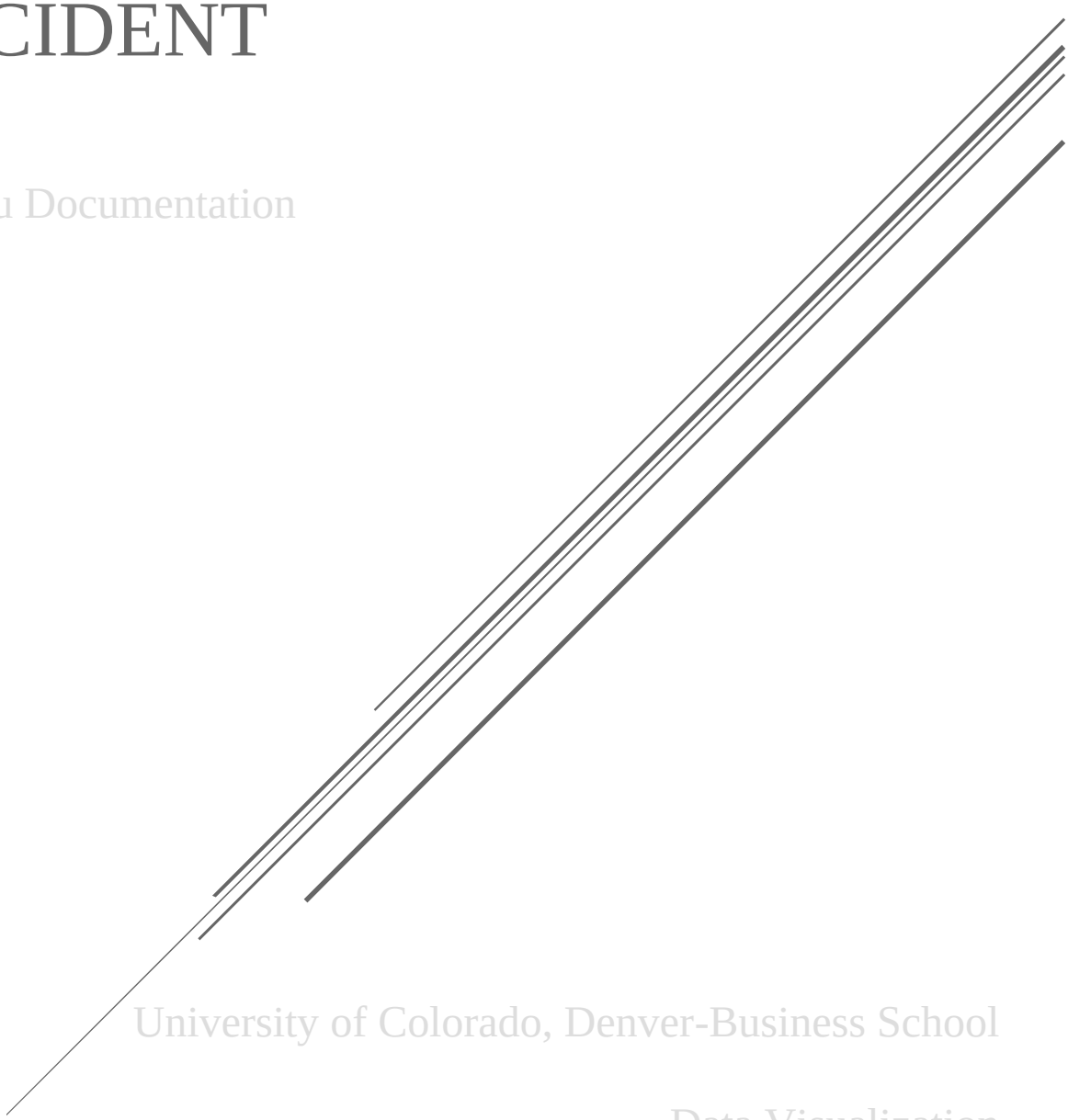
US ACCIDENTS (2016 - 2020)

COUNTRYWIDE TRAFFIC ACCIDENT

Tableau Documentation



University of Colorado, Denver-Business School

Data Visualization

US Accidents (2016 - 2020)

Countrywide Traffic Accident

Urvish A. Patel

University of Colorado, Denver

Business School

Abstract

This document offers an analytical view on road accidents which helps the Department of Transportation, Road safety department, Hospitals & various response teams as they will be prepared for such accidents and will be knowing the exact measures to take beforehand an accident occur. Specifically, this document is a summary of findings through Tableau which tells us statistics of the dataset through various visualizations which answers questions such as which State/Zip-code/County has the highest number of accidents? At what time/day/ do accidents usually occur in the US? What are the factors which causes road accidents? Predictions of accidents in future. This document lays out everything which might be helpful for safety of travelers.

Keywords: Time Series Forecasting, Predictions, Tableau Story, Geospatial visualization, Weather dependency.

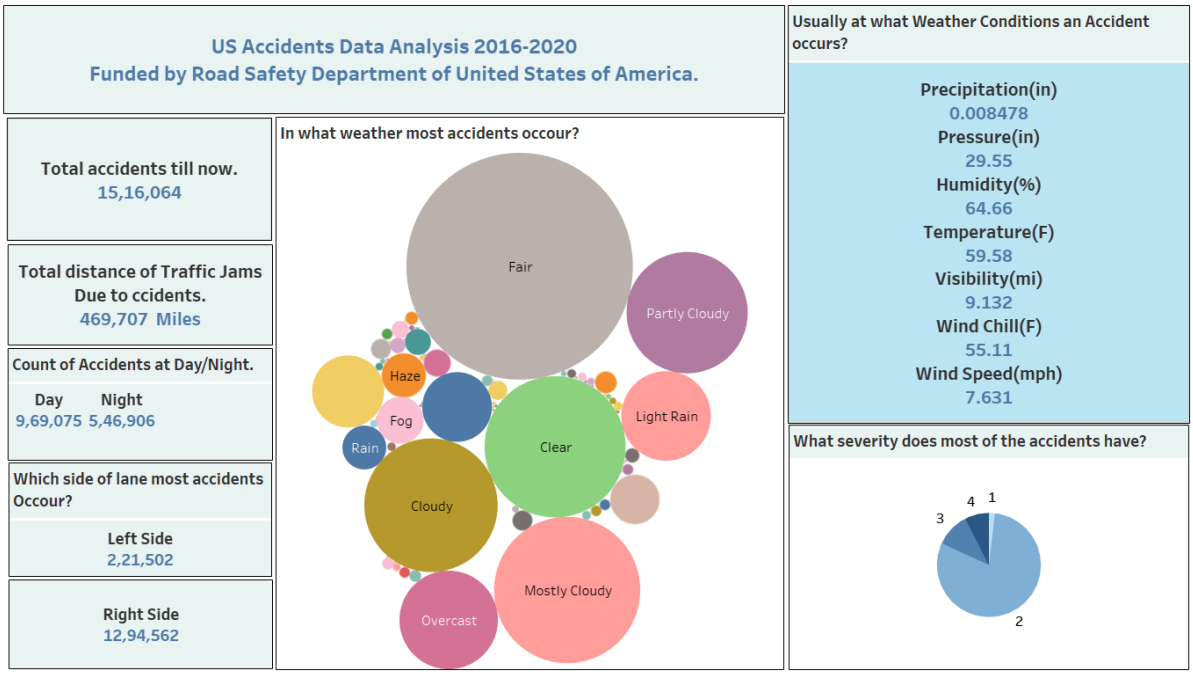
US Accidents (2016 - 2020)

Countrywide Traffic Accident

The US Accidents dataset is a data reported by the relevant police department, US and state departments of transportation, law enforcement agencies, traffic cameras, and traffic sensors within the road-networks whenever an accident occurs. The dataset used covers 49 states of the USA. The accident data are collected from February 2016 to Aug 2020. They note down the exact location of accident and the distance of traffic which is affected after an incident occurs. The very first thing which Department of Transportation wants to know is the severity of an accident and how frequently an accident occurs during the day/week/time. How can a response team work efficiently given these circumstances? Weather plays a severe role in any type of accident. This analysis discloses the facts and relations about accidents which might be directly linked to the type of weather condition during an accident.

Tableau Dashboards.

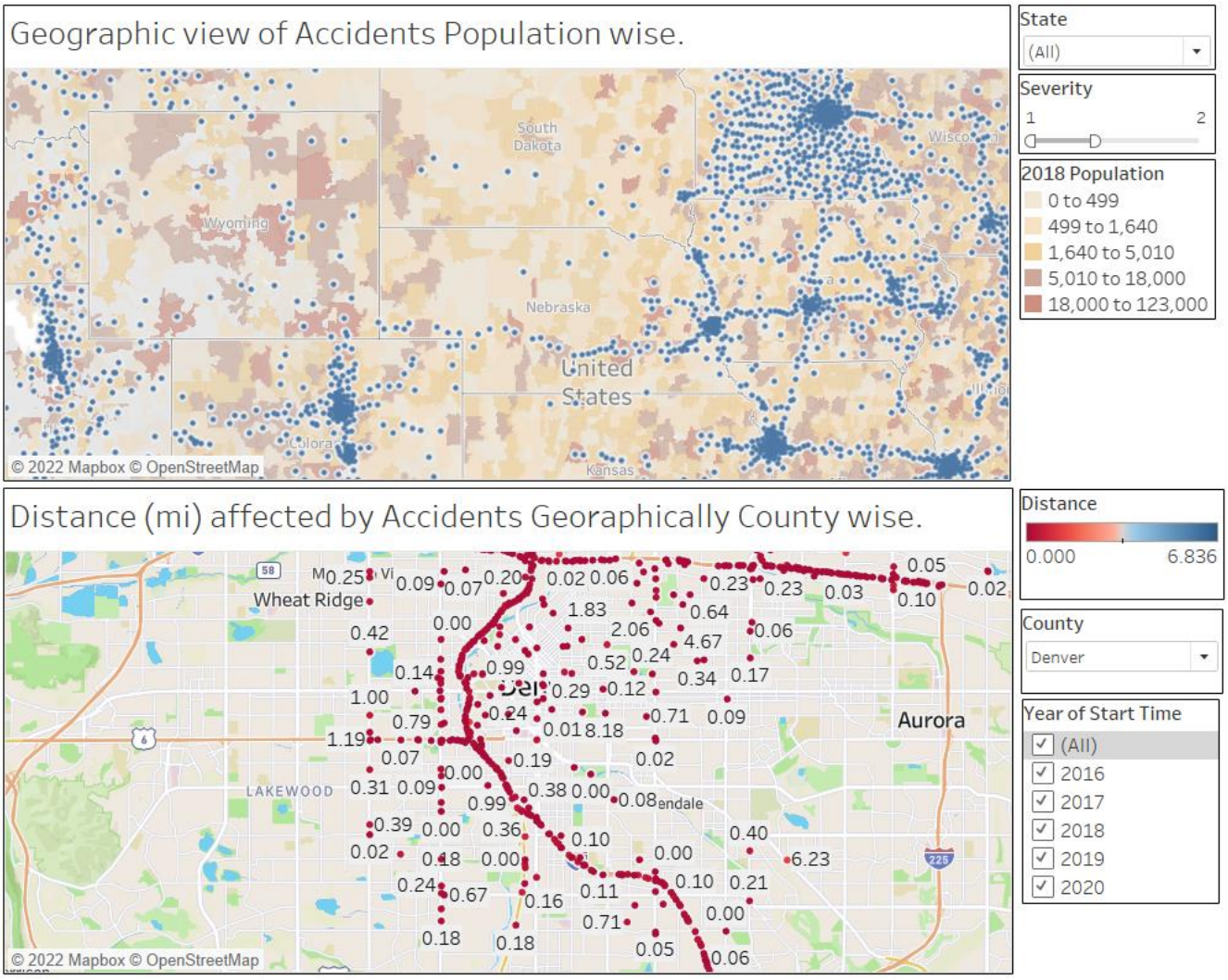
PAGE 1:



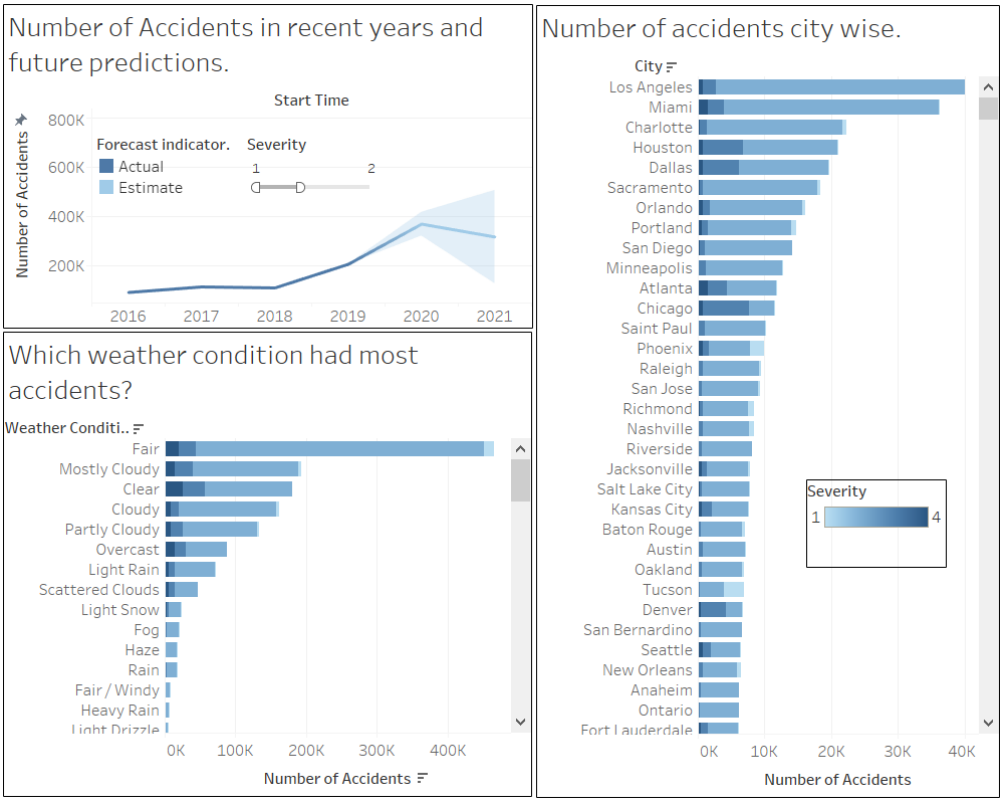
The very first dashboard gives you some insights and overview about what this analysis is all about. It answers the following questions.

1. What is the total number of accidents till now?
2. What is the total distance in miles affected by the accidents happening on road?
3. What is the number of accidents happening in daylight and nightlight?
4. What is the number of accidents happening on left & right side of a lane?
5. In what weather most accidents occur?
6. Usually at what Weather Conditions an Accident occurs?

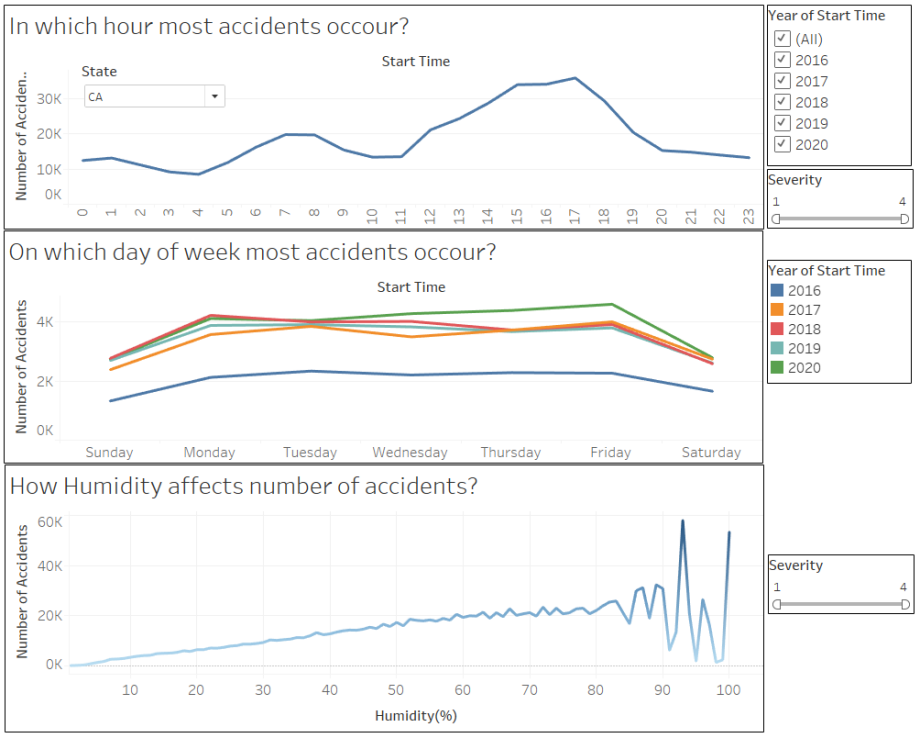
PAGE 2:



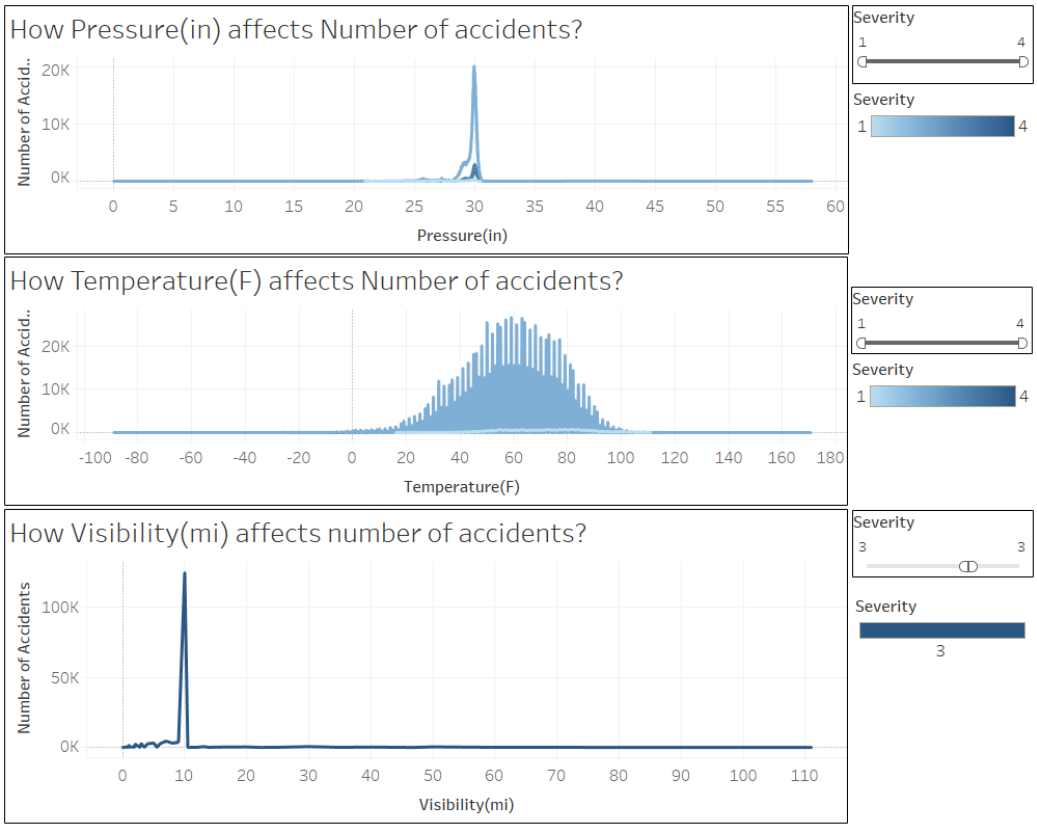
PAGE 3:


Number of Accidents in recent years and future predictions.
Start Time
Number of Accidents
800K
600K
400K
200K
Forecast indicator.
Actual
Estimate
Severity
1
2
2016
2017
2018
2019
2020
2021
Which weather condition had most accidents?
Weather Conditi..
Fair
Mostly Cloudy
Clear
Cloudy
Partly Cloudy
Overcast
Light Rain
Scattered Clouds
Light Snow
Fog
Haze
Rain
Fair / Windy
Heavy Rain
0K
100K
200K
300K
400K
Number of Accidents
Number of accidents city wise.
City
Los Angeles
Miami
Charlotte
Houston
Dallas
Sacramento
Orlando
Portland
San Diego
Minneapolis
Atlanta
Chicago
Saint Paul
Phoenix
Raleigh
San Jose
Richmond
Nashville
Riverside
Jacksonville
Salt Lake City
Kansas City
Baton Rouge
Austin
Oakland
Tucson
Denver
San Bernardino
Seattle
New Orleans
Anaheim
Ontario
Fort Lauderdale
Severity
1
4
0K
10K
20K
30K
40K
Number of Accidents

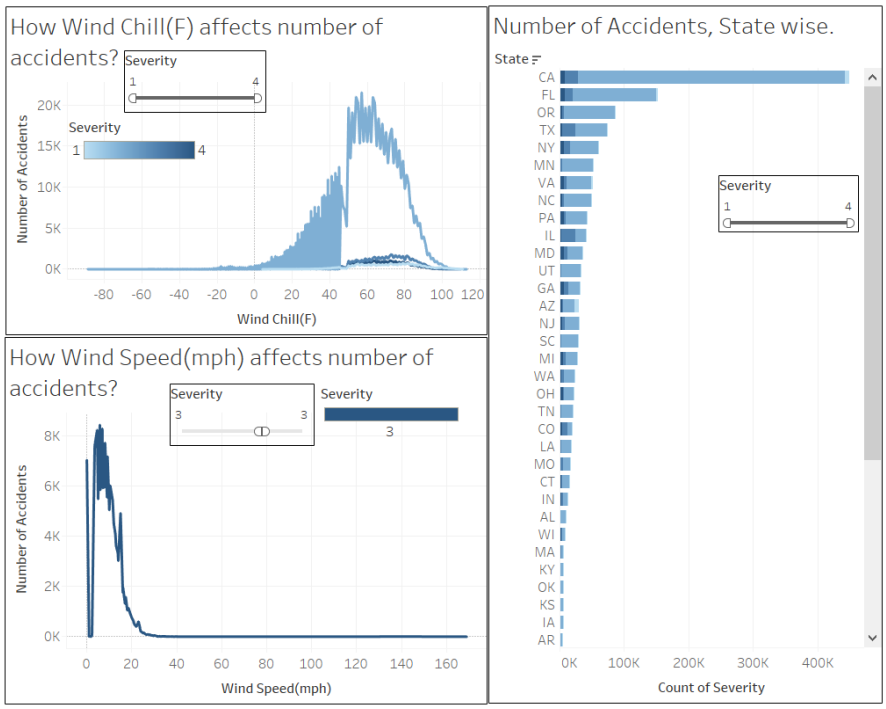
PAGE 4:


In which hour most accidents occour?
Start Time
State
CA
Number of Acciden..
30K
20K
10K
0K
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Year of Start Time
(All)
2016
2017
2018
2019
2020
Severity
1
4
On which day of week most accidents occour?
Start Time
Number of Accidents
4K
2K
0K
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Year of Start Time
2016
2017
2018
2019
2020
How Humidity affects number of accidents?
Number of Accidents
60K
40K
20K
0K
10
20
30
40
50
60
70
80
90
100
Humidity(%)
Severity
1
4

PAGE 5:


How Pressure(in) affects Number of accidents?
Number of Accid..
20K
10K
0K
0 5 10 15 20 25 30 35 40 45 50 55 60
Pressure(in)
Severity
1 4
Severity
1 4
How Temperature(F) affects Number of accidents?
Number of Accid..
20K
10K
0K
-100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Temperature(F)
Severity
1 4
Severity
1 4
How Visibility(mi) affects number of accidents?
Number of Accidents
100K
50K
0K
0 10 20 30 40 50 60 70 80 90 100 110
Visibility(mi)
Severity
3 3
Severity
3

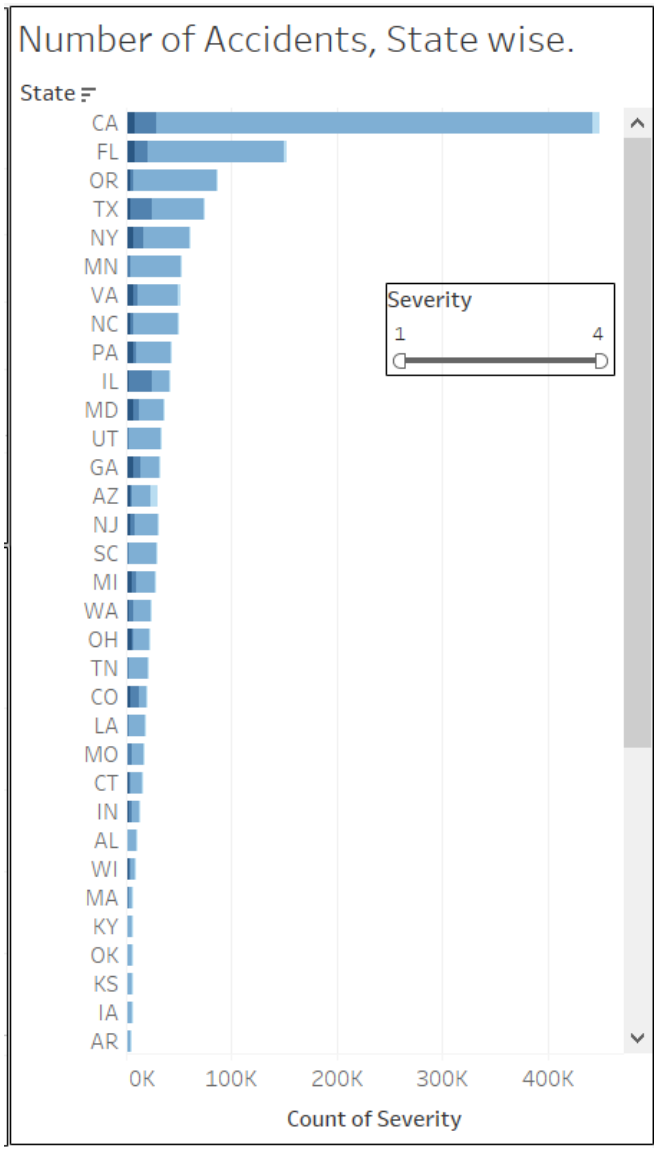
PAGE 6:


How Wind Chill(F) affects number of accidents?
Severity
1 4
Severity
1 4
Number of Accidents
20K
15K
10K
5K
0K
-80 -60 -40 -20 0 20 40 60 80 100 120
Wind Chill(F)
How Wind Speed(mph) affects number of accidents?
Severity
3 3
Severity
3
Number of Accidents
8K
6K
4K
2K
0K
0 20 40 60 80 100 120 140 160
Wind Speed(mph)
Number of Accidents, State wise.
State
CA FL OR TX NY MN VA NC PA IL MD UT GA AZ NJ SC MI WA OH TN CO LA MO CT IN AL WI MA KY OK KS IA AR
Severity
1 4
0K 100K 200K 300K 400K
Count of Severity

Visualizations

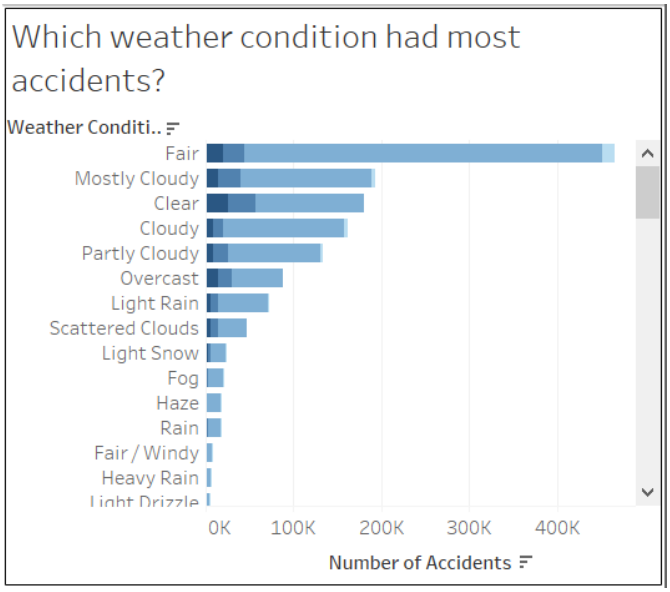
Visualizations which answers the following questions.

1. What is the count of accidents in each state?



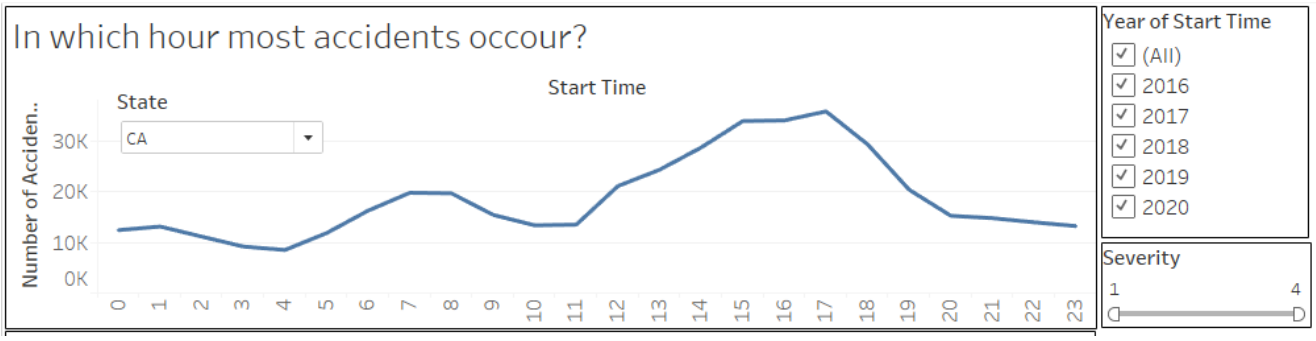
This bar graph represents the number of accidents happened in each state from highest to lowest. Sometimes a simple graph is enough for giving an insight. You can also not that this graph also determines number of accidents according to the level of severity. Lightest color blue is of level one & darkest of level 4.

2. In which Weather Condition do accidents occur most?



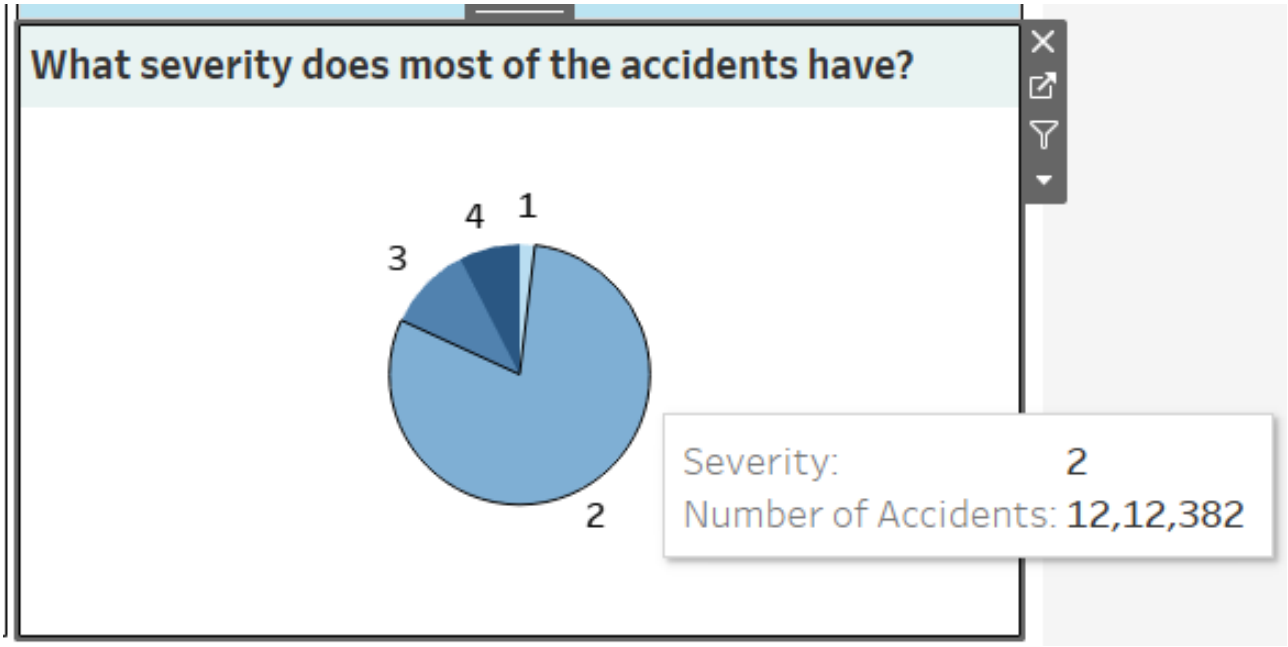
This is a bar graph which represents that most of the accidents occur when the weather is fair. Apart from that, accidents also occur when the weather is mostly cloudy, windy and having a light rain. This is a very simple way to represent quantity of a categorical columns of a dataset. You can also not that this graph also determines number of accidents according to the level of severity. Lightest color blue is of level one & darkest of level 4.

3. Usually at what hour most accidents occur in US?



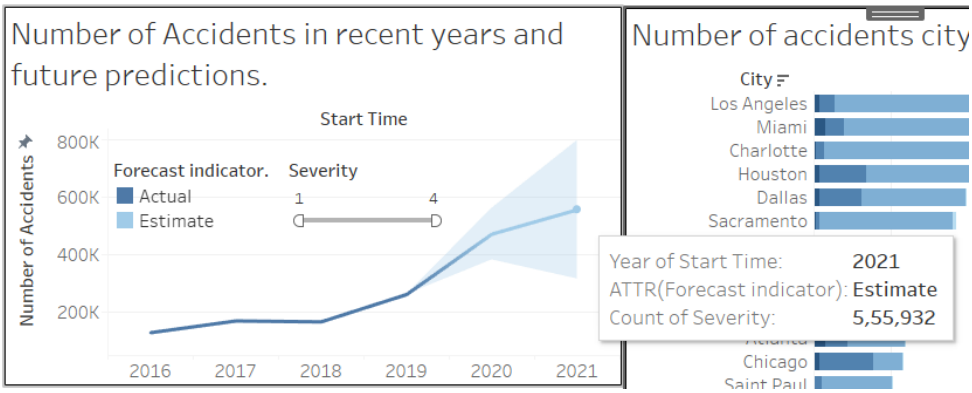
According to this plot we can conclude that most accidents occur between 15 hrs. To 17 hrs. The column of Start_time which had both date and time did not generated time hierarchy in power bi, but tableau does this with ease. You can also filter data according to severity & year.

4. What type of severity accidents mostly occur?



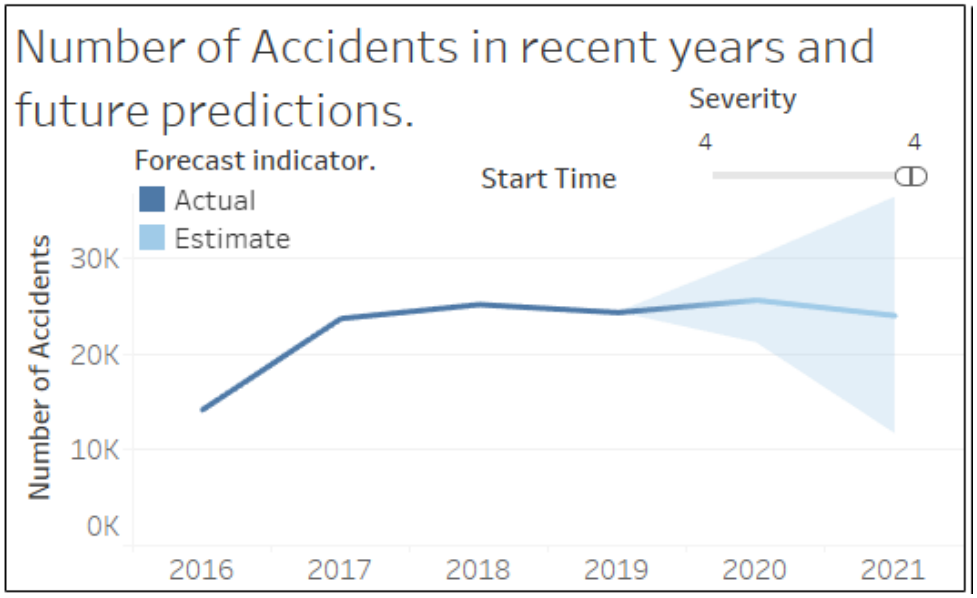
This is a pie chart which represents the number of accidents by Severity. We can conclude from this visual that, Severity of type 2 has the highest number of followed by severity 4, 3, & 1.

5. What are the predictions for the future? What number of accidents we can expect?

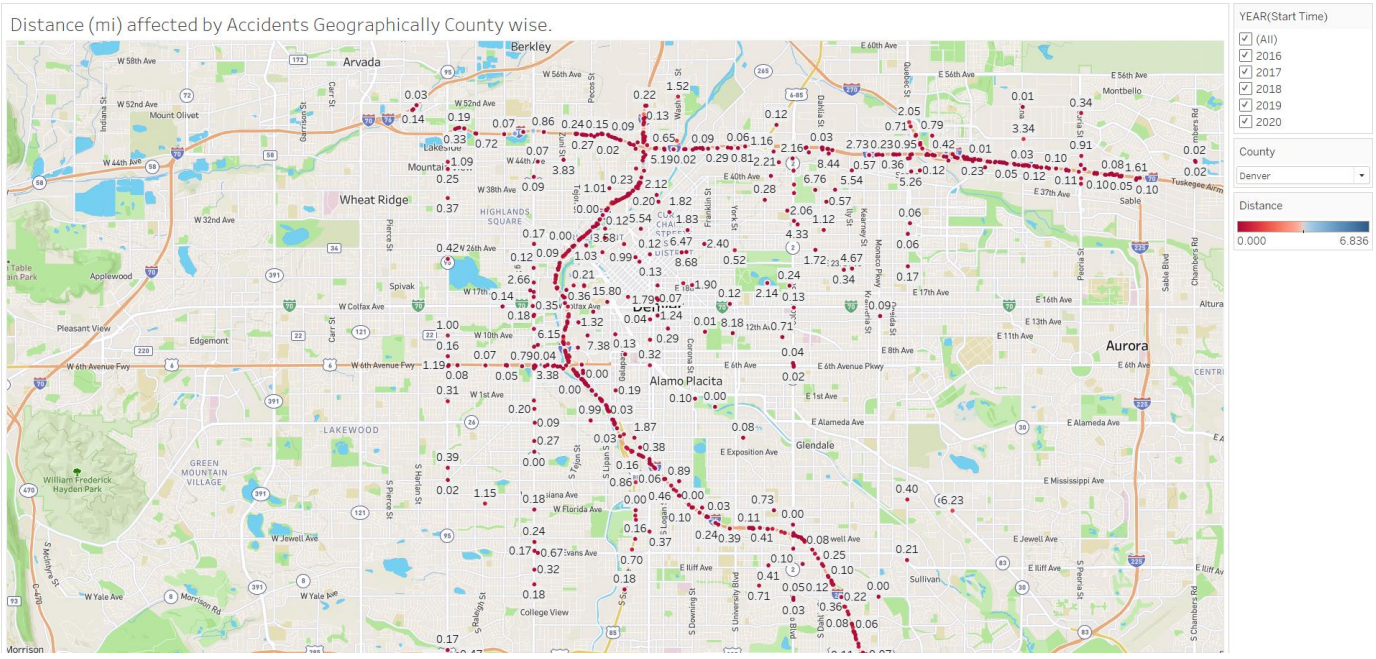


This is a time series forecasting graph. From this we can say that the expected number of accidents in future is likely to increase according to the trend. Now we can also filter the data

according to the number of severity. If you select severity of 4 the forecast will predict the accident count for severity of 4. Below is the image for the same.



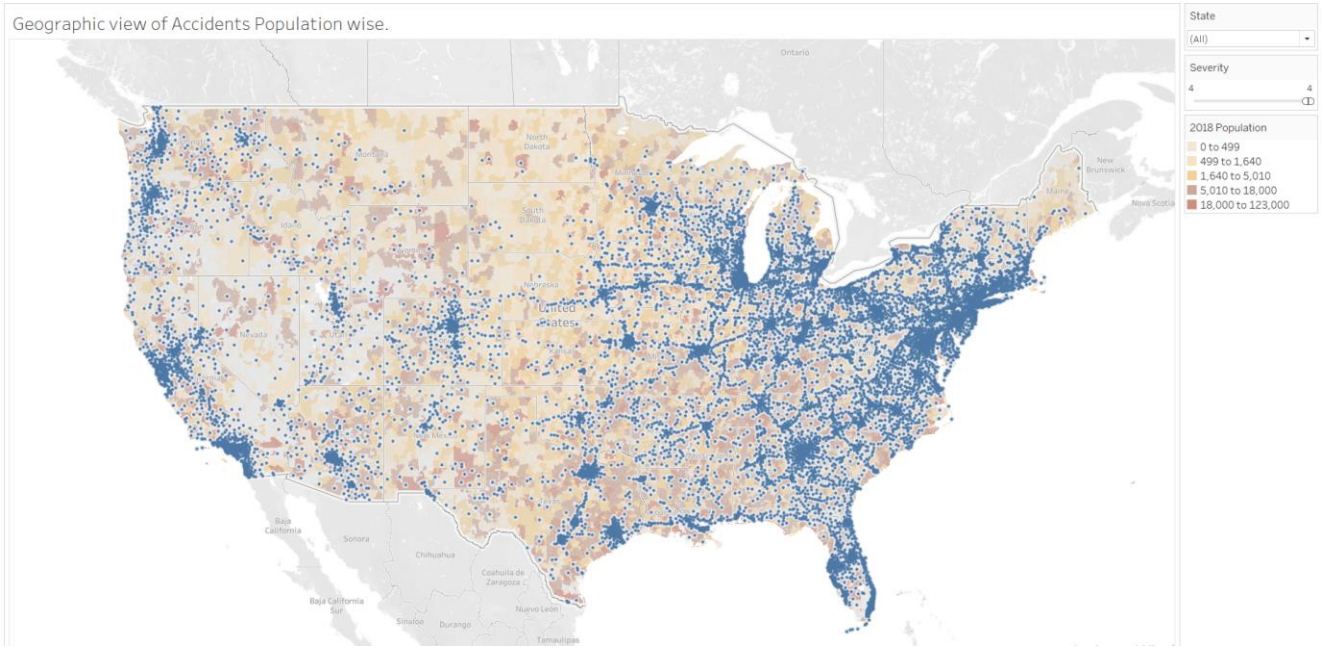
6. What is the Distance (mi) affected by Accidents Geographically?



The above image shows what and where is the most distance which is affected when an accident occurred in the county of Denver. We can also do for any other county by using filters right beside it. This was visualization was generated by making new measure named

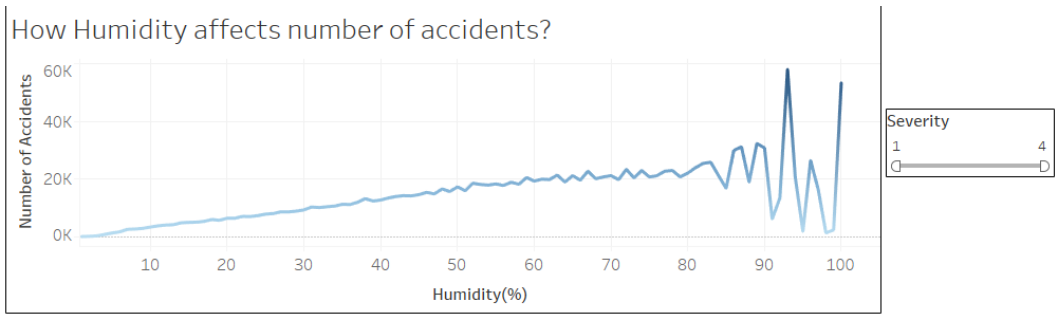
"Distance" which had a calculated filed which determined the distance between 2 longitude and latitude values in miles.

7. What is the overview? In which region most number of accidents occur in USA?



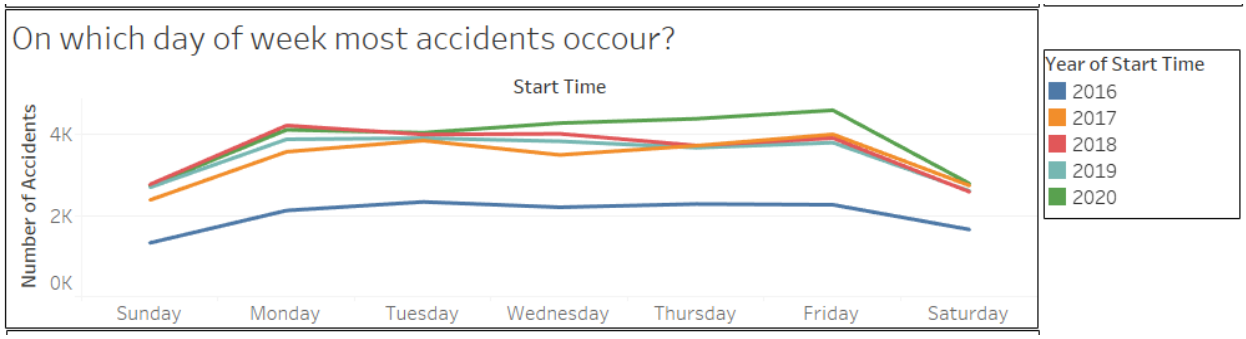
The above image gives you an overview on where most number of accidents occurs? This also gives you an insight on population, does the number of accidents depend on population of a county? We can sure compare that using this graph.

8. How the weather conditions like humidity affects the number of accidents?



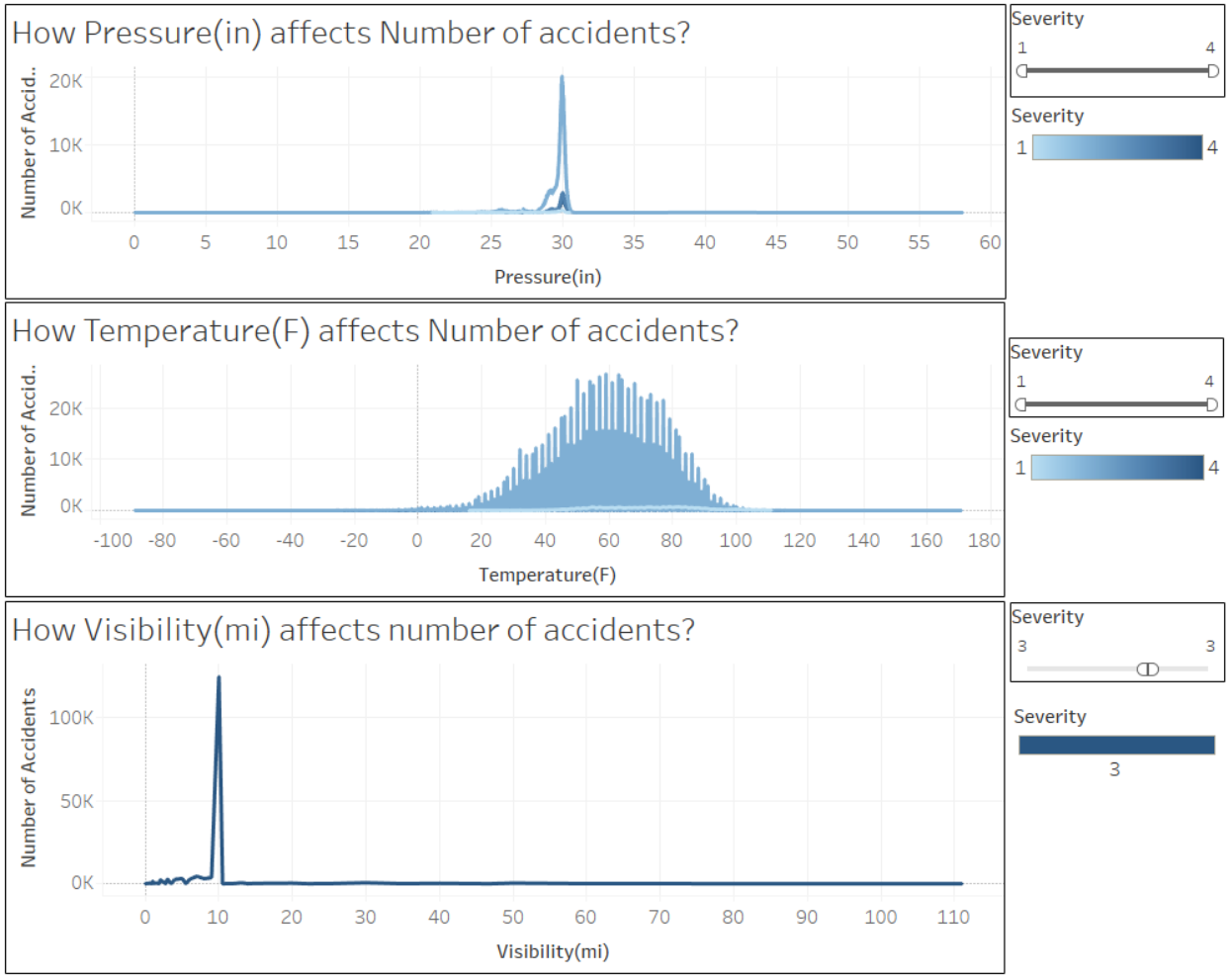
This image answers the question. You can also try changing the severity using filter given in right hand side.

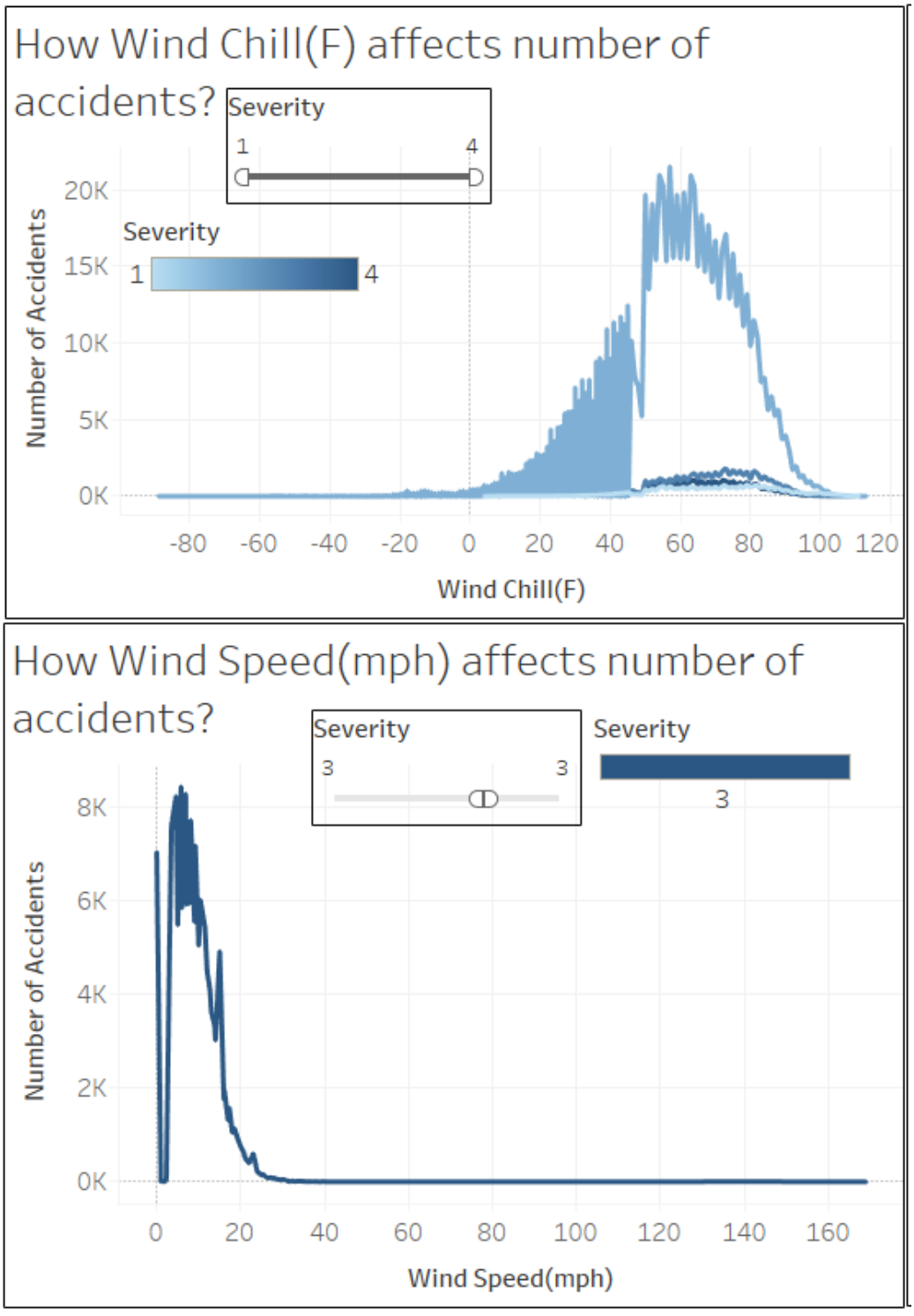
9. On which day of week most accidents occur?



This image shows the number of accidents that had occurred on each day of a week. You can compare this year to year. Try hovering on one of the lines to see more details.

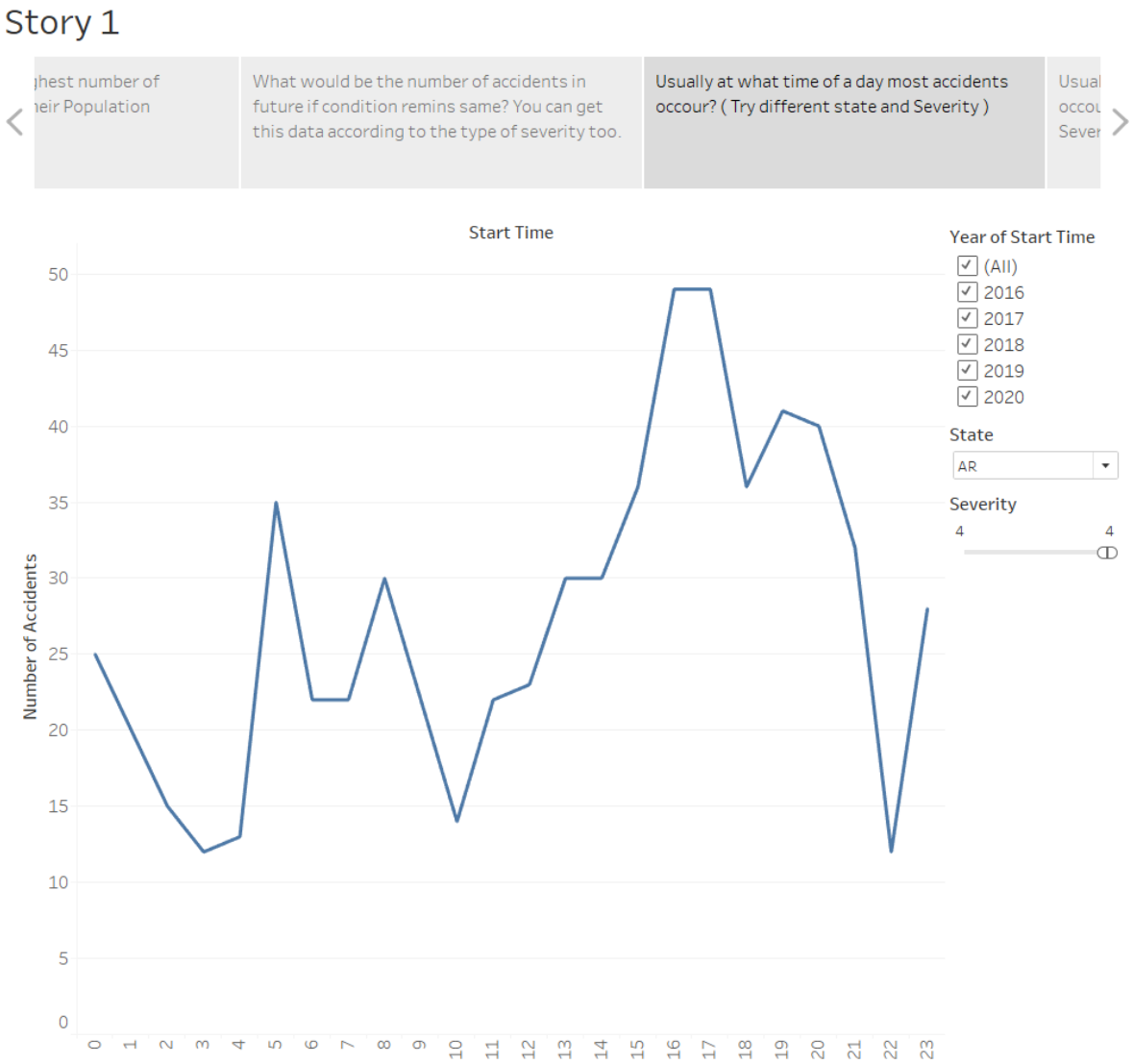
10. How the weather conditions like pressure, temperature, visibility, wind chill, & wind speed affects the number of accidents?





This is dashboard 5, this answers all the questions mentioned above. We can also filter the data using filters given on right hand side. From this we can directly compare and predict the number of accidents that might occur if we know this weather conditions.

Now Tableau has a number of features and one of them is story. I have created story which shows the same as dashboard but it makes easy for the user to understand. Below is just one example, you can have a look in tableau file for more insights.



Link to dashboards:

https://public.tableau.com/views/FinalProject_16501460218280/Dashboard1?:language=en-US&publish=yes&:display_count=n&:origin=viz_share_link

Recommendations.

After analyzing and visualizing the data I will recommend the following things which may reduce the number of road accidents.

- The response teams and hospitals must be given special provisions in the hours in which most accidents are occurred.
- Warning signs about speed limits are to be put in the accident prone streets
- The state with highest accidents must be provided with better resources and budget plans to avoid accidents and rescue the victims.
- Warnings are to be put depending on the weather conditions which cause accidents.
- A mandate of vehicles to have first aid kit should be passed.
- Online surveillance for prompt response from emergency services should be implemented.
- To have enough response teams to rescue in accident prone locations

References

https://www.flerlagetwins.com/2020/07/obscure-tips.html

https://www.tableau.com/about/blog/7-tips-and-tricks-dashboard-experts

https://www.youtube.com/watch?v=CAZ3IAJEuCI

https://www.youtube.com/watch?v=rnP7zP8J_7g

https://www.youtube.com/watch?v=aHaOIvR00So

https://youtu.be/gWZtNdMko1k