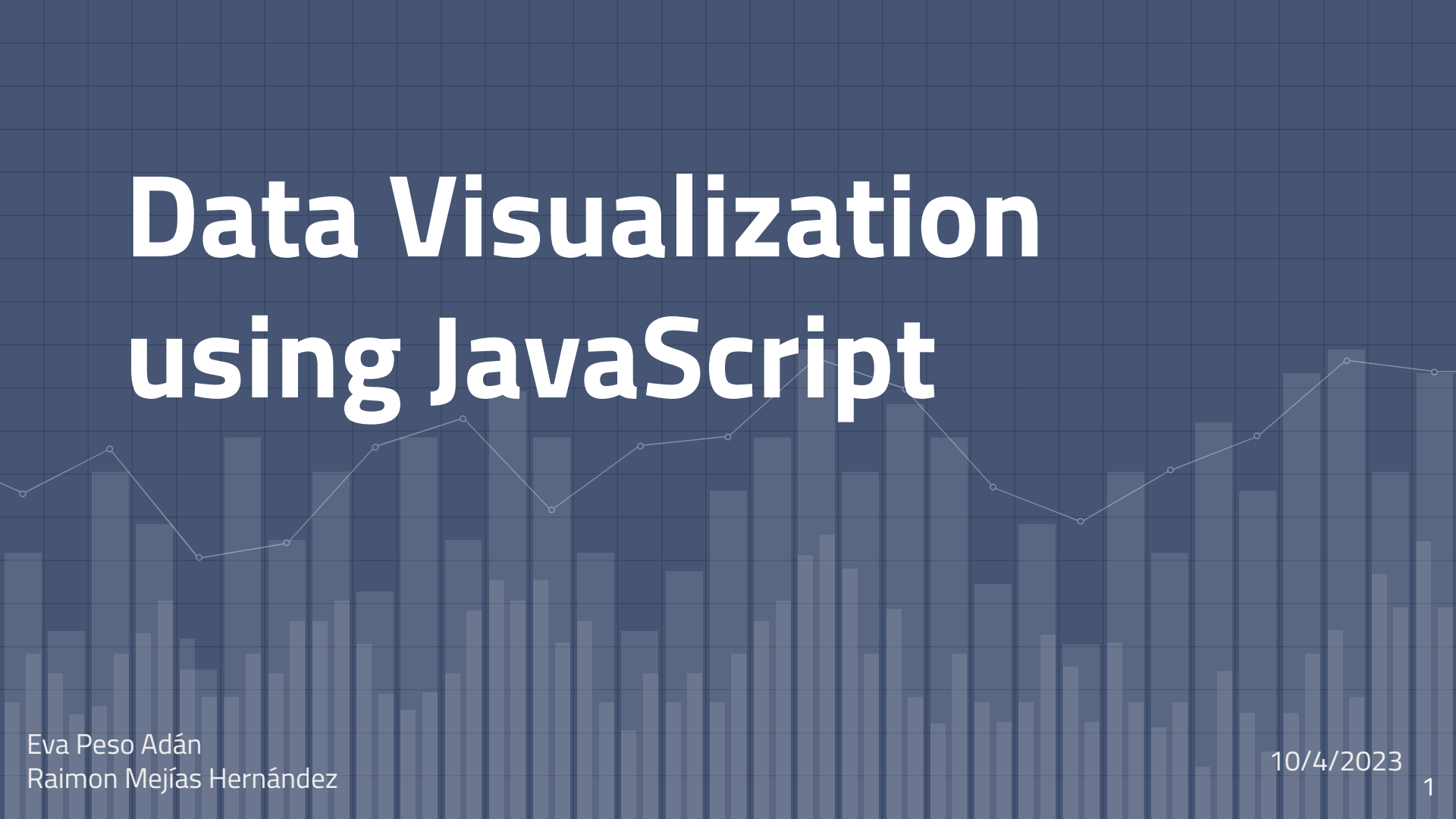


Data Visualization using JavaScript

The background features a dark blue grid. A white line chart with circular markers is positioned in the upper right, showing a fluctuating trend. Below it, a bar chart with vertical bars of varying heights is visible, rendered in a lighter blue shade.

ABOUT US



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Eva Peso Adán

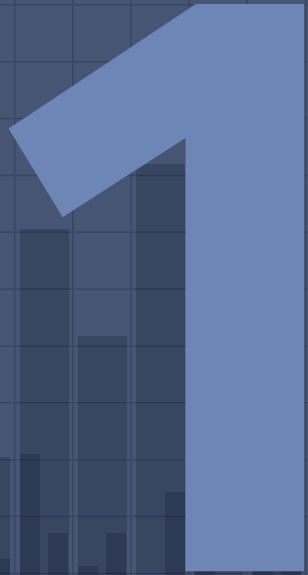
✉ alu0101398037@ull.edu.es

✉ peso.adan.05@ull.edu.es

CONTENT

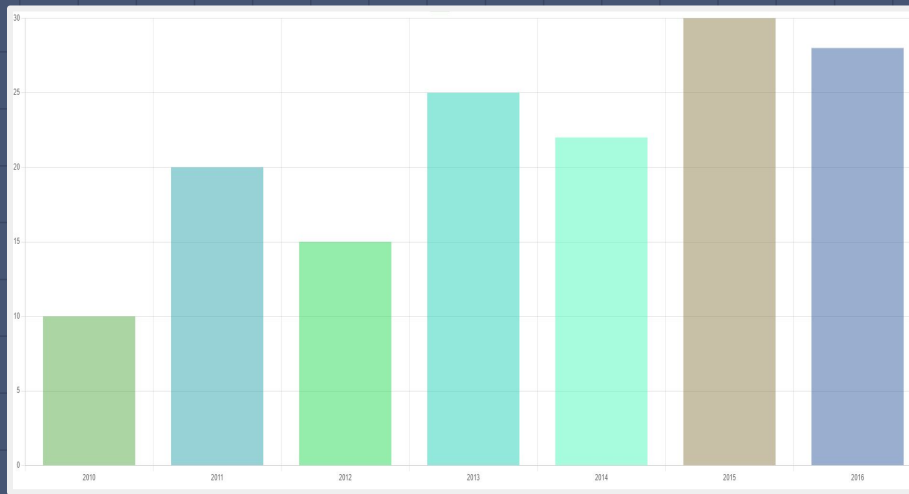
- 1) What is Data Visualization?
 - 2) Malicious Practices
 - 3) Good Practices
 - 4) Data Visualization Libraries
 - 5) Chart.js
 - 6) Examples
- 
- A decorative background graphic at the bottom of the slide. It features a light blue line graph with circular markers at various points, overlaid on a dark blue bar chart. The bars and line are semi-transparent, creating a layered effect.

What is Data Visualization?



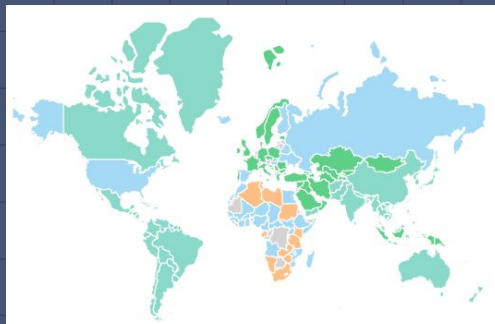
INTRODUCTION

“Data visualization” refers to the graphical representation of data.

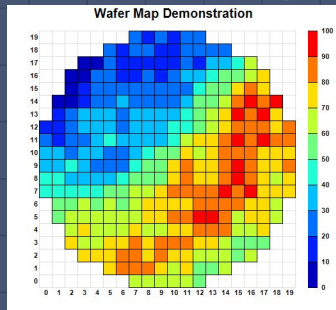


This chart was made using Chart.js

INTRODUCTION



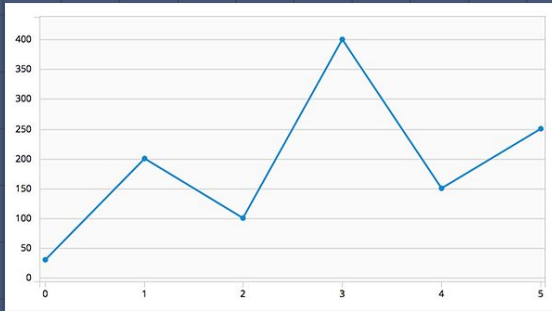
There are not only charts, but also infographics and plots



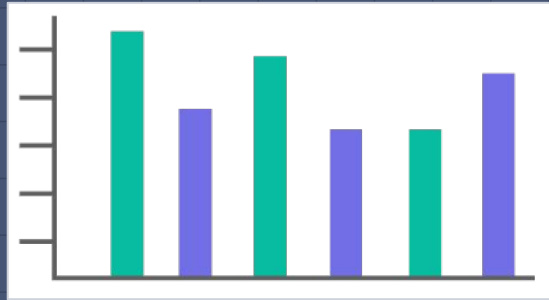
It must meet two conditions:

- 1) The elements vary according to the data.
- 2) It has to be understandable by humans.

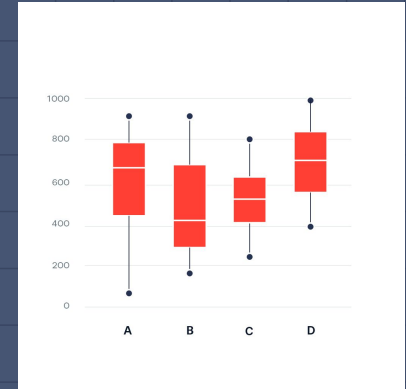
TYPES OF CHARTS



Line chart



Bar chart

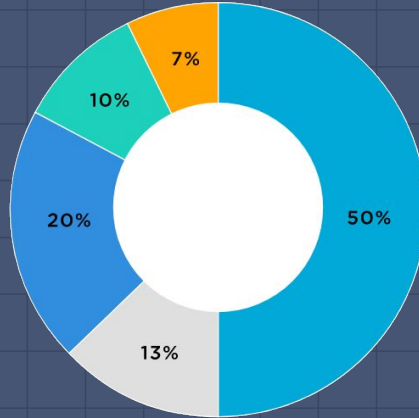


Box chart

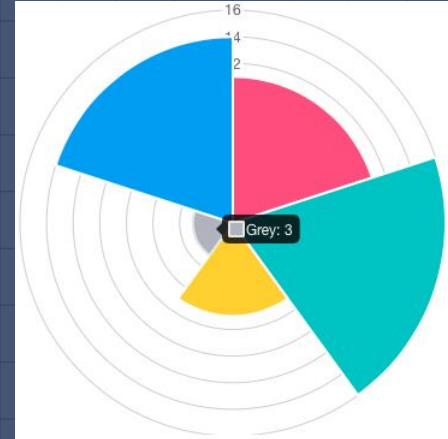
TYPES OF CHARTS



Pie chart

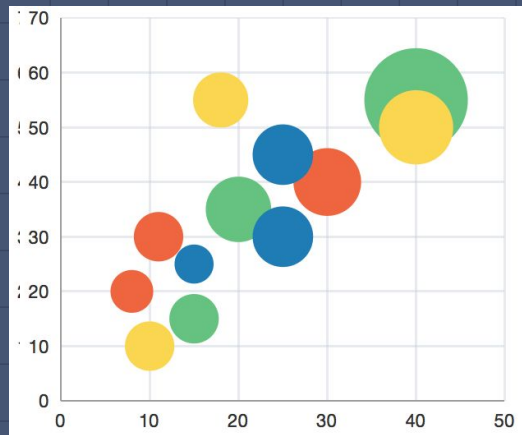


Doughnut chart

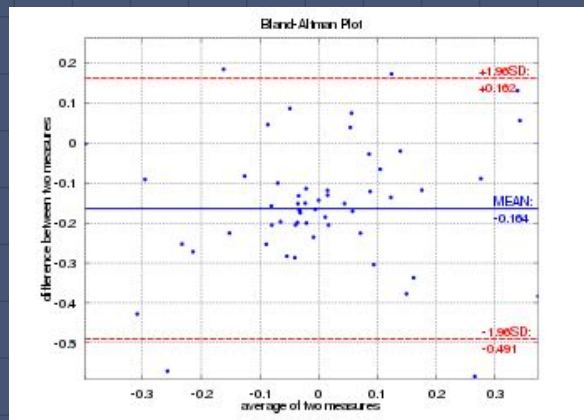


Polar chart

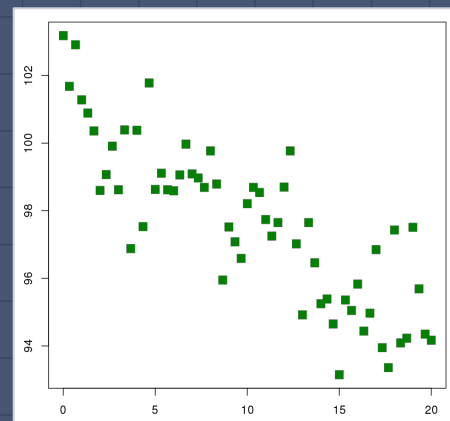
TYPES OF CHARTS



Bubble chart

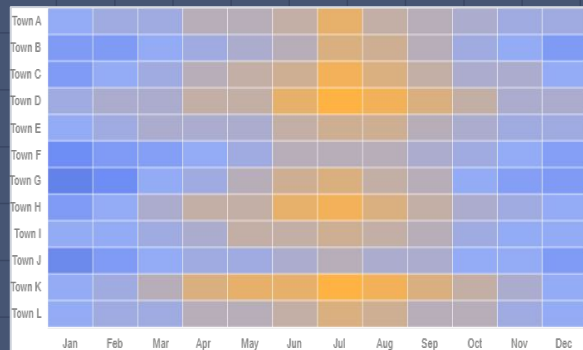


Bland-Altman chart

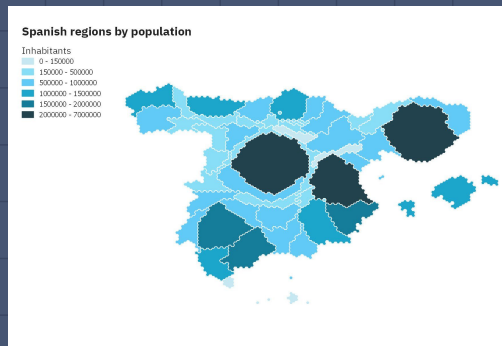


Scatter chart

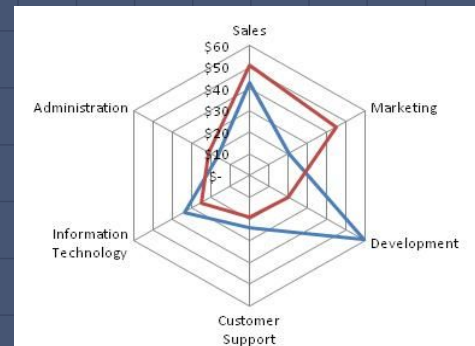
AND EVEN MORE TYPES OF CHARTS



Heat maps



Cartogram

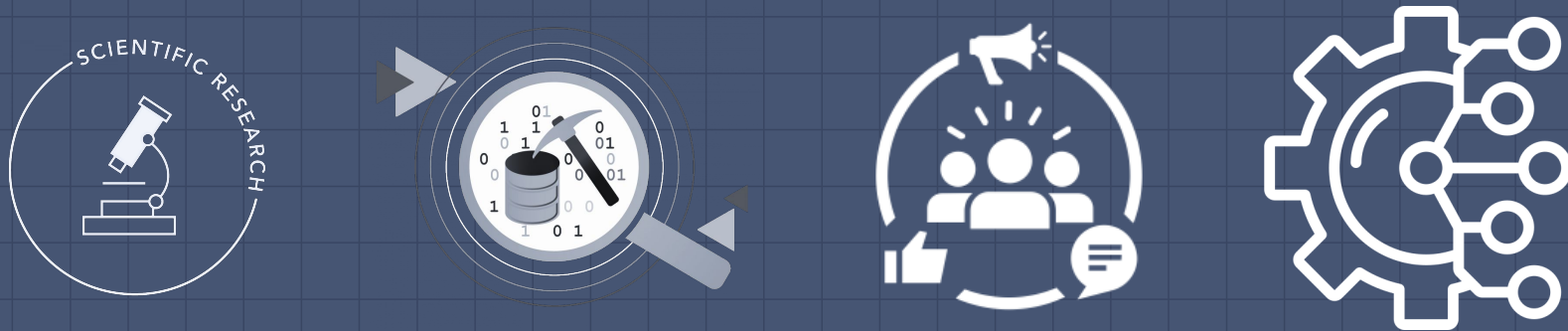


Radial chart

...and that's still not even half of them!

IMPORTANCE

Data visualization is increasingly applied as a critical component in:



It is an indispensable part of all applied research and problem solving in industry.

IMPORTANCE

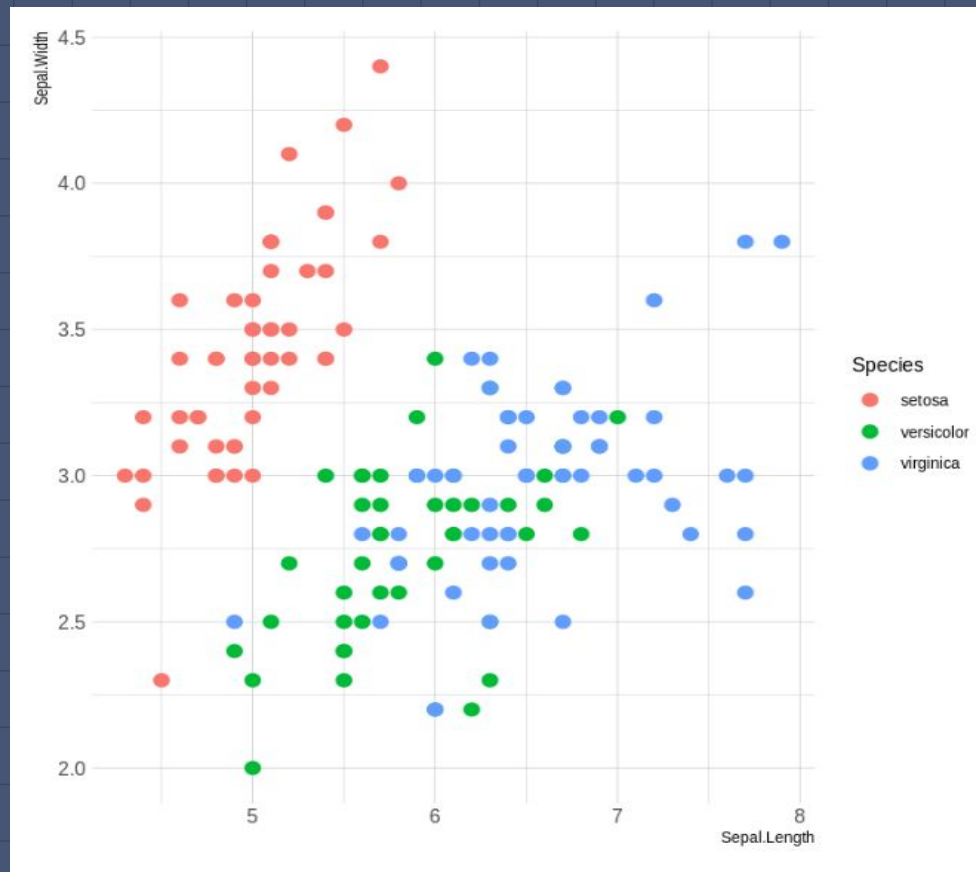
What conclusions can you draw from this data?

Dataset order ↕	Sepal length ↕	Sepal width ↕	Petal length ↕	Petal width ↕	Species ↕
1	5.1	3.5	1.4	0.2	<i>I. setosa</i>
2	4.9	3.0	1.4	0.2	<i>I. setosa</i>
3	4.7	3.2	1.3	0.2	<i>I. setosa</i>
4	4.6	3.1	1.5	0.2	<i>I. setosa</i>
5	5.0	3.6	1.4	0.3	<i>I. setosa</i>
6	5.4	3.9	1.7	0.4	<i>I. setosa</i>
7	4.6	3.4	1.4	0.3	<i>I. setosa</i>
8	5.0	3.4	1.5	0.2	<i>I. setosa</i>
9	4.4	2.9	1.4	0.2	<i>I. setosa</i>
100	5.7	2.8	4.1	1.3	<i>I. versicolor</i>
101	6.3	3.3	6.0	2.5	<i>I. virginica</i>
102	5.8	2.7	5.1	1.9	<i>I. virginica</i>
103	7.1	3.0	5.9	2.1	<i>I. virginica</i>
104	6.3	2.9	5.6	1.8	<i>I. virginica</i>
105	6.5	3.0	5.8	2.2	<i>I. virginica</i>
106	7.6	3.0	6.6	2.1	<i>I. virginica</i>
107	4.9	2.5	4.5	1.7	<i>I. virginica</i>
108	7.3	2.9	6.3	1.8	<i>I. virginica</i>
109	6.7	2.5	5.8	1.8	<i>I. virginica</i>
110	7.2	3.6	6.1	2.5	<i>I. virginica</i>

IMPORTANCE

Analyzing data becomes much easier when presented visually.

Humans are visual creatures, after all.



ADVANTAGES

- Makes it easier to search for patterns
- Data is processed faster
- Helps making better decisions



HOWEVER...

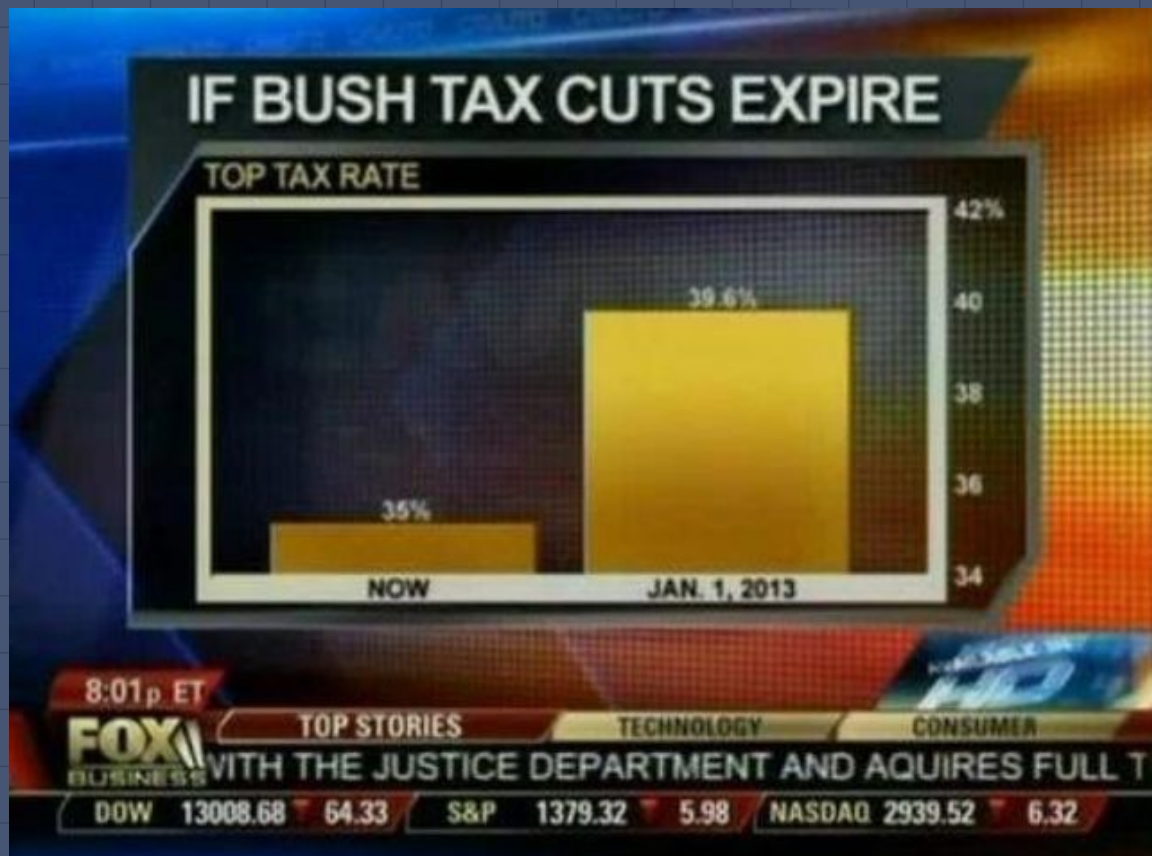
Visualized data can be manipulated to mislead people!



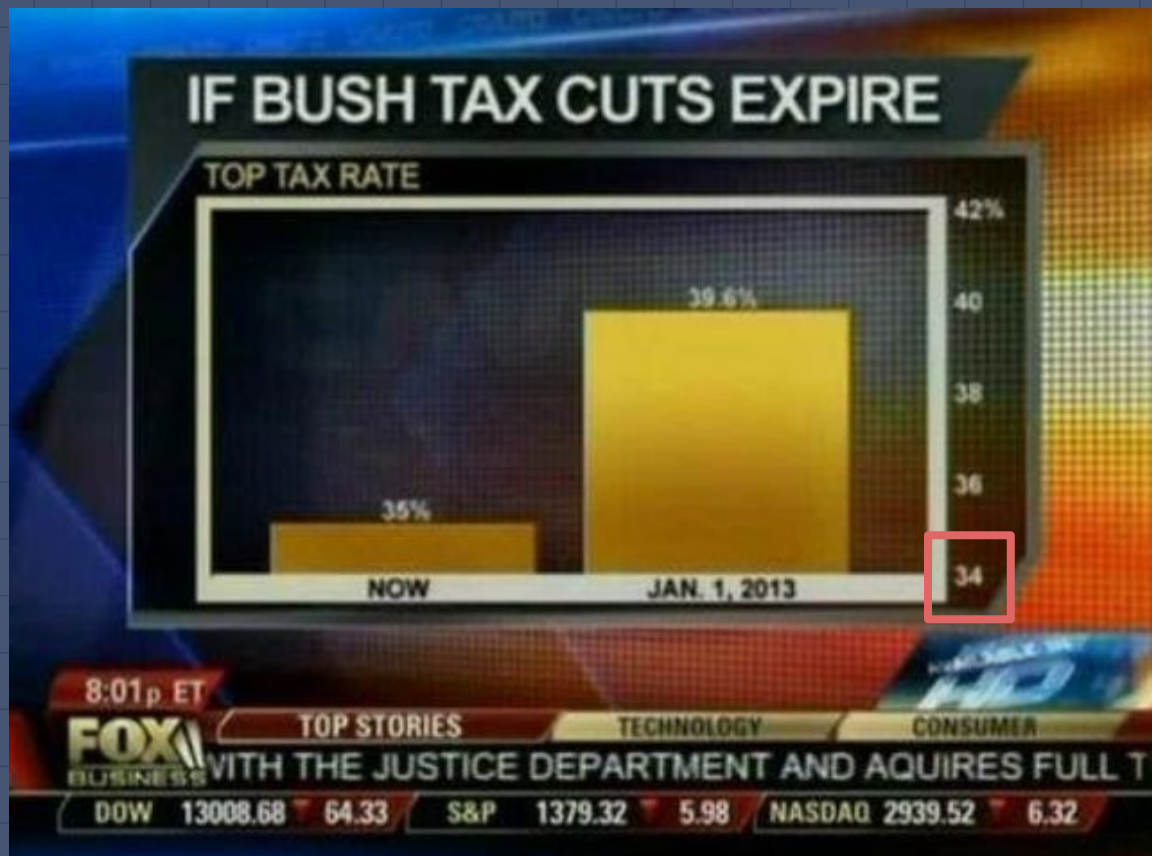
Malicious Practices

2

TRUNCATING THE AXIS



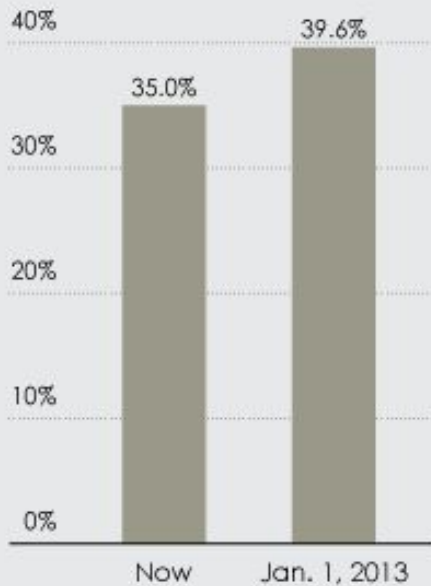
TRUNCATING THE AXIS



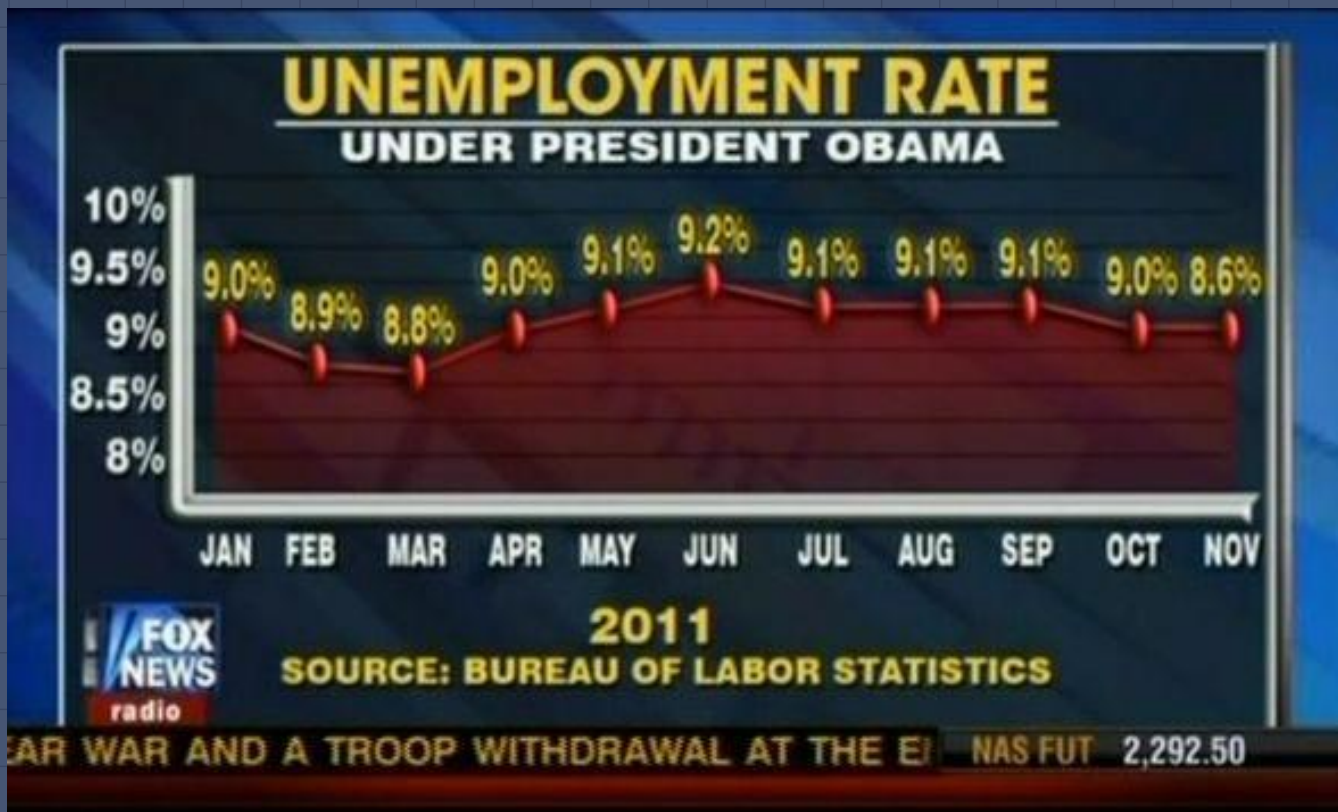
TRUNCATING THE AXIS

If Bush tax cuts expire...

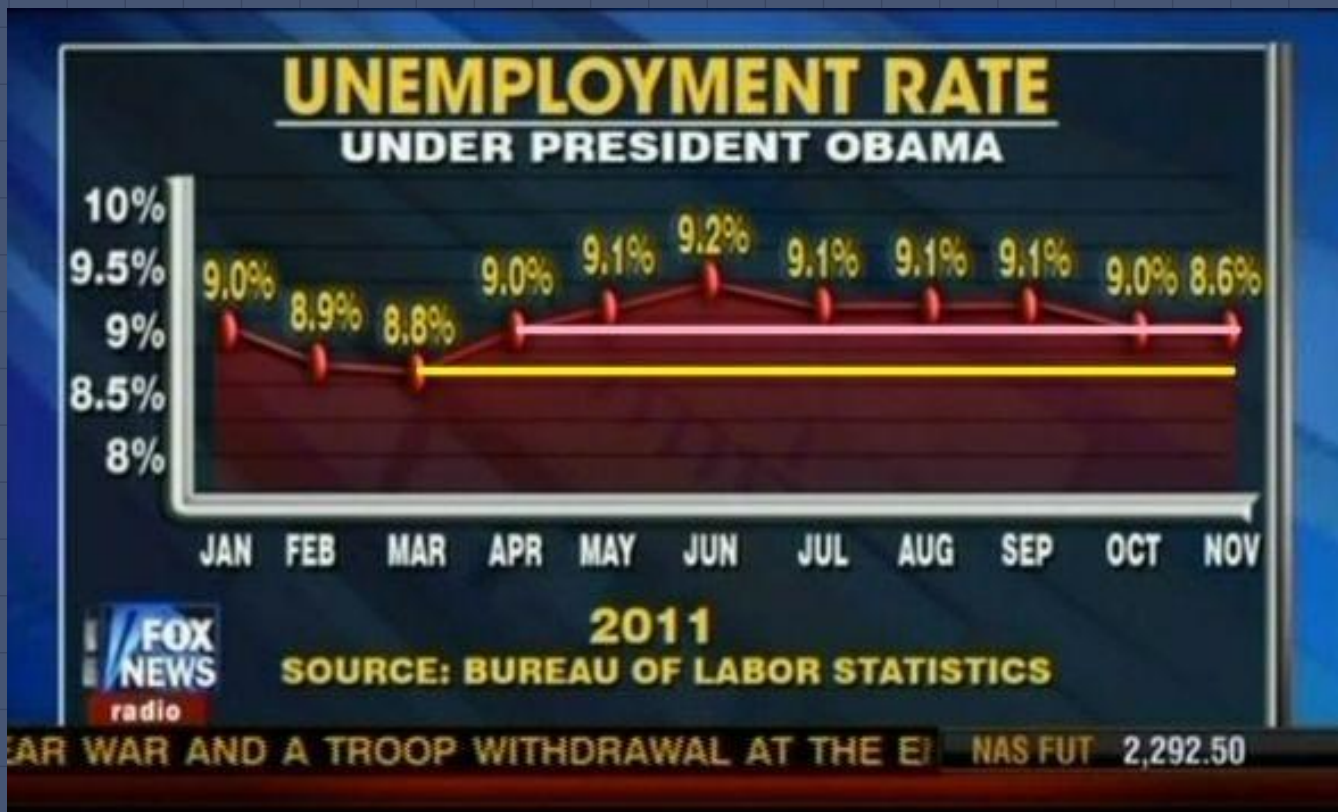
Top tax rate



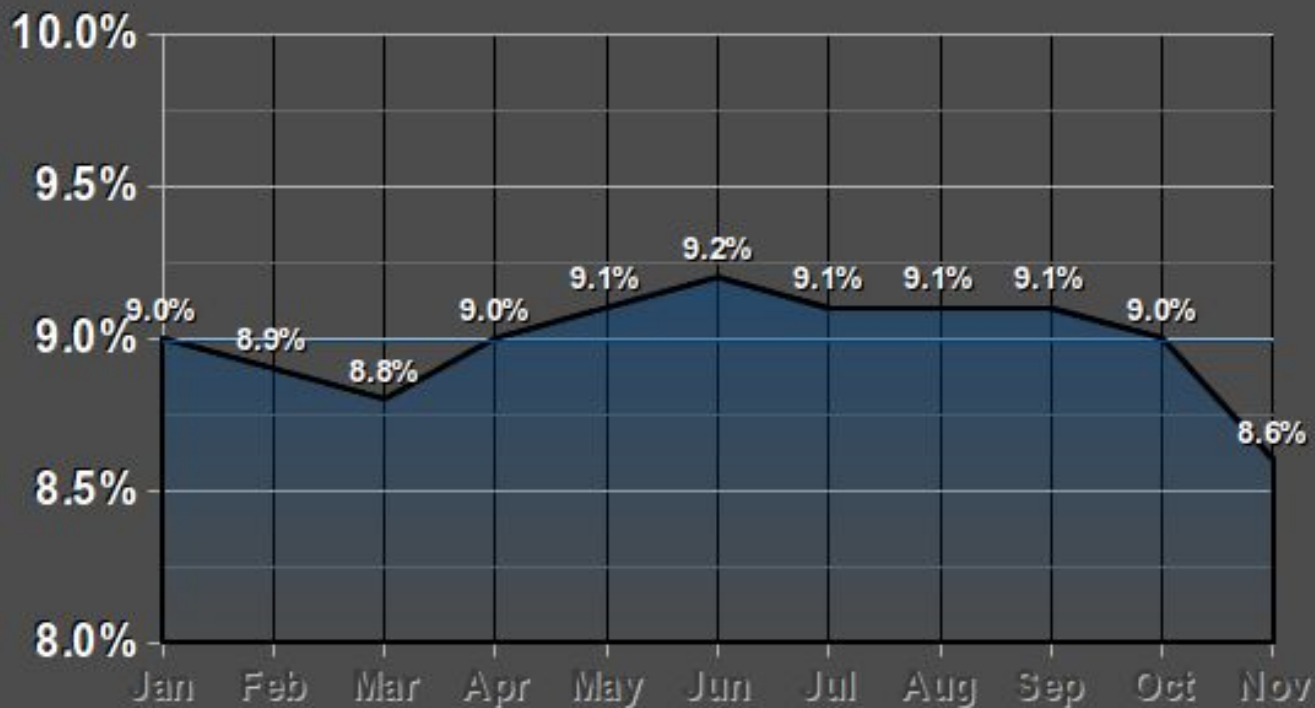
PLOTTING INCORRECTLY



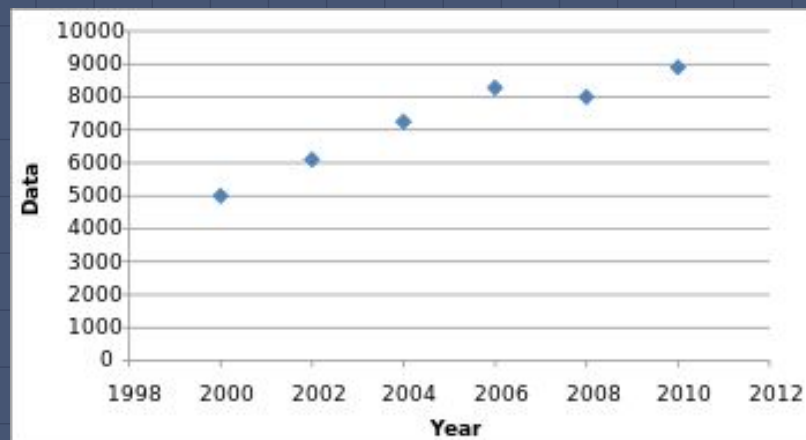
PLOTTING INCORRECTLY



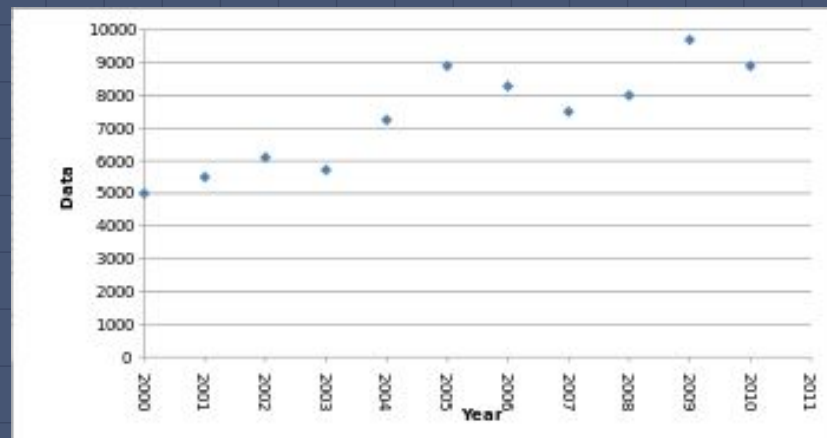
PLOTTING INCORRECTLY



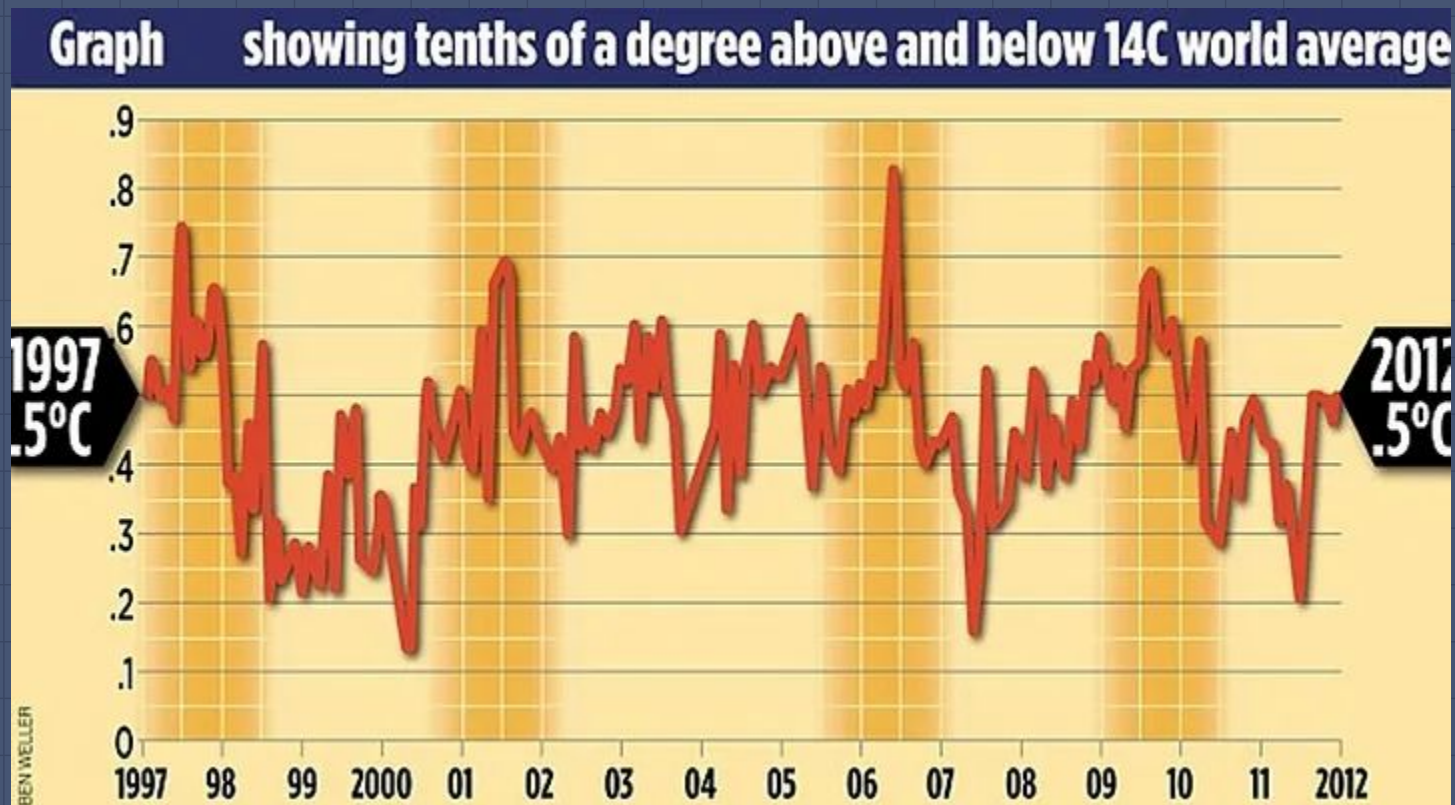
OMITTING DATA



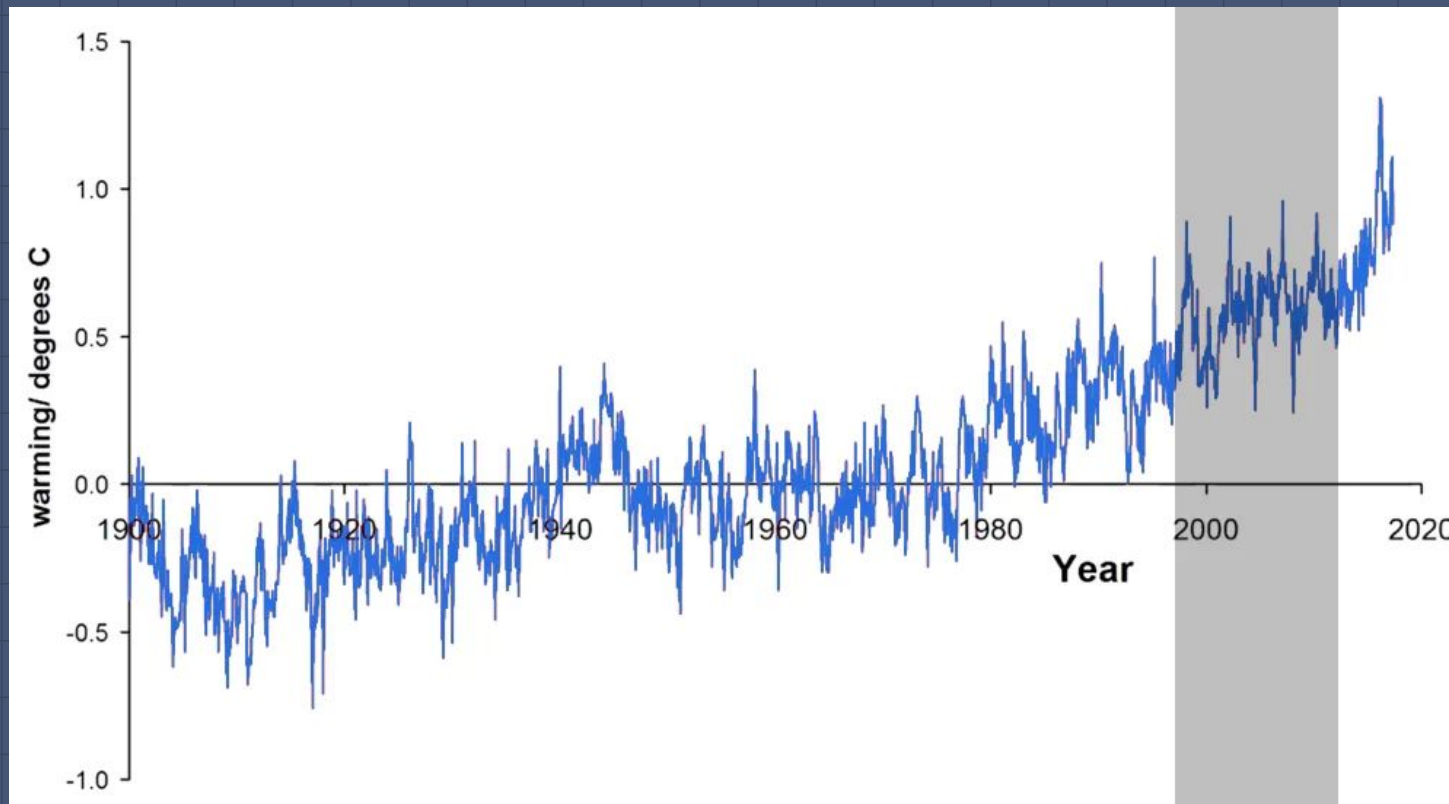
OMITTING DATA



CHERRY PICKING



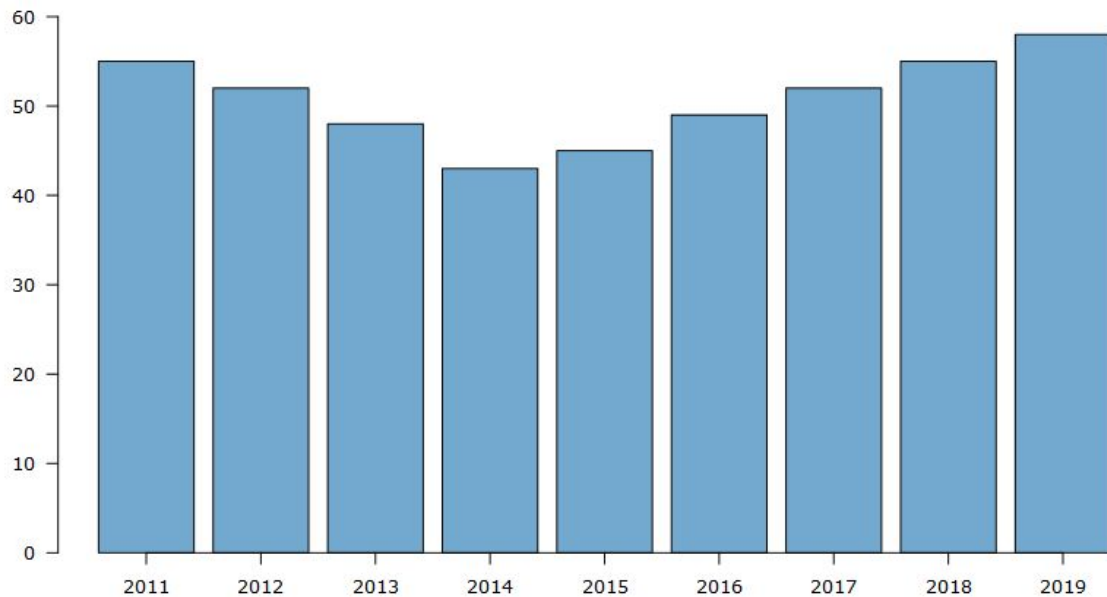
CHERRY PICKING



Good Practices

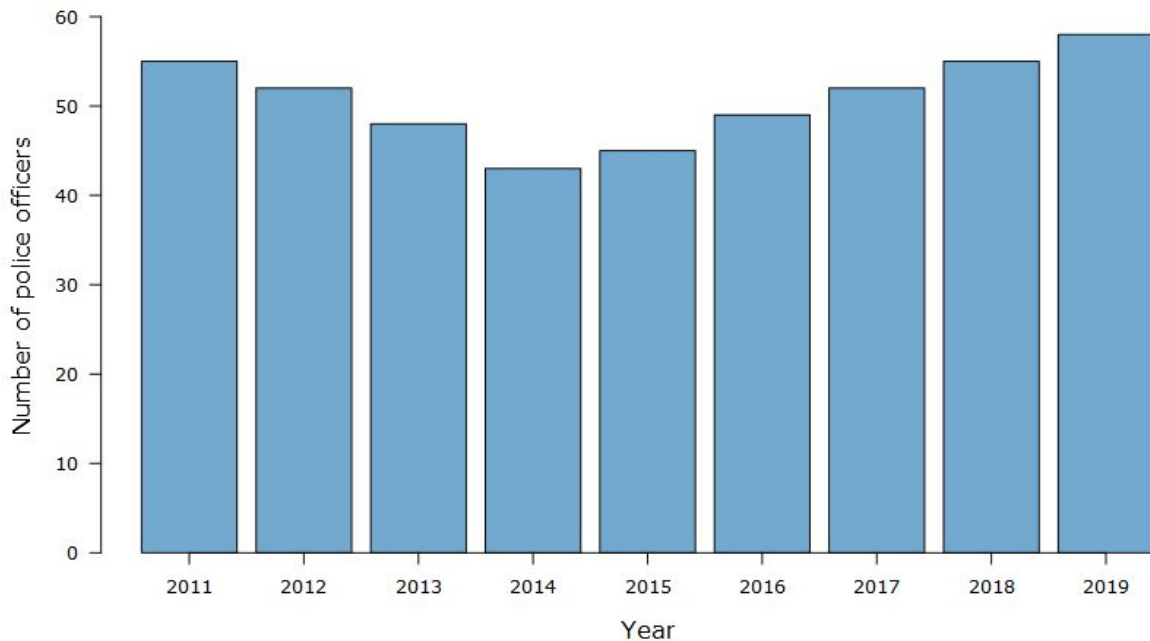
3

WRITE THE LABELS AND LEGEND

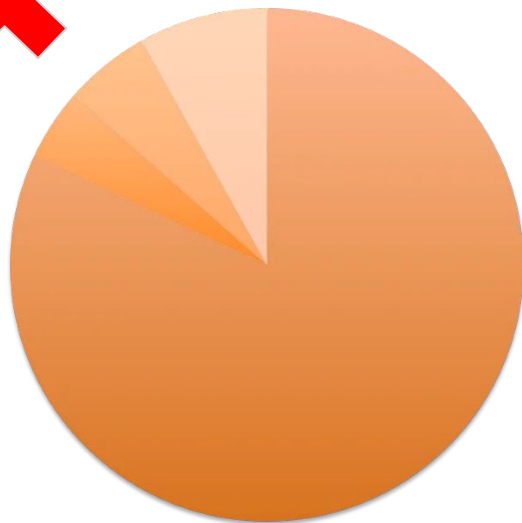


WRITE THE LABELS AND LEGEND

Chart 5.2.1
Number of police officers in Crimeville, 2011 to 2019

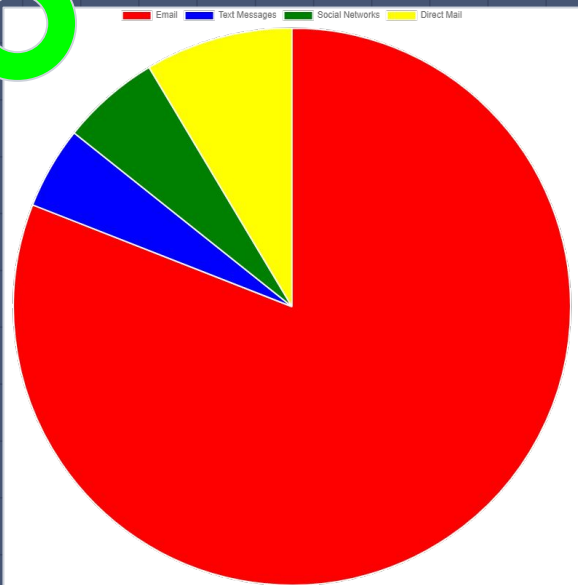


CHOOSE DISTINCTIVE COLORS



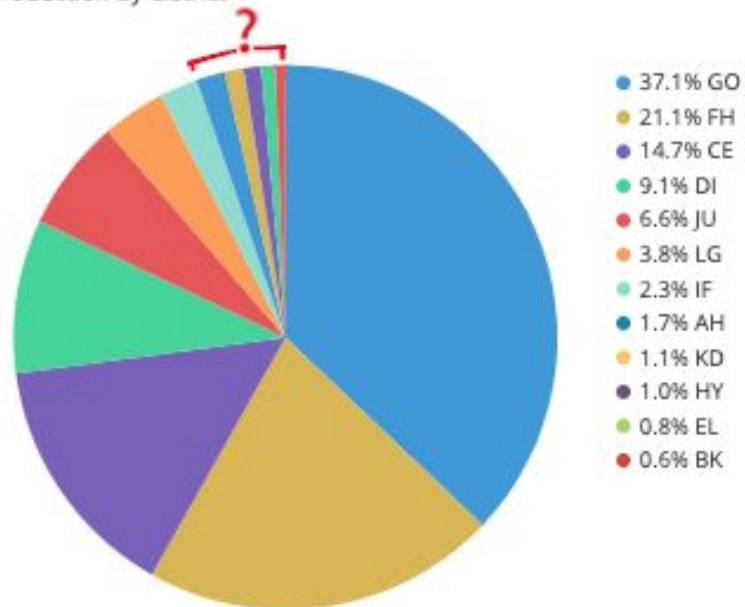
■ Email
■ Text Messages
■ Social Networks
■ Direct Mail

Source: ExactTarget

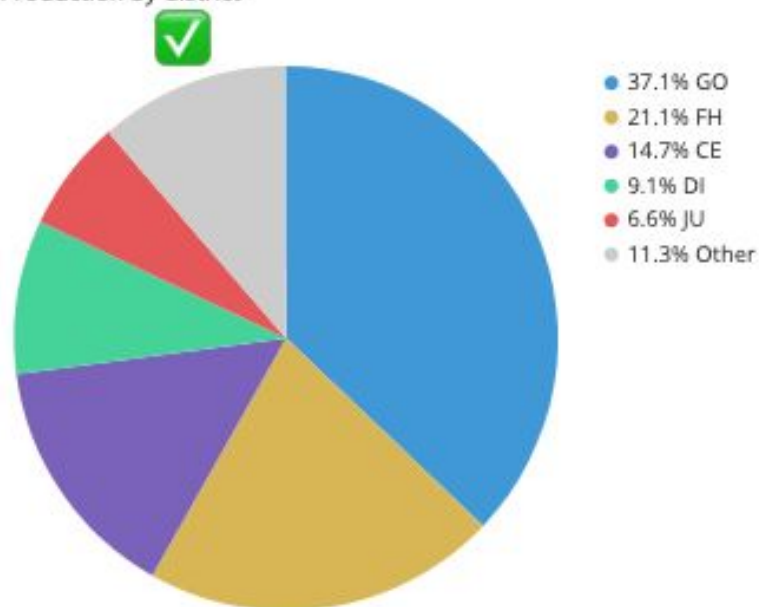


KEEP IT CLEAR

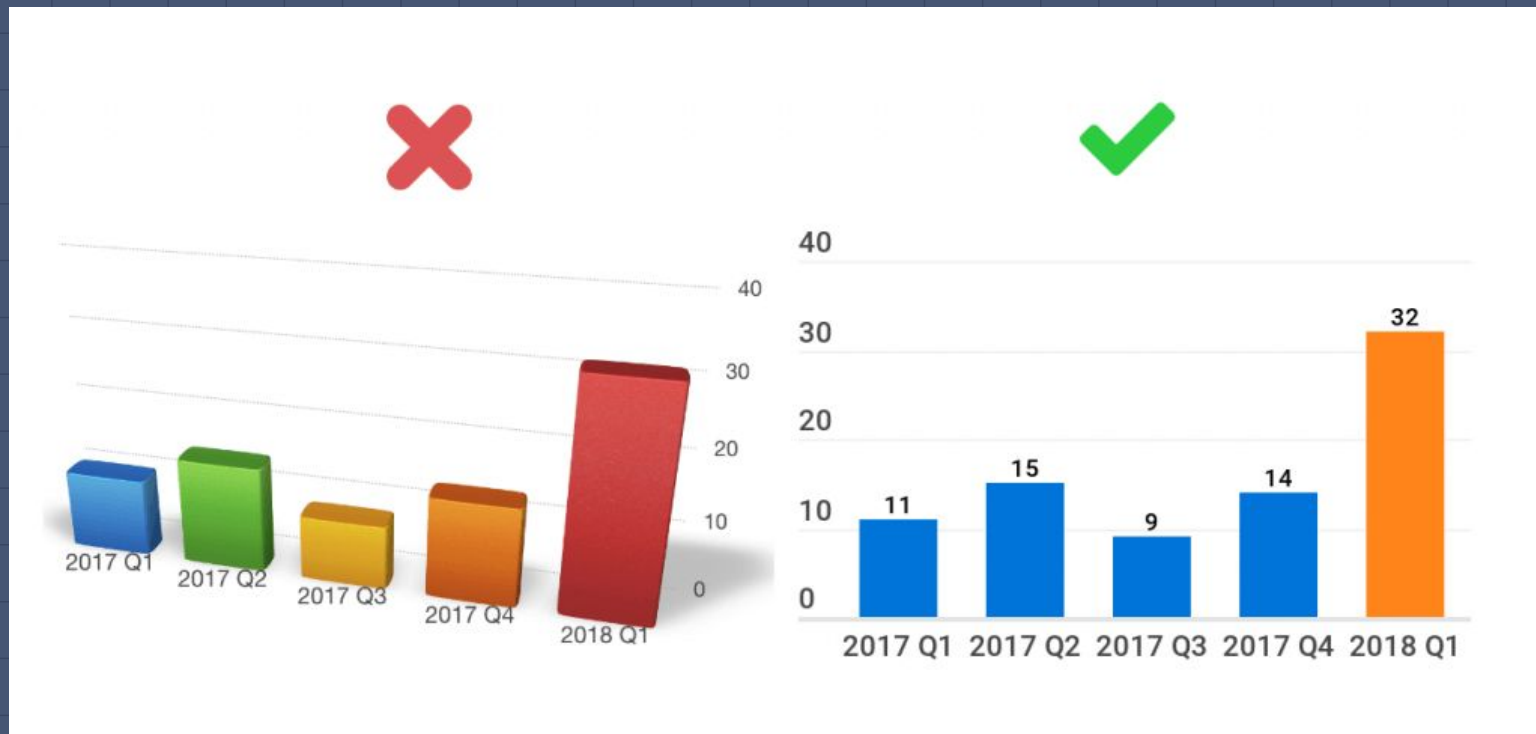
Production by district



Production by district



SIMPLE IS BETTER

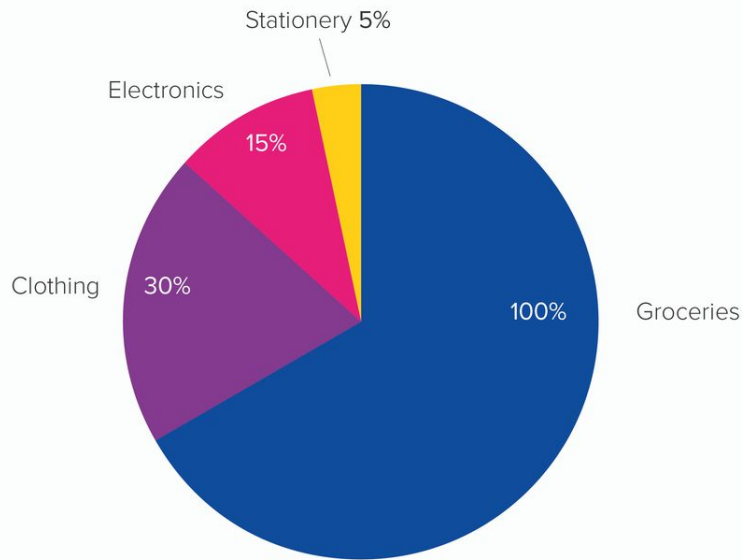


PICK THE PROPER CHART FOR THE JOB

The percentages on a pie chart must add up to 100%!

What caused our record growth?

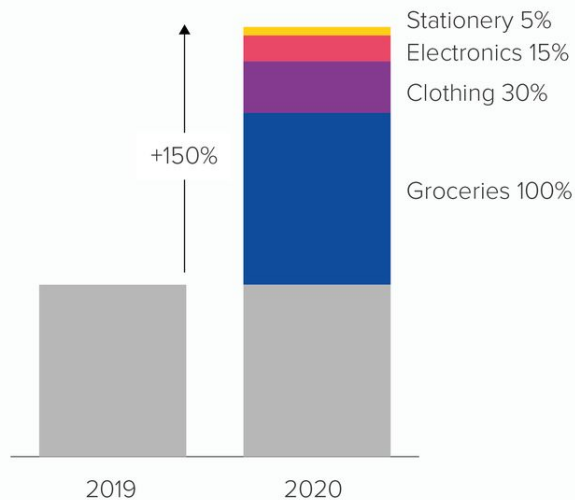
How our 150% sales increase breaks down




PICK THE PROPER CHART FOR THE JOB

What caused our record growth?

How our 150% sales increase breaks down





"The main goal of data visualization is to communicate information clearly and effectively... It doesn't mean that data visualization needs to look boring to be functional or extremely sophisticated to look beautiful..."

- Vitaly Friedman -

Data Visualization Libraries

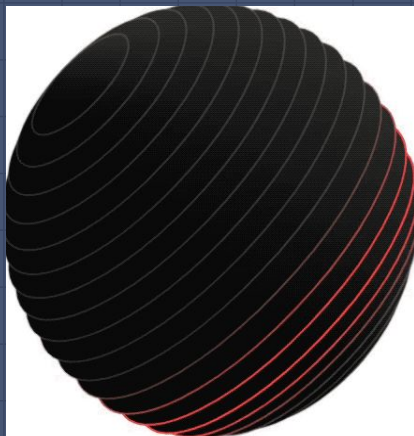


INTRODUCTION

JavaScript offers many libraries for visualizing data.

CHART LIBRARIES EXAMPLES

Creating charts and graph animations



anime

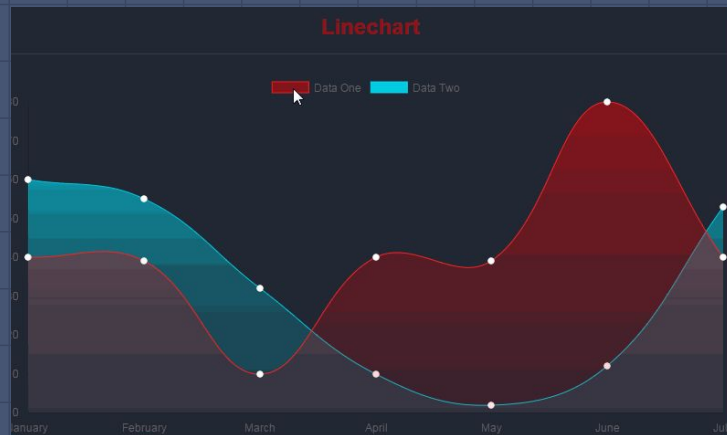
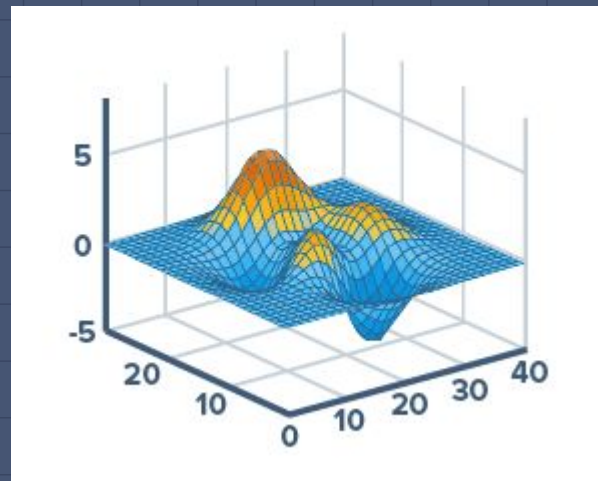
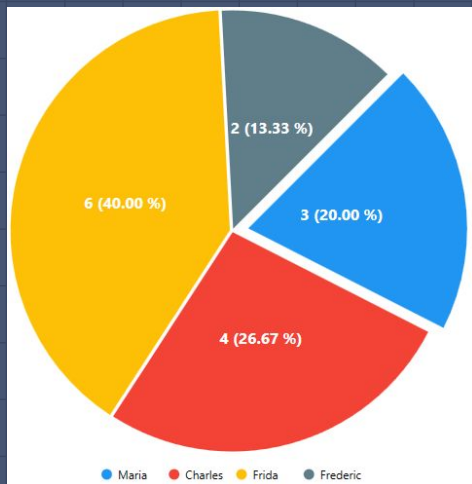


CHART LIBRARIES EXAMPLES

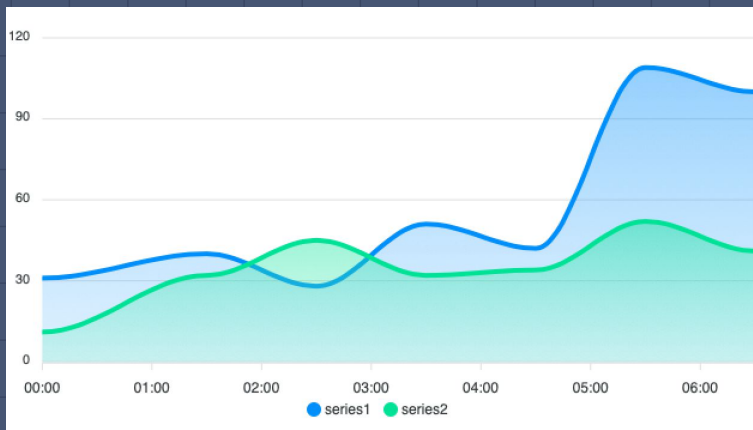
Creating 2D or 3D charts



AnyChart

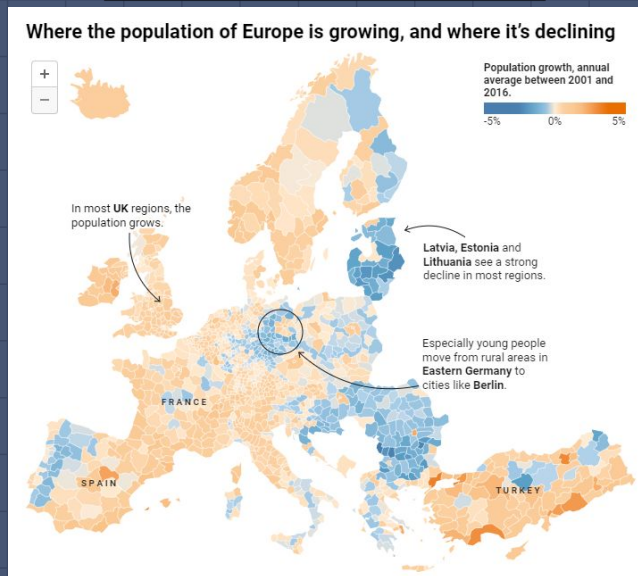
CHART LIBRARIES EXAMPLES

Some are open source, others are behind a paywall



 APEXCHARTS

Datawrapper



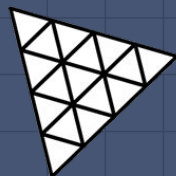
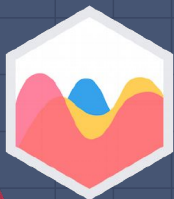
THERE ARE MANY (TOO MANY, FOR REAL)



AnyChart

React-Vis

Chartkick



APEXCHARTS



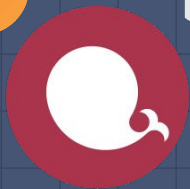
canvasJS

three.js

Raphaël



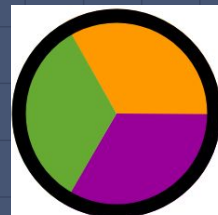
zoomcharts



ani.me



Google
Developers
Charts




Datawrapper

VICTORY



Recharts



“For a JS developer, the ability to visualize data is just as valuable as making interactive Web pages. Especially since the two often go in pairs.”

– Jakub Majorek –

Chart.js

5

WHY CHART.JS ?



Chart.js

Advantages:

- Easy learning curve.
- Works directly with HTML canvas.
- Pretty fast. ([Example](#))
- Good documentation and active community.
- Open source and easy to modify.

Disadvantages:

- Only 7 officially supported Chart types.

HOW TO USE

1) Install

```
npm install chart.js
```

2) Use

```
import { Chart, registerables } from  
'<PATH>/node_modules/chart.js/dist/chart.js';  
  
Chart.register(...registerables);
```

CREATING A GRAPH

- 1) Prepare your data
- 2) Configure your graph
- 3) Draw the chart on Canvas

Simple!



SETTING UP YOUR DATA

```
const DATA = {  
  labels: string[], // Names describing the axis  
  datasets: ChartData[], // The data to represent  
  /**  
   * Depending on the graph, there's other options  
   * to customize how the data is presented.  
   * This can be found in the examples.  
   */  
};
```

CONFIGURING THE CHART

```
const CONFIG = {  
  type: '<chartType>',  
  data: <the DATA object>,  
  options: {}, // Contains the colors, title, legend...  
  Plugins: {} // User-created objects that extend the  
                // functionality  
}
```


CREATE THE CHART

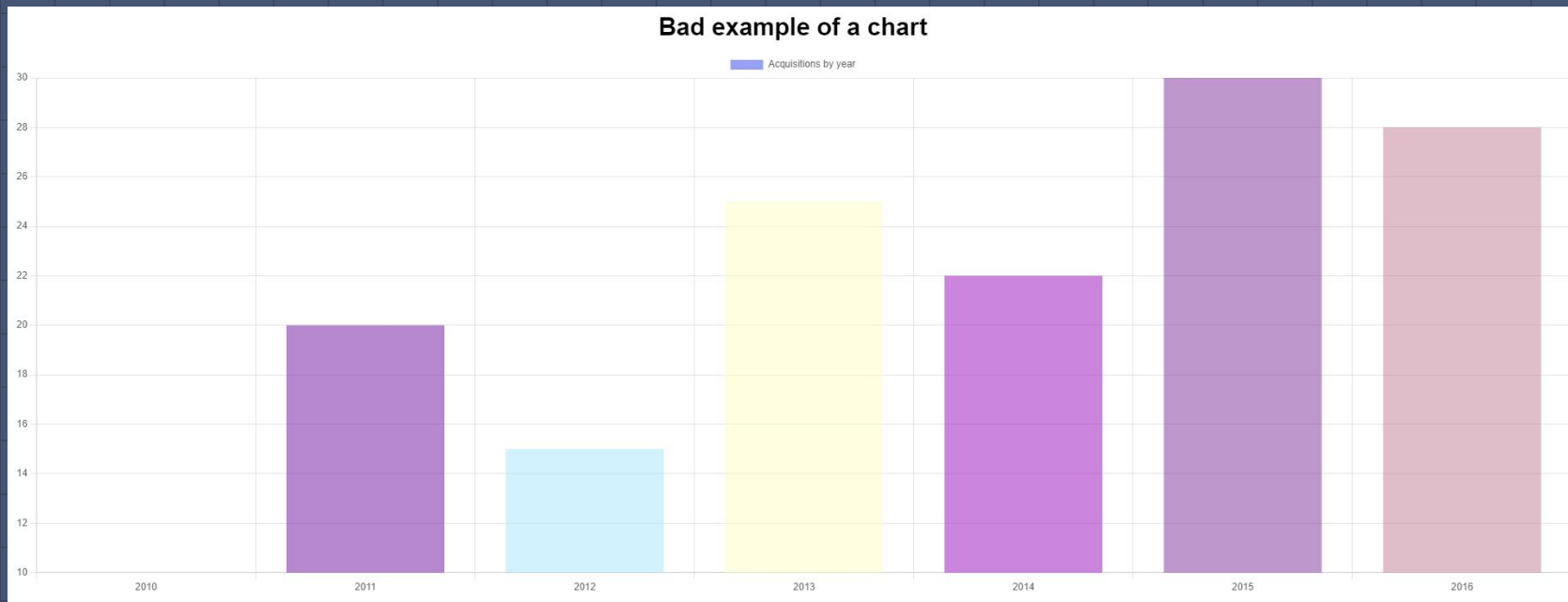
```
new Chart(<canvas or context>, CONFIG);
```



Examples

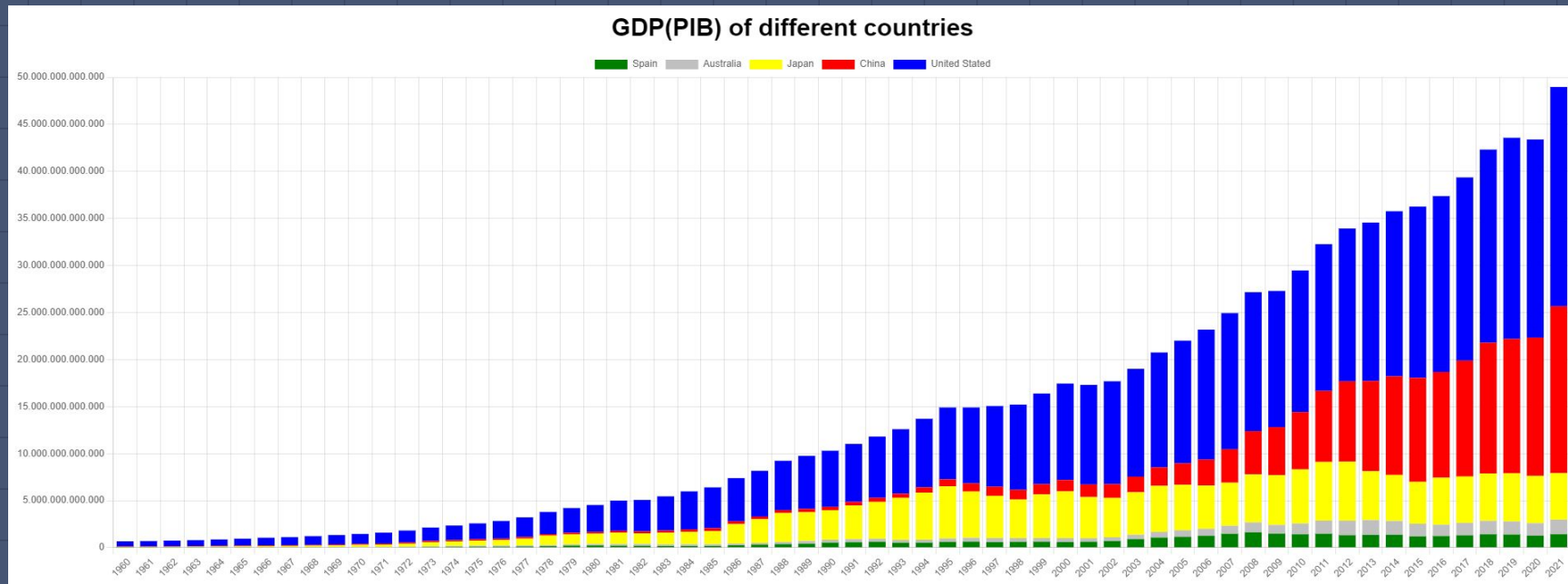
6

BAR CHART EXAMPLE



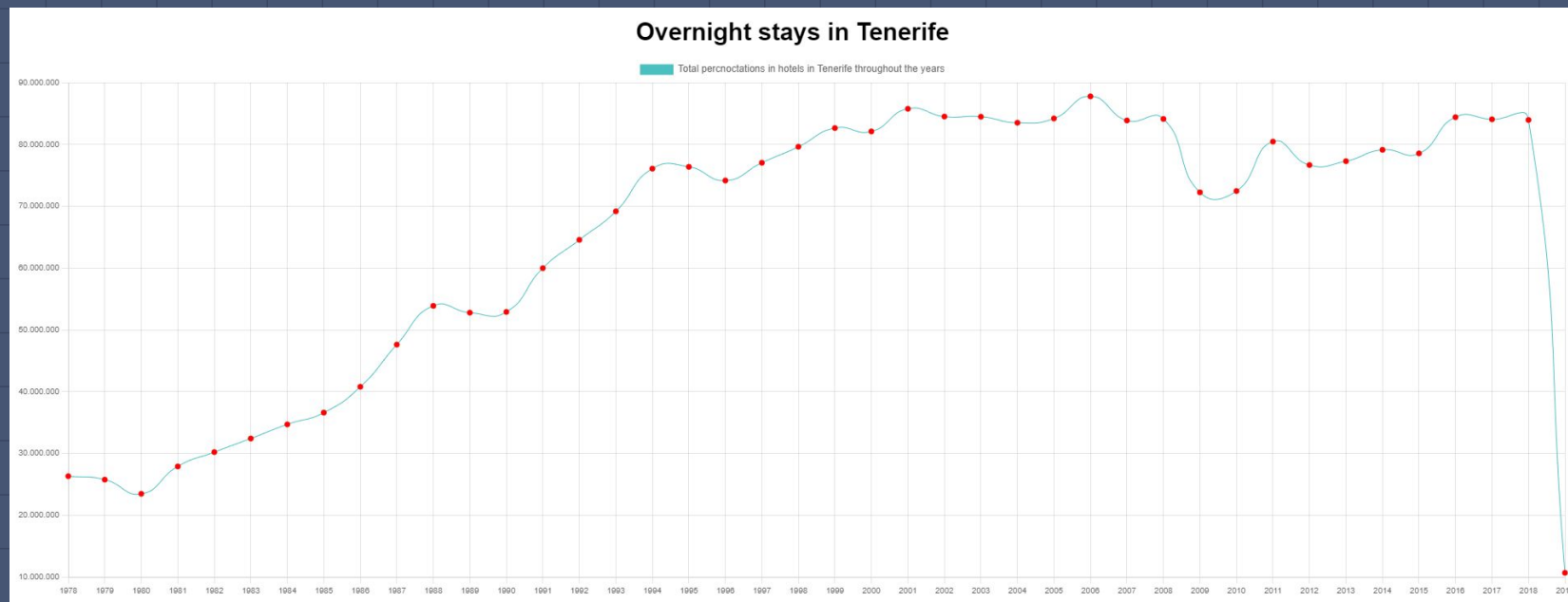
[GitHub Repository](#)

BAR CHART EXAMPLE



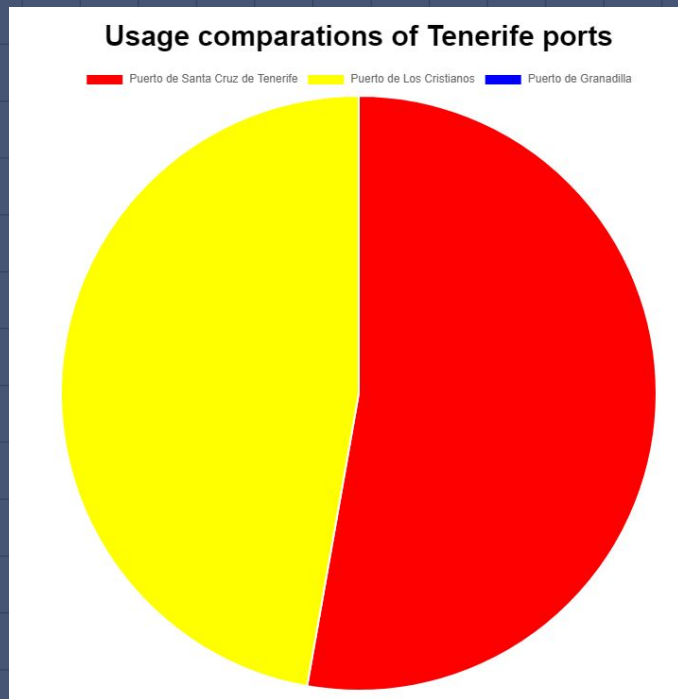
GitHub Repository

LINE CHART EXAMPLE



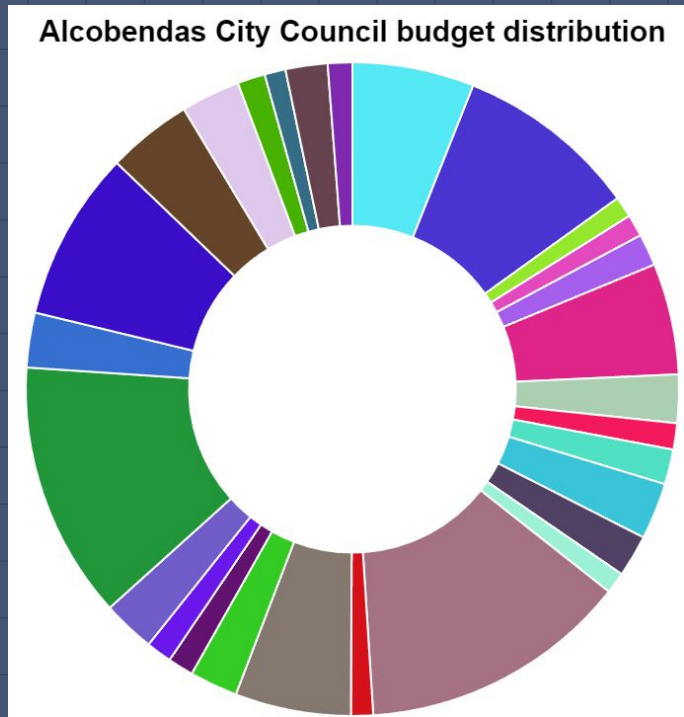
GitHub Repository

PIE CHART EXAMPLE



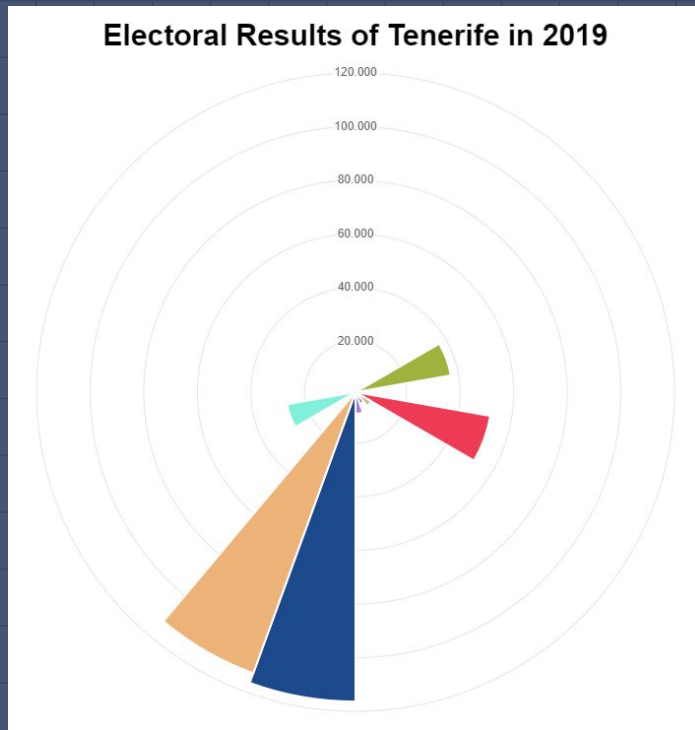
GitHub Repository

DOUGHNUT CHART EXAMPLE



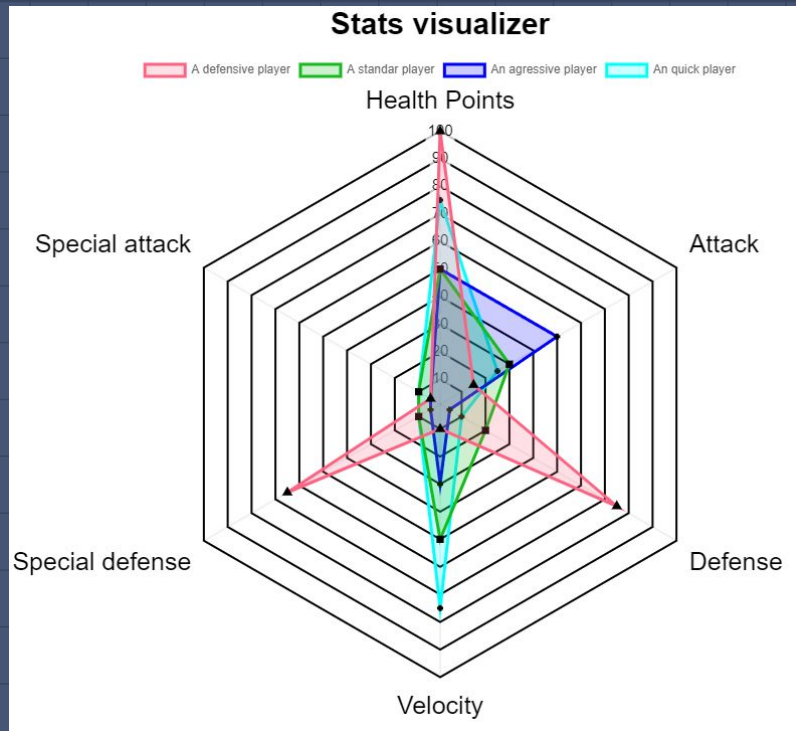
GitHub Repository

Polar Area Chart Example



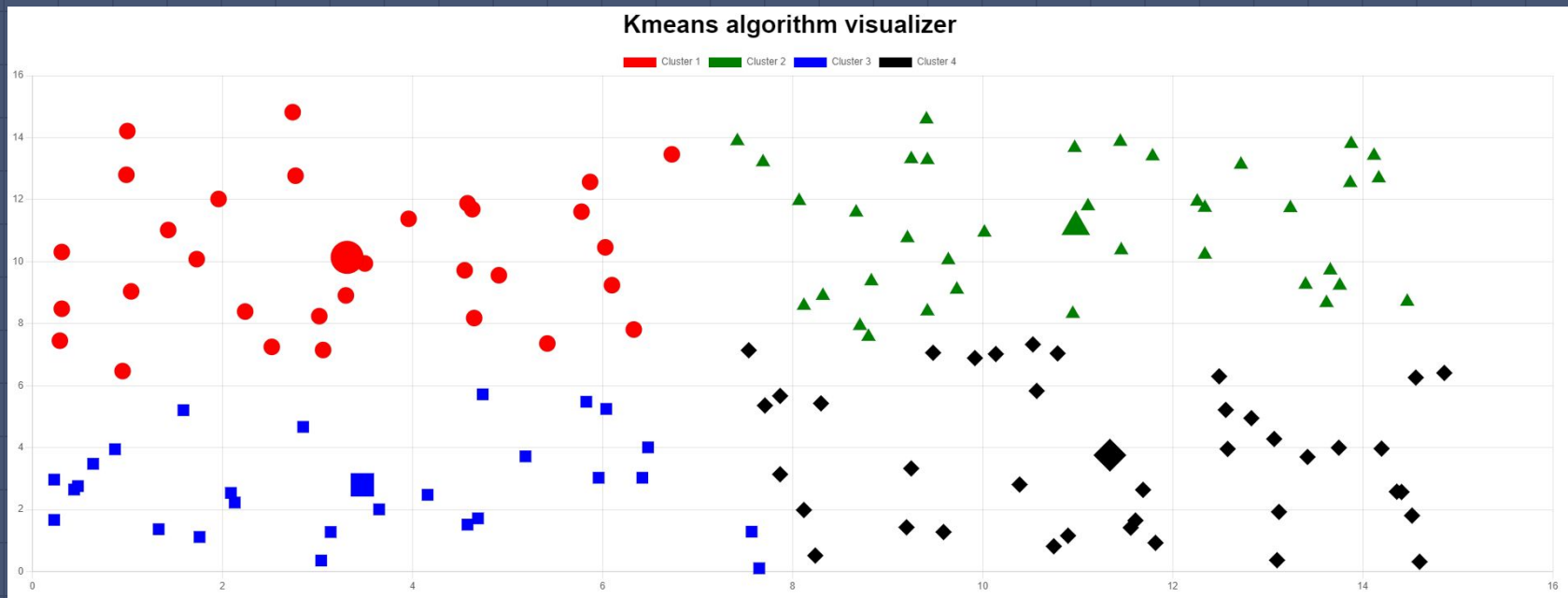
[GitHub Repository](#)

RADAR CHART EXAMPLE



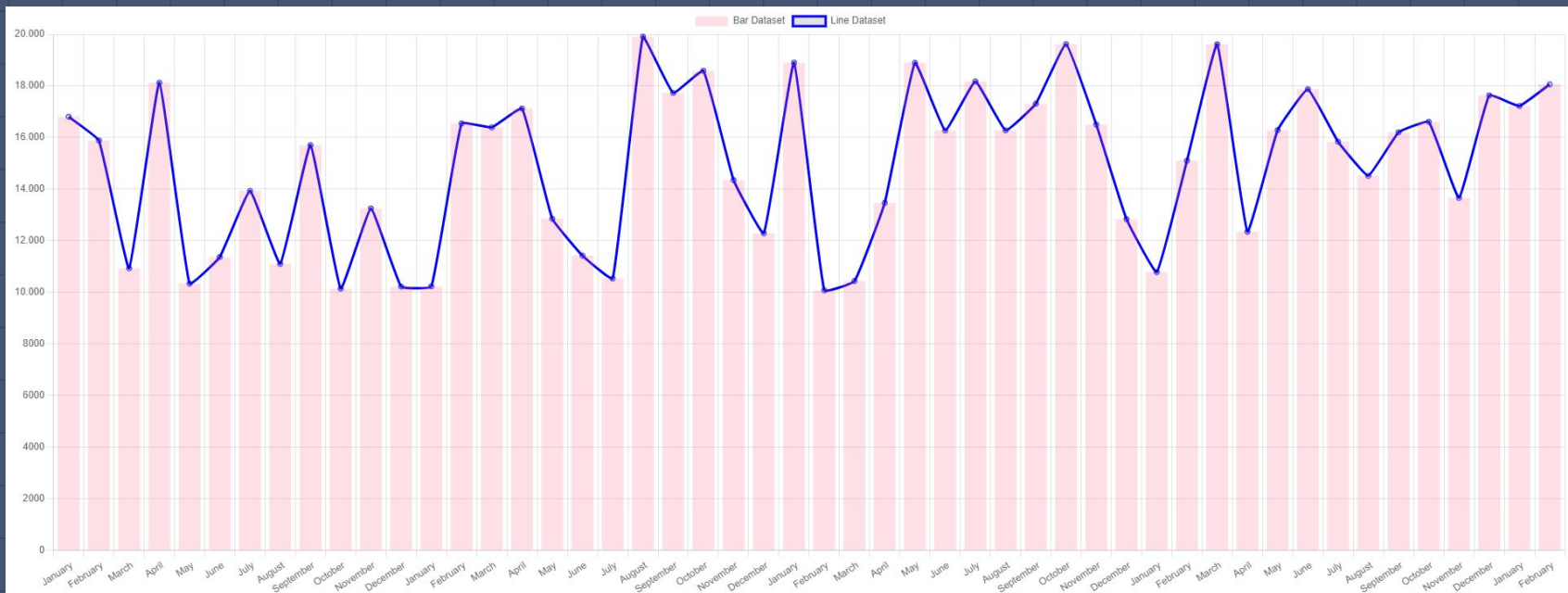
GitHub Repository

BUBBLE AND SCATTER CHART EXAMPLE



[GitHub Repository](#)

MIXED CHART EXAMPLE



[GitHub Repository](#)

REFERENCES

[Data and Information Visualization](#) - Wikipedia

Basic concepts of Data Visualization

[Top 15 JS Data Visualization libraries](#) - Software Testing Help

Opinion Article Explaining 15 Graphics Libraries

[19 Best JS Data Visualization libraries](#) - Monterail

Opinion Article Explaining 19 Graphics Libraries

[Chart.js](#) - API documentation of Chart.js



ABOUT US



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✉ peso.adan.05@ull.edu.es

Questions?

