Identification and Plotting of Accident Points

A waypoint in a route to Road Safety Index

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PLACEHOLDER LOGO

Abstract

Accident points along a route between 2 specific points in New York city are identified programmatically based on 2016 NYC road accidents data and plotted on a map. The factors that influenced these accidents have been analyzed visually. These would aid in calculating safety index for that particular route.

Introduction

Road Safety Index(SI) has a great influence on the insurance premium. Lower the SI, higher the insurance premium and vice-versa. Previous studies focused more on the influence of Indicators on the safety of a route *(Anstey, Kaarin J)*[2]. or suggested the change of road design *(Elvine,Rune and Va)*[3]. But a concrete metric is not developed which directly indicates the degree of safeness of a route. Although tries to assess SI as an performance index *(Hermans, Elke and Van den Bossche)*[4], it fails to take into account the external factors influencing the accident.

New York city in placed at 5th position in the top 10 cities of United States with worst traffic *(INTRIX Blog)*[1].Commuters experience a 20-25 percent increase in their overall commute time every day, due to busy traffic. Also, the fatalities in road accidents in NYC accounts for 25 percent of national rate and cost an average of 4.3 billion dollars to the economy of the city *(Peden, Margie and Scurfield)*[5].

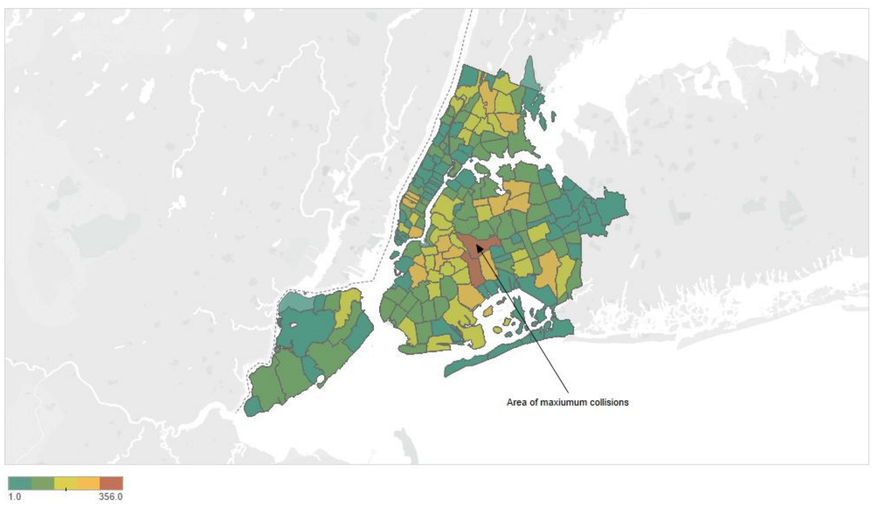

Figure 1: Figure 1:Accident density in NYC by Location. The central NYC has most no of accidents reported.

Data

The data considered for this study is the NYPD road crashes data for the year 2016 published online by the NYC government. The dataset contains 130,000 observations. The indicators include the location of the accident, no of fatalities, driver condition,vehicle type among others.

Method

Step 1 : A Basic Map is designed using mapstraction and google apis. Mapstraction is a javascript library that connects with different mapping apis.

Step 2 : The design is then enhanced to include feature to select a start point and an end point of a route. This is done using HTML and javascript. Multiple routes between the two given points is plotted. Direction service library provided by the google API has been used to plot the multiple routes.

Step 3 : The shortest route is selected and the coordinates along the route are extracted. These coordinates are then compared with the accident location coordinates, to check if any of the one coincides with the other. The rationale in doing this, is to check if any of the accident coordinates fall in this specific route

Step 4 : The matching coordinates are then plotted on the map along with the route using a heat map.

Step 5 : Other factors in the dataset corresponding to these coordinates are analyzed visually.

Results

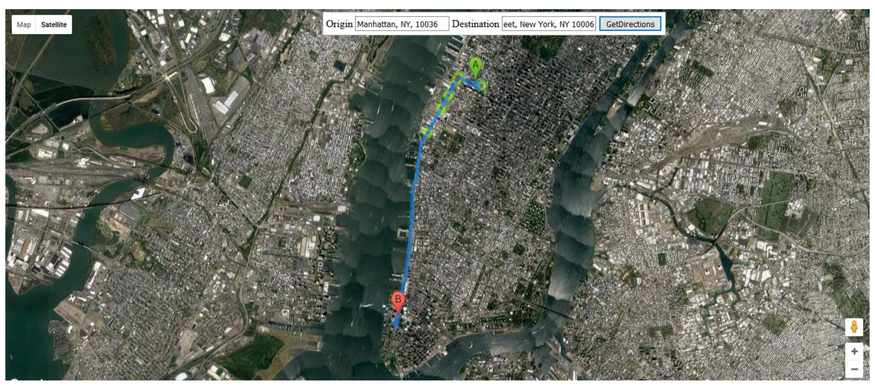

Figure 2: Figure 2: Accident points plotted on Map. There are 6 accident points in the shortest route between Time Square and WTC

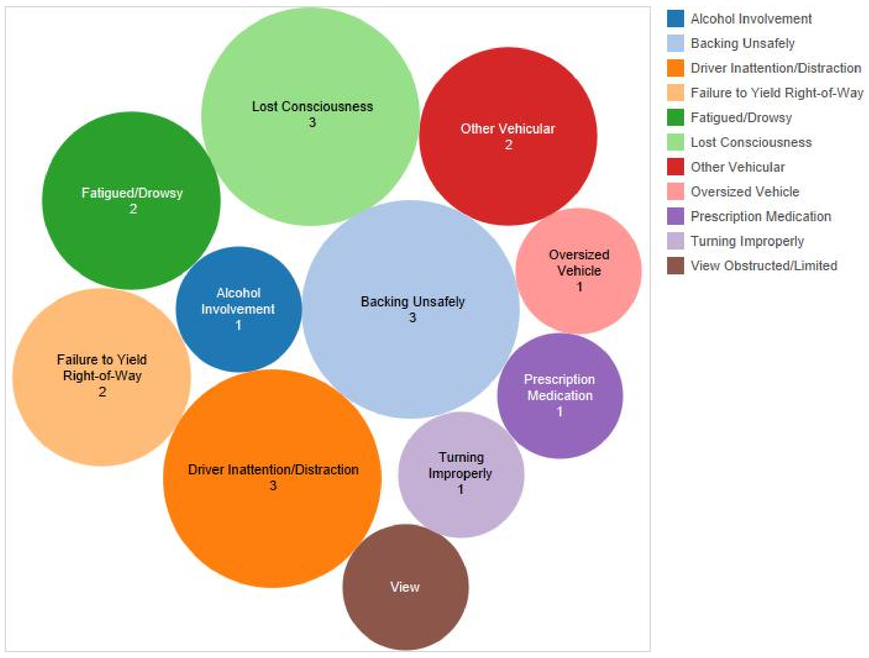

Figure 3: Figure 3: Cause of Accident in the above mentioned accident points. No major difference between the causes

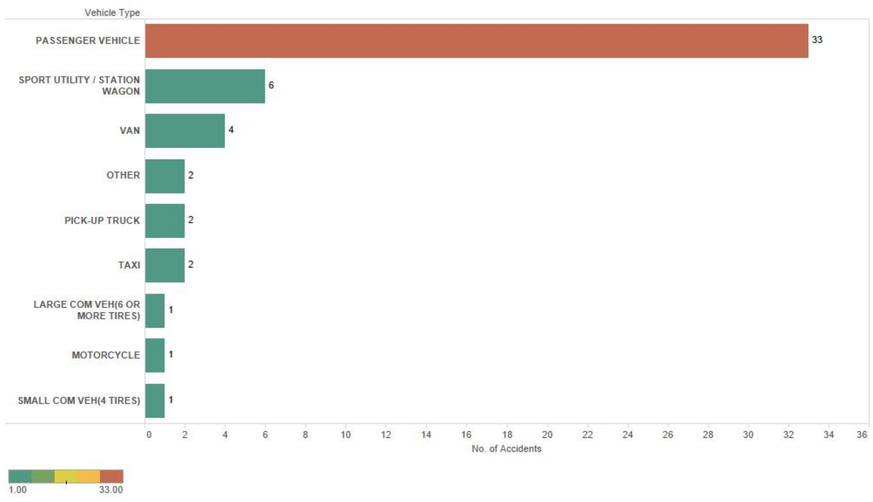

Figure 4: Figure 4: Vehicle Type involved. Passenger vehicle dominates the numbers

Discussions

The results in the previous sections shows that there are 6 accident points between Time Square and World Trade Center in New York. These are indicated by concentric circles in the heat map. Also, Driver getting distracted, losing consciousness and backing unsafely are the major accident factors. Moreover, Passenger vehicle clocked the maximum accidents than SUVs and buses.

Conclusions

- An Interactive Map has been designed in which different routes between 2 points can be plotted
- This design would be used to get the accident points along a route between the specified points
- Accident causing factors are analyzed visually.
- This would aid in calculating the number of accidents in that particular route which in turn would be a major factor in calculating the Road Safety Index

References

[1] New york city ranks 5 in the top 10 worst traffic cities, 2015.

[2] Kaarin J Anstey, Joanne Wood, Stephen Lord, and Janine G Walker. Cognitive, sensory and physical factors enabling driving safety in older adults. *Clinical psychology review*, 25(1):45–65, 2005.

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[5] Margie Peden, Richard Scurfield, David Sleet, Dinesh Mohan, Adnan A Hyder, Eva Jarawan, Colin D Mathers, et al. World report on road traffic injury prevention, 2004.