this case)
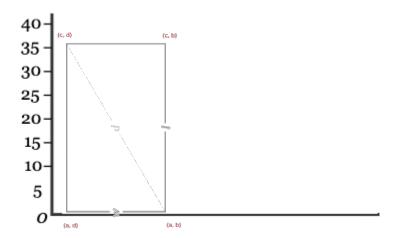
# Rectangles

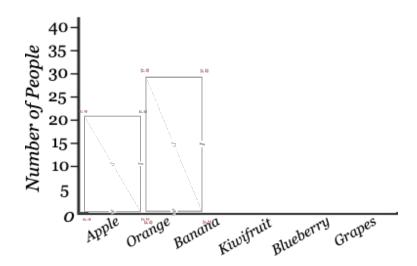To see it more in bar form, let's rotate it by 90 degrees.

# Overlay as a Bar

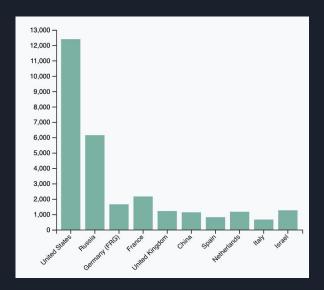The rectangle then is lined up on the x-axis and centered around a label

# Labels

Text is injected into the SVG separately from the shapes

# Bar Chart with d3.js

```javascript
// set the dimensions and margins of the graph
var margin = {top: 30, right: 30, bottom: 70, left: 60},
    width = 460 - margin.left - margin.right,
    height = 400 - margin.top - margin.bottom;

// append the svg object to the body of the page
var svg = d3.select("#my_dataviz")
  .append("svg")
    .attr("width", width + margin.left + margin.right)
    .attr("height", height + margin.top + margin.bottom)
  .append("g")
    .attr("transform",
          "translate(" + margin.left + "," + margin.top + ")");

// Parse the Data
const site = "https://raw.githubusercontent.com/holtzy/data_to_viz/master/
d3.csv(site, function(data) {

// X axis
var x = d3.scaleBand()
  .range([ 0, width ])
  .domain(data.map(function(d) { return d.Country; }))
  .padding(0.2);
svg.append("g")
  .attr("transform", "translate(0," + height + ")")
  .call(d3.axisBottom(x))
  .selectAll("text")
    .attr("transform", "translate(-10,0)rotate(-45)")
    .style("text-anchor", "end");

// Add Y axis
var y = d3.scaleLinear()
  .domain([0, 13000])
  .range([ height, 0]);
svg.append("g")
  .call(d3.axisLeft(y));

// Bars
svg.selectAll("mybar")
  .data(data)
  .enter()
  .append("rect")
    .attr("x", function(d) { return x(d.Country); })
    .attr("y", function(d) { return y(d.Value); })
    .attr("width", x.bandwidth())
    .attr("height", function(d) { return height - y(d.Value); })
    .attr("fill", "#69b3a2")

})
```

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# Cons of d3.js

- it's old (about a decade)
- large library/ bundle size
- there is a large learning curve
- there is a large amount of effort to make basic visualizations
- backwards incompatibility
- hard to modify existing visualization

"When someone is creating just another chart for the dashboard and reaches out for d3 you should raise a red flag 🚩."
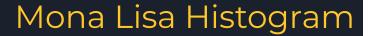
— Adam Mortka

# Bar Chart with Chart.js



https://www.chartjs.org/docs/master/charts/bar.html

**Config**  **Setup**

```
const config = {
  type: 'bar',
  data: data,
};
```
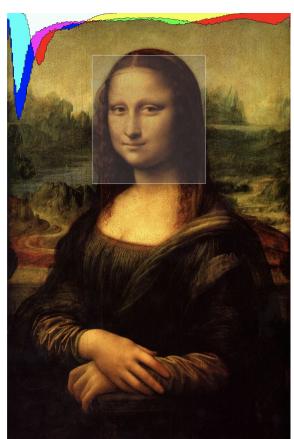
**Config**  **Setup**

```
const labels = Utils.months({count: 7});
const data = {
  labels: labels,
  datasets: [{
    label: 'My First Dataset',
    data: [65, 59, 80, 81, 56, 55, 40],
    backgroundColor: '#69b3a2'
  }]
};
```

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# Mona Lisa Histogram

Pixel values from the square zone are shown as a histogram on top

https://observablehq.com/@d3/mona-lisa-histogram
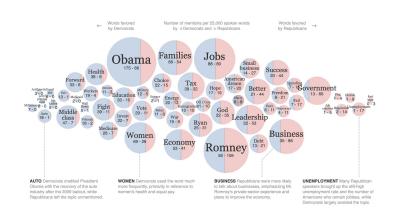
# Convention Word Count

A comparison of how often speakers at the two presidential nominating conventions used different words and phrases, based on an analysis of transcripts from the Federal News Service.

https://archive.nytimes.com/www.nytimes.com/interactive/2012/09/06/us/politics/convention-word-counts.html



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# Constellations of Directors and Their Stars

A long-running relationship between an actor and a director can indicate an artistic understanding, a functional routine or even a marketing strategy. Here, a selection of notable directors are shown with actors they cast in at least four films.

https://www.nytimes.com/newsgraphics/2013/09/07/director-star-chart/index.html

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# Pros of d3.js

- Able to visualize anything
    - Just need an idea and data
- Conforms to web standards by sticking with HTML, SVG, and CSS
- Provides you with functions to manipulate elements for visualizations
- Ability to add event listeners, attributes, css, etc to visualizations
- Can provide animation of visuals with data interpolation

"D3 is not a monolithic framework that seeks to provide every conceivable feature. Instead, D3 solves the crux of the problem: efficient manipulation of documents based on data."

# TLDR

Use a modern day framework like chart.js for

    basic charts and cookiecutter templates

Use d3.js for

    creative visualizations that don't necessarily have solutions yet

# Questions?

# Thank you