Objective:

To provide hands-on experience about selecting and creating the right visualization and presentation; evaluate the quality of visualizations.

Problem Statement:

Study and Analysis of number of accidents reported in India, from 2015 till 2018.

What is in the data?

Table size: 36 * 4
Rows: 36 (29 states and 7 union territories)
Columns: 4 (4 years(2015-18))

Why the three visualizations?

Without directly choosing the complex visualizations which might not be easy to interpret, this data will use the basic graphs for visualization, which will be quick and easy to comprehend.

Bar graph:

- Total number of accidents in a given year represented by the length of the bar where bars represent different years in which accidents have occured.
- Length is the effective measure to compare between two numeric values(in our case, accidents occured in different years).

Line chart: x - axis represents years(2015 - 18)
y - axis represents accidents in a given year.

- Each line chart represents a union territory where accidents have occured in given years.
- Each union territory is represented as a different color in the form of a separate line chart.
- x - axis is representing a temporal quantity(years), line chart is a suitable choice, an increasing or decreasing trend of accidents can be seen in different years.

Geo map:

- Geo coordinates are chosen for different states as per our data.
- States are visualized as per their geo coordinates.
- Intensity of color represents the total number of accidents in a given region in the year 2018. More the intensity, more the number of accidents.
- As our data is dealing with spatial locations, so geo map is a good representation. It becomes easy to visualize data by knowing the location.

Strengths:

- **Bar graph:**
    1. It is easy to estimate the values at a glance.
    2. It shows data categories in a frequency distribution.
    3. Clarify trends better than tables.

- **Line chart:**
    1. Gives a quick analysis of data.
    2. We are able to derive the range, minimum, maximum quickly from the data.
    3. Can easily extract the trend(increasing or decreasing) of the data.

- **Geo map:**
    1. Maps are easier to use and carry around.
    2. In our case, India's map is visualized, in which each state is located and marked as a different color as per accidents.
    3. It is easy to visualize for viewers as different states are concerned. Map gives details of spatial location along with numeric data.

Weaknesses:

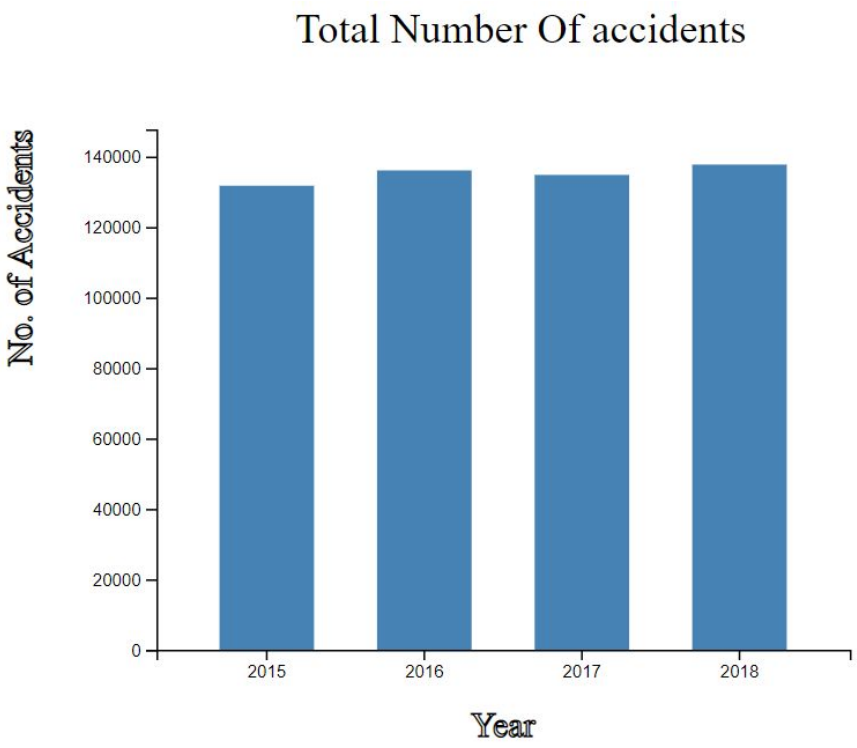
- **Bar graph:**
    1. Additional details like state - wise accidents are not covered by the bar graph. It involves total accidents in a given year.
    2. It does not give the idea of the cause of accidents, and fails to expose patterns.
    3. The x - axis attribute is temporal but we have represented it in the form of bars which gives a false impression that we can interchange bars.

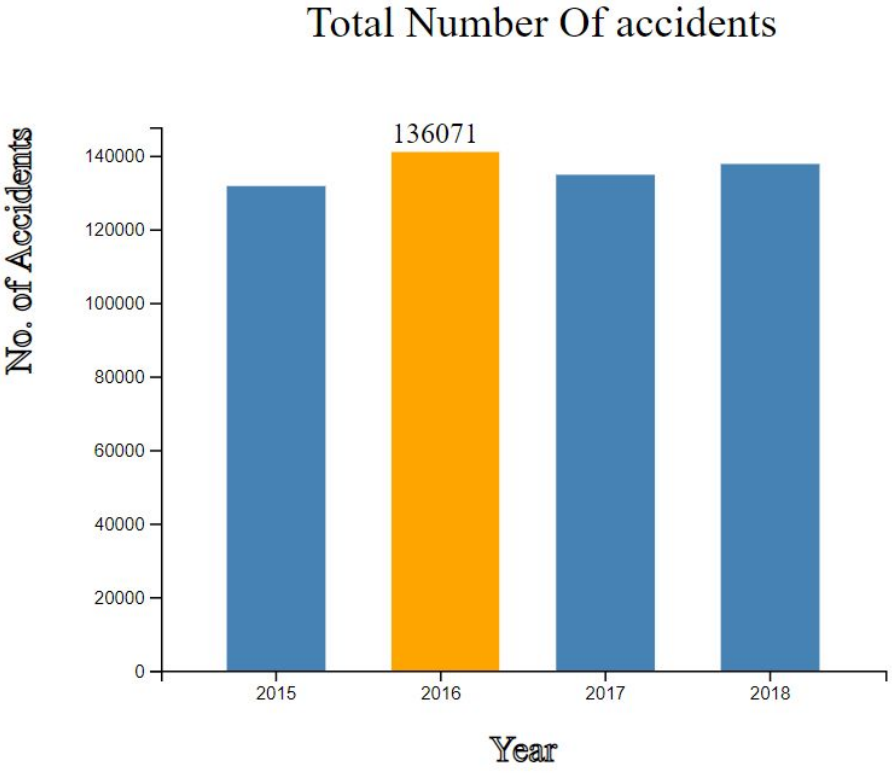
- **Line chart:**
    1. We have visualized only the union territory data.
    2. To visualize the whole data, line charts become a bad choice as too many lines are not easy to visualize and to provide lines different colors, becomes hard to visualize for a viewer.

- **Geo map:**
    1. It carries the perspective of its creator, what assumptions he had made.
    2. Many states have nearly the same color, so it is difficult to calculate numeric value by looking at color only.

Visualizations:

1. **Number of accidents each year:**
   Depicted using BAR-CHART.





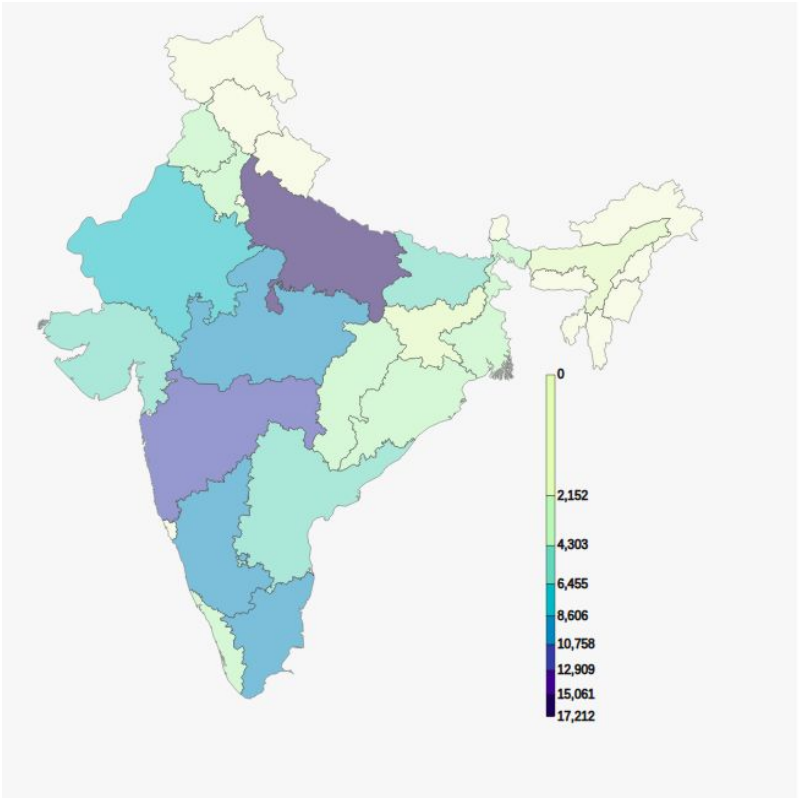
- *First bar graph is depicting the total number of accidents in a given year in the form of bars.*
- *Second bar graph is showing the number of accidents in the year 2016 as a numeric value (on hovering).*
  The above plots are achieved through the below code.

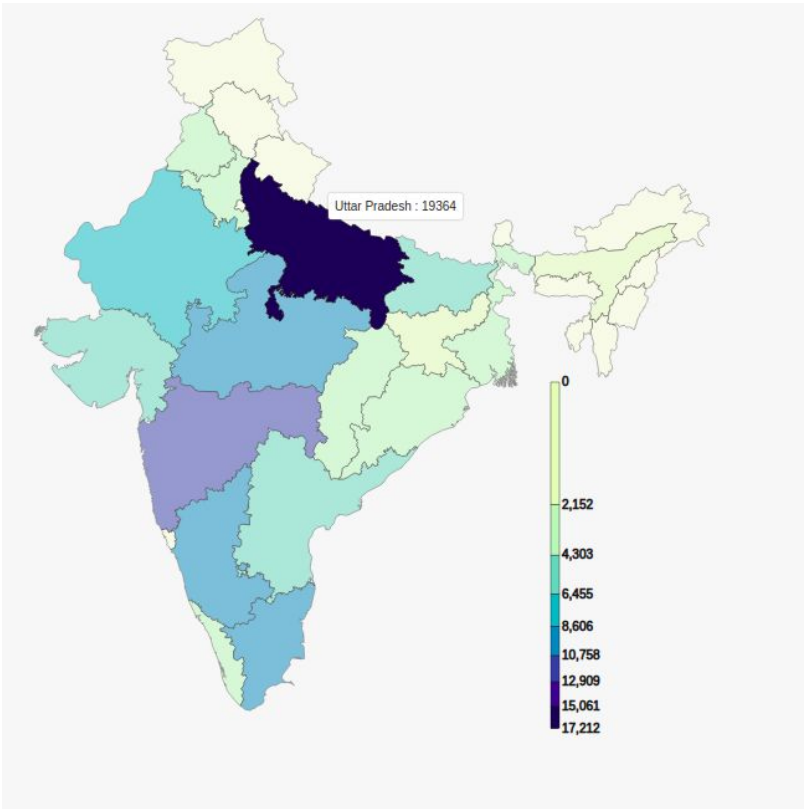
```
//Drawing bars
g.selectAll(".bar")
 .data(data)
 .enter().append("rect")
 .attr("class", "bar")
 .on("mouseover", onMouseOver) //Add listener for the mouseover event
 .on("mouseout", onMouseOut)   //Add listener for the mouseout event
 .attr("x", function(d) { return x(d.year); })
 .attr("y", function(d) { return y(d.value); })
 .attr("width", x.bandwidth())
 .transition()
 .ease(d3.easeLinear)
 .duration(400)
 .delay(function (d, i) {
     return i * 50;
 })
 .attr("height", function(d) { return height - y(d.value); });
```

2. **Number of accidents state-wise in the year 2018:**
   Depicted using GEO-MAP.

   The code below is used to achieve the desired map.

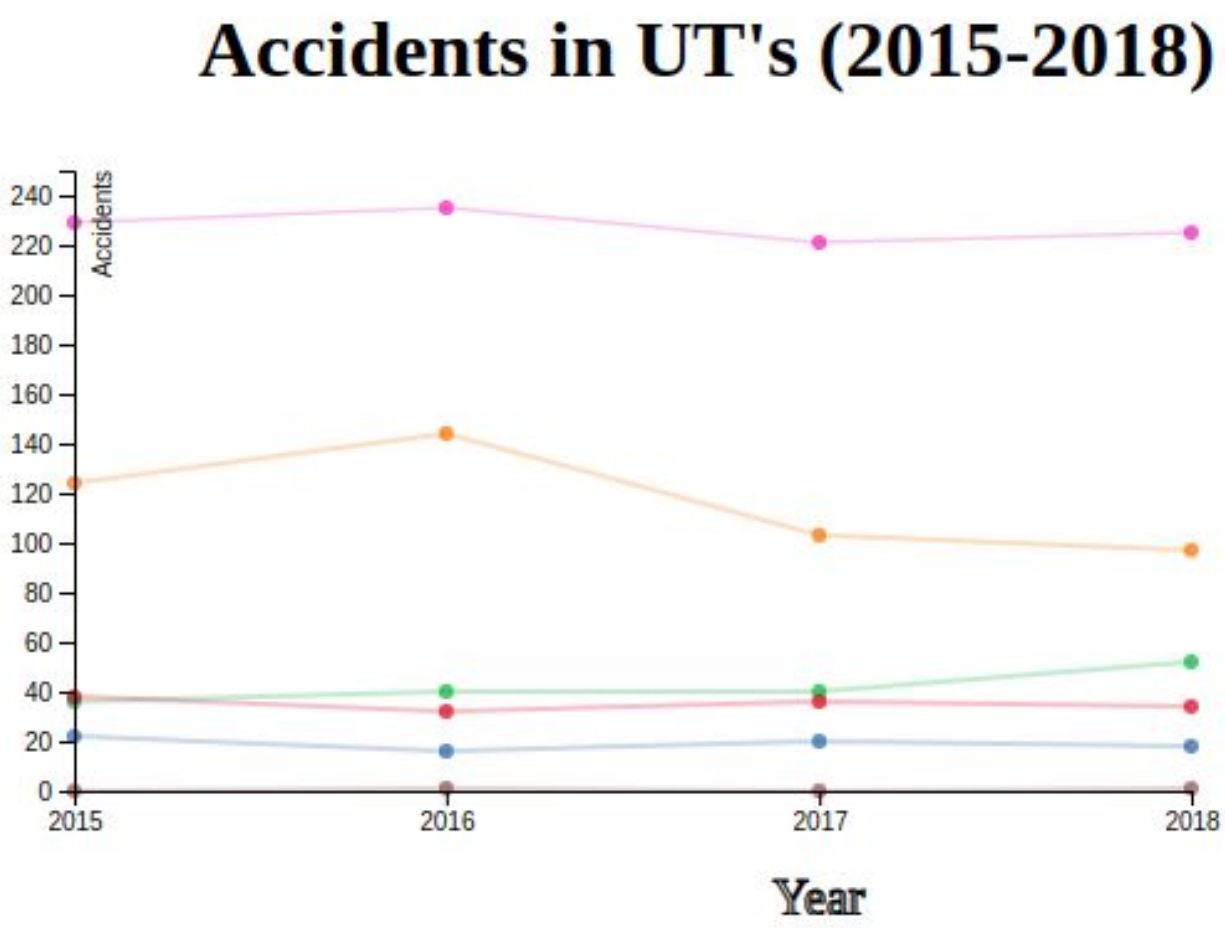
```
//Drawing the map
india.selectAll("path")
   .data(json.features)
   .enter().append("path")
   .attr("d", path)
   .style("fill", colors[0])
   .style("opacity", 0.5)
```





- *On hovering, we can see the number of accidents in 2018 in any state(in our case Uttar Pradesh).*

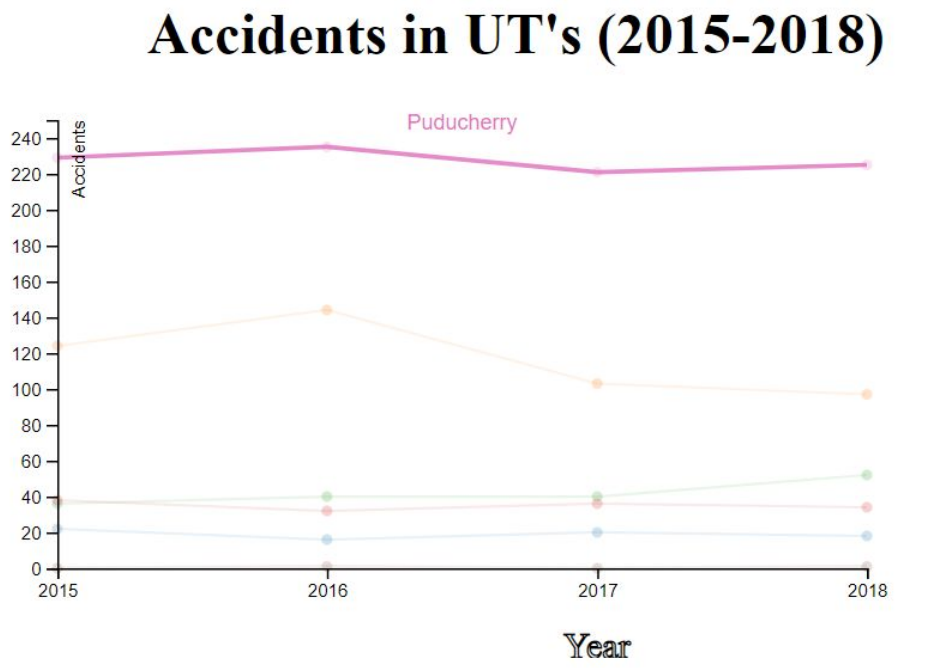
3. **Variation in the number of accidents in UNION TERRITORIES during 2015-2018: Depicted using LINE-CHART.**

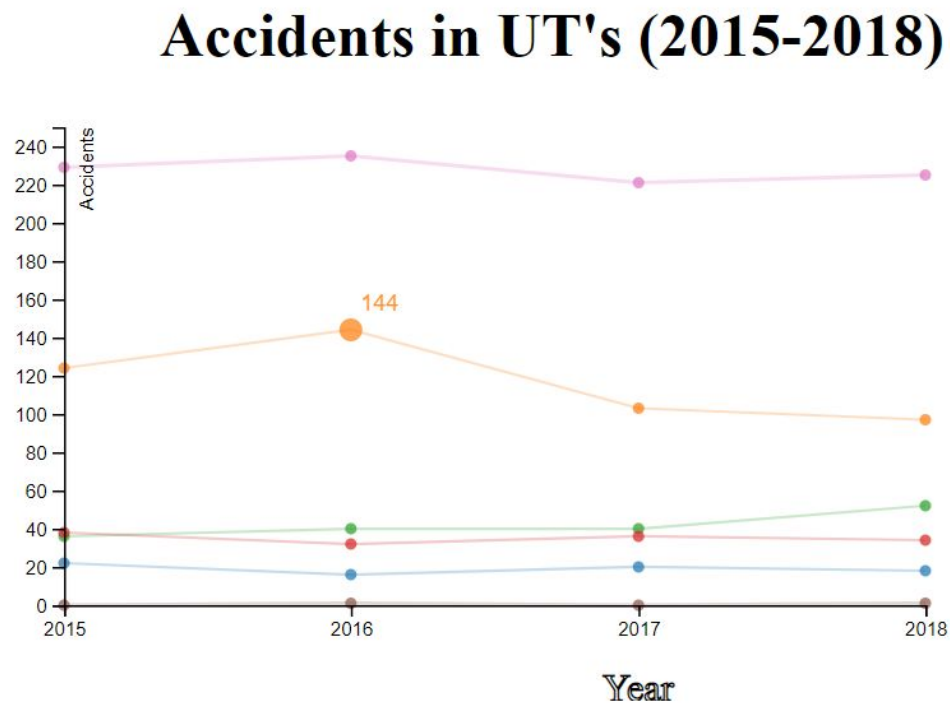


Note: Color Indication-

1. *Purple: Lakshadweep*
2. *Blue: Andaman and Nicobar Islands*
3. *Red: Daman and Diu*
4. *Green:Dadra and Nagar Haveli*
5. *Orange: Chandigarh*
6. *Pink: Puducherry*

- *The effect of hovering on the above Line-Chart is shown using the below two plots.*





```
// Add line into SVG
var line = d3.line()
  .x(d => xScale(d.date))
  .y(d => yScale(d.accidents));

let lines = svg.append('g')
  .attr('class', 'lines');
```

- The dots in line chart is showing the number of accidents in a given year where each line is corresponding to a Union Territory.
- On hovering upon the line, we can know the name of the union territory the line is representing.
- On hovering upon the dots, we can see the numeric value of accidents in a given year corresponding to a union territory.

References:

www.google.com