BUSINESS INTELLIGENCE MSIS 670

US Traffic Accidents Analysis

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US Traffic Accidents

INTRODUCTION

Every year, crashes claim thousands of lives, hurt hundreds of thousands of people, and cause billions of dollars in property damage. Accurate statistics are required for the creation, implementation, and assessment of highway safety initiatives aimed at reducing this toll. The Crash Report Sampling System (CRSS) is simply one of the information sources used by the NHTSA (National Highway Traffic Safety Administration).

The CRSS is a sample of collisions reported to police that involved a range of motor vehicles, pedestrians, and bicycles, and resulted in only property damage or deaths. The CRSS is used to analyze the overall accident picture, identify issue areas for highway safety, track trends, drive consumer education campaigns, and serve as the basis for cost-benefit analyses of highway safety measures and legislation.

The CRSS derives its statistics from a nationally representative probability sample taken from more than six million police-reported collisions each year. Despite claims from many sources that there are many more crashes that go unreported to the police, the majority of these unreported incidents result in minor property damage and no serious personal injuries. By confining its attention to police-reported collisions, the CRSS concentrates on crashes that the public and the highway safety community deem most troubling.

DATASET

Why this Dataset?

This dataset will help us to analyze car accidents from the years 2016 – 2020. This data set provides the number of factors that lead to accidents. The number of accidents, the number of injured people, the time factor of accidents, work zones, type of roads involved in accidents, atmospheric conditions, and alcohol are some of the aspects of the data.

The data set helps us identify the major factors causing accidents. This helps us analyze and come up with solutions to decrease the number of accidents.

These insights and solution can there by used to educate the driving license holders and general public which will help them in avoiding the accidents.

Strength:

In this dataset, we are able to get the last five years information about the Traffic accidents in the US. It consists of a variety of data items, such as the accident's date and time, region, the weather at the time, the type of vehicles involved, and the severity of the accident, helping us come up with the Time series Visualization.

Limitation:

The information is based on official documents like police reports, which may not include all traffic accidents. Unreported accidents are more likely to occur in rural or distant places. Additionally, the accuracy of police reports may vary, leading to reporting biases that may affect the quality of the data.

Dataset Cleaning:

Considering that some of the date columns were mismatched, and since the data is not consistent among all the years, we had to make necessary changes in the dataset using Tableau Prep as it was difficult to create a visualization in tableau, so we had to filter and transpose some columns to get a better understanding.

KEY AUDIENCE:

Our target audience for the U.S Traffic Accidents are Driving License Holders. As these people are at risk of accidents, if they know the reasons and other factors causing them, they can avert these crashes, which sometimes lead to loss of life.

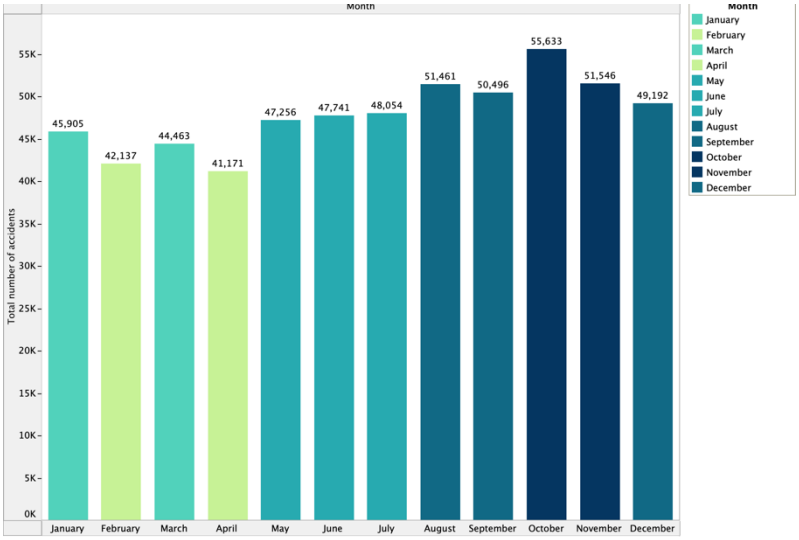
STRATEGIC-LEVEL QUESTIONS:

1.What effect does time have on accidents?

2. How did weather conditions contribute to accidents?

3. The relation between alcohol consumption and accidents?

1. What effect does time have on accidents?



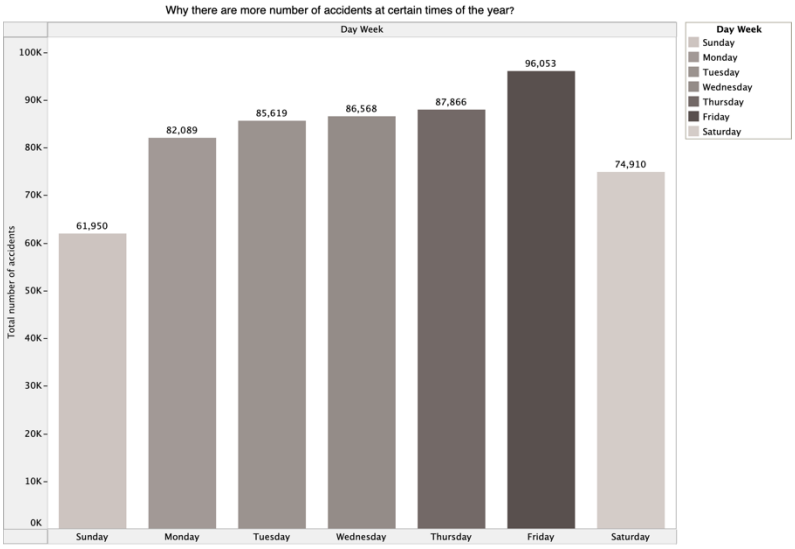
Time is one of many elements that cause accidents. Other factors include driver behavior, road and weather conditions, vehicle safety technology, and more. It's also worth mentioning that the relationship between time and accidents is complex and varies depending on location, demographics, and other variables.

Accident rates vary depending on the time of day, the day of the week, and even the season. Because there are more cars on the road and more people may be rushing to get to their destinations, rush hour during the weekdays tends to have a higher number of accidents. Due to increased levels of alcohol consumption or more individuals using the roads for recreational purposes, weekends may also witness an increase in accidents. Therefore, it's important to take a holistic approach to accident prevention and address multiple factors simultaneously.

Despite major traffic reductions during the initial years of the COVID-19 epidemic, the number of motor vehicle deaths in the United States did not decline.

A. When are more accidents occurring?

In general, more automobiles on the road increase the likelihood of a deadly collision. According to the National Safety Council (NSC) as well as the findings of this project visualizations the majority of accidents occur in September, October and November. Based on our analysis, the month with the largest number of motor vehicle accidents was October, followed by November and August. According to NSC the above months also had the highest number of miles driven.



B. Why are there more accidents at certain time of the year?

There are several possible reasons why there may be more accidents on October in the US.

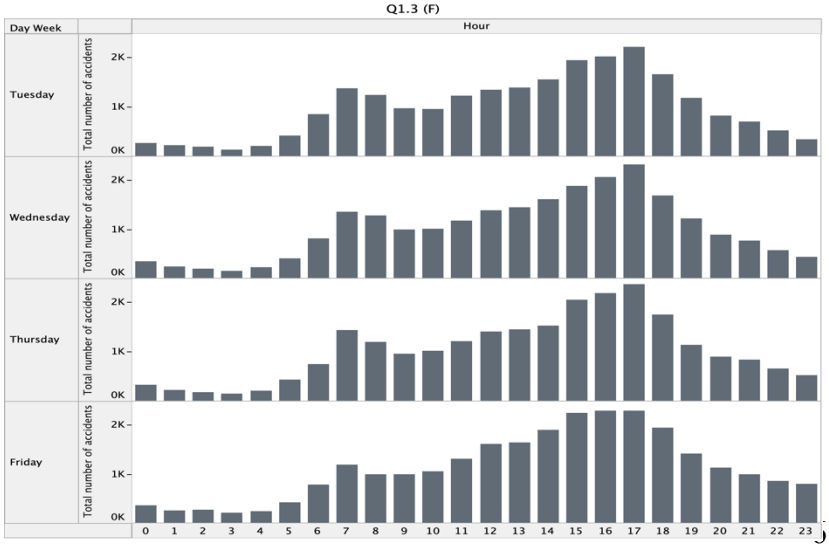
According to new University of Colorado Boulder study, fatal vehicle accidents in the United States increase by 6% during the workweek following the "spring forward" to daylight saving time, resulting in approximately 28 more deaths each year.

Because there are fewer daylight hours during the winter months, more people drive in the dark. This can make it more difficult to notice other vehicles, pedestrians, and road hazards, thus leading to more accidents.

From our analysis we also found out there are more accidents caused by Bad weather as well as the alcohol abuse in the month of October.

C. What time were the most number of accidents occurring?

(Friday followed by Thursday, Tuesday, and Wednesday)
In the United States, the time between 2:00 and 7:00 p.m. is commonly referred to as "peak commuting time".
From our findings we found out that most of these accidents are on the weekdays.



D. What steps should be taken to reduce these accidents?

As we can see from the analysis and visualization there are more accidents happening between 2:00 and 7:00 p.m. In the United States, this time is commonly referred to as "peak commuting time".

Many people have been working or studying all day and may be tired or psychologically exhausted during the evening rush hour. This can impair their driving skills and increase the chances of an accident occurring.

People may be in a hurry to go home or to their next location, which can lead to aggressive or risky driving behaviors such as speeding or cutting other cars off.

Drivers may be more inclined to use their phones or participate in other distractions during their trip home, increasing the likelihood of an accident.

To reduce these accidents the drivers should remain alert and practice safe driving habits during rush hour traffic. This includes avoiding distractions, leaving plenty of space between your vehicle and other vehicles.

2. How did weather conditions contribute to accidents?

Weather conditions may cause accidents in a variety of ways, including:

Rain, fog, and snow can impair visibility on the roadways, making it harder for drivers to notice other cars, pedestrians, or road hazards. This can increase the likelihood of a collision, particularly if drivers are moving at high speeds.

Slippery roads: Wet or slippery roads can make stopping and maneuvering difficult, resulting in skidding, sliding, and loss of control. This can increase the likelihood of an accident, especially if drivers do not modify their driving to the conditions.
Reduced tire traction: Extreme heat or cold can impact tire pressure and grip, diminishing road traction. This can make it harder to stop or turn, increasing the risk of an accident**.**

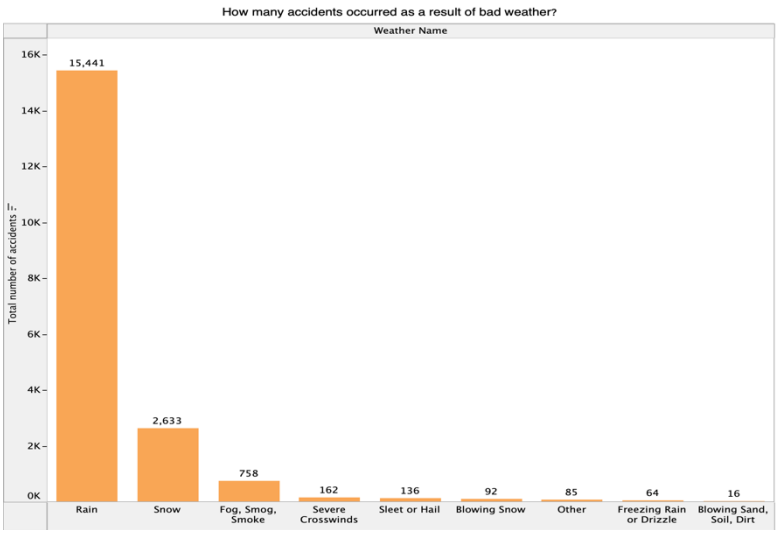
Strong winds can have an impact on the stability of vehicles, particularly high-sided vehicles like trucks and buses. This can force them to veer or flip, increasing the likelihood of an accident.

Electrical storms may cause power outages, which can disrupt traffic lights and other infrastructure, increasing the likelihood of an accident.

Overall, weather conditions may have a considerable influence on road safety, therefore drivers must adapt their driving to the circumstances and take extra steps to avoid accidents.

A. How many accidents occurred as a result of bad weather?

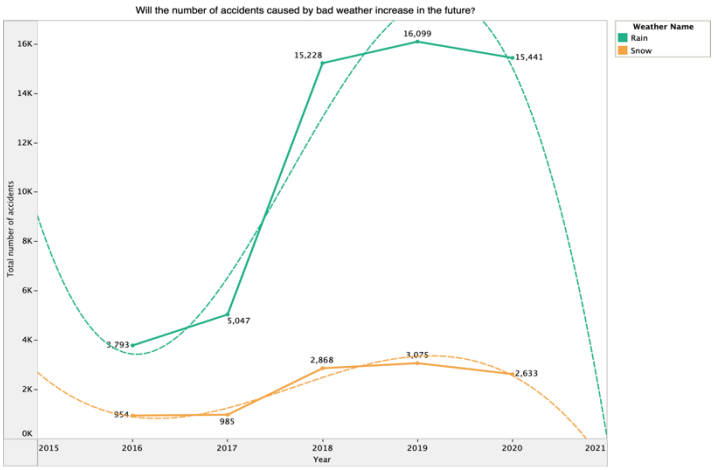
Bad weather is usually defined as Weather Unsuitable for outdoor activities. There are number of bad weather phenomenon which changes from time to time. The severity of bad weather also changes from event to event.



Most of the bad weather phenomenon effects the visibility of the roadway Infront of the driver. Rain can cause malfunction in street lights and traffic infrastructure which can confuse drivers and prevent them from implementing right-of-way rules.

As we see from the visualization the most accidents due to bad weather is caused by Rain and snow. The other bad weather phenomenon such as fog, smog, smoke, sleet or hail, crosswinds and other have caused very few accidents.

B. Will the number of accidents caused by bad weather increase in the future?



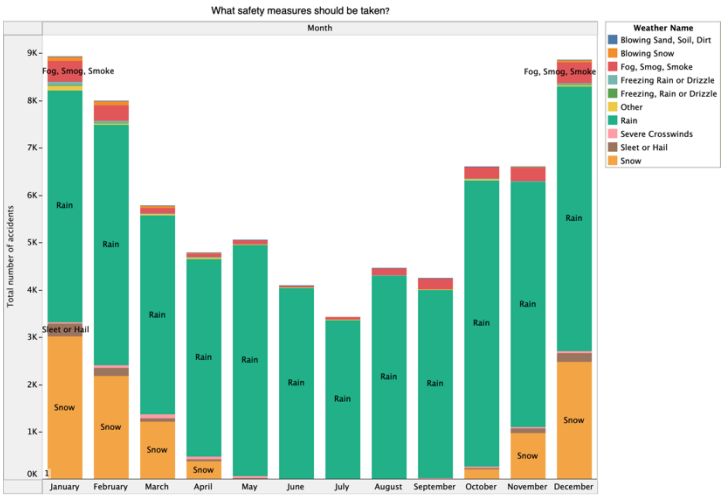
As we can see from the visualization the trend of accidents caused by bad weather is increasing from 2016 although there is a dip in the year 2020 which can be due to the impact of COVID-19 which is again not a drastic fall. So, we can say there are higher chances of accidents caused by bad weather to increase in future.

Extreme weather events such as torrential rain, flooding, and heatwaves are becoming more common and severe as the climate changes. This might lead to an increase in the frequency of accidents caused by inclement weather.

Urbanization: As more people relocate to cities, there are more automobiles on the road, thereby increasing the likelihood of weather-related accidents.

Many roads and highways in developed countries were built decades ago and may be incapable of withstanding extreme weather events. This might result in more accidents.

C. What safety measures should be taken?



Drivers in the United States can take many precautions to avoid traffic accidents during inclement weather, including:

Check the weather and road conditions: Before driving, drivers should check the weather and road conditions and plan their route appropriately. Being extra careful and paying more attention to the weather warnings especially in the months where there are higher weather related accidents i.e. January, February, October, November and December.

Reduce speed: When driving in inclement weather, it is important to slow down and maintain a safe speed adequate for the conditions. This can aid in the prevention of skidding, hydroplaning, and loss of control.

Drivers should increase the following distance between their vehicle and the vehicle in front of them to give themselves more time to respond to unexpected stops or hazards.
Use headlights/ hazards: In low visibility situations, using headlights can help drivers see the road and be noticed by other cars.

Avoid abrupt moves: Drivers should avoid abrupt manoeuvres such as harsh brakes or rapid turns, which can be dangerous.

Tire maintenance: Tires with sufficient tread depth can enhance grip and handling on wet or slippery roads.

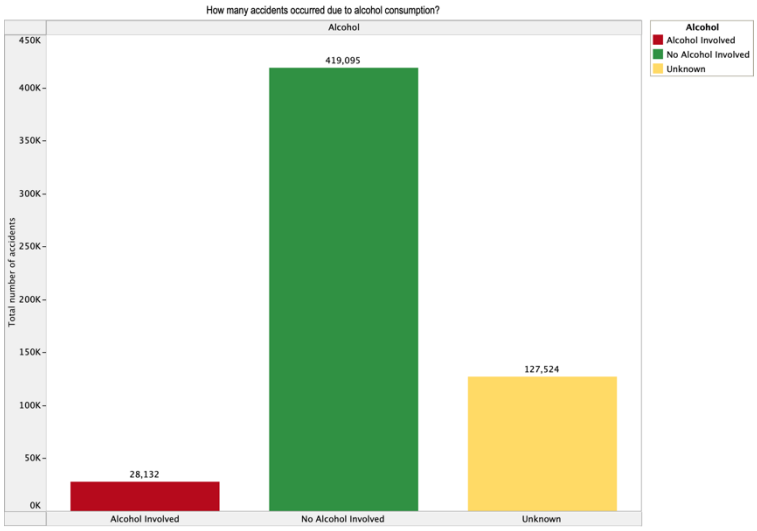
Drivers should be vigilant and avoid distractions such as texting or using their phone while driving.

3. The relation between alcohol consumption and accidents?

There is a substantial link between alcohol intake and automobile accidents. Alcohol is a depressant that impairs judgment, lowers coordination and response speed, and can hinder a person's ability to make smart judgments. When a person consumes alcohol and then drives a car or engages in other activities that demand coordination and awareness, they increase their chances of being involved in an accident.

A) How many accidents occurred due to alcohol consumption?

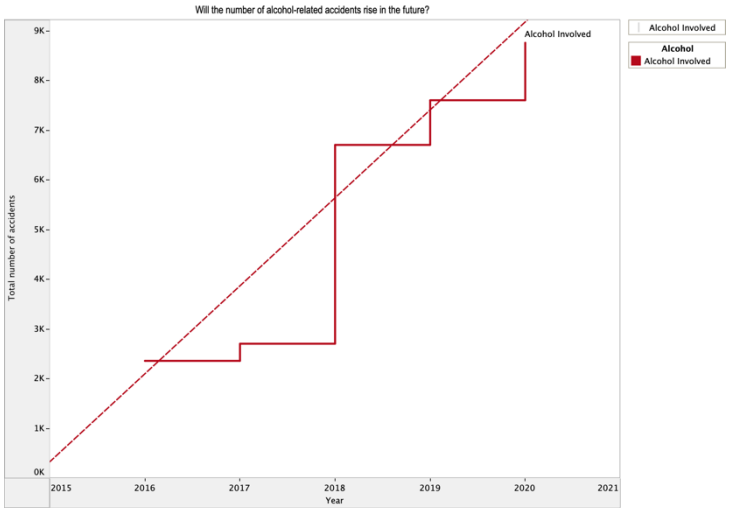
We have a common misconception that most of the accident are caused due to the misuse of alcohol but we learned from the visualization that it is not the case the accidents happened without any alcohol use is exponentially high.



B. Will the number of alcohol-related accidents rise in the future?

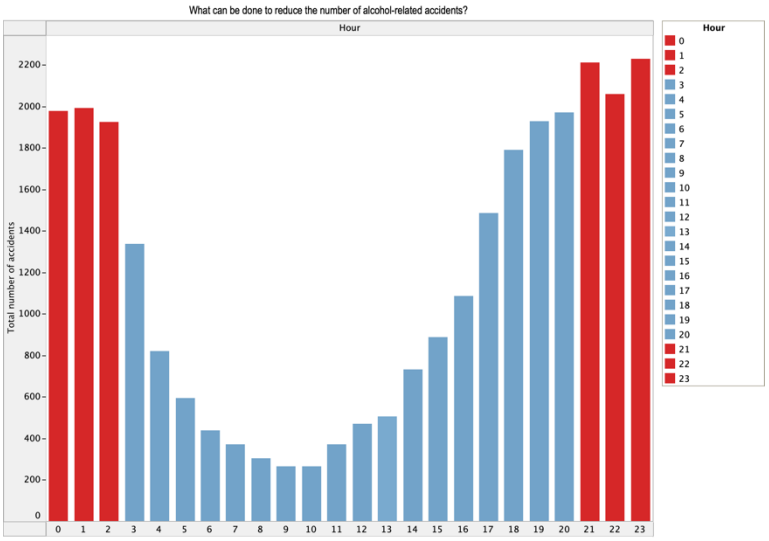
There are high chances that alcohol-related accidents will increase in the future since the accidents are on increasing trend. Surprisingly, the number of alcohol related accidents increased in the year 2020 as well while the other accidents numbers were affected by COVID-19.

In the US, online alcohol sales during March 2020 grew by 234% as compared to the preceding year.



C. What can be done to reduce the number of alcohol-related accidents?

As we can see from the visualization that most number of accidents are occurring from 10:00 pm till 2:00 am in the night we should try reducing the number of alcohol-related accidents.



Here are some strategies that can help to reduce the number of alcohol-related accidents during night:

Use of Carpooling services: Using new age carpooling apps and carpooling to home when someone is drunk.

Cab / Taxi Services: Making use of Uber, Lift or any other Cab services.

Public transit: Using public transportation at night when someone is drunk.

Designated driver: Having a Designated driver on specific days when someone has a plan to drink.

Conclusion:

From our analysis we can see that there is a rise in the number of accidents over years but these accidents can be reduced to a large extent by using the following measures: Closely following weather warnings to avoid bad weather related accidents, Using carpooling and cab services when someone is drunk and being extra careful in the rush hours and peak commuting hours.

Learnings:

We learned how to collect dataset from Kaggle and other sources, clean, merge and analyse it. We also learned how to make different data visualizations using Tableau and create a story out of it.

We have a common misconception that alcohol, rain and snow are the main factors contributing towards accidents but we learned from the visualization that it is not the case. Many accidents have taken place in the clear as well as cloudy weather conditions and without any alcohol involvement. There are many other factors that contribute towards the same. We learned and experienced how visualization can speak for itself.

Sources:

https://www.kaggle.com/datasets/jonbown/us-2020-traffic-accidents

https://www.avrek.com/blog/what-time-of-year-do-most-car-accidents-happen/#:~:text=According%20to%20the%20National%20Safety,the%20summer%20and%20fall%20months.an

https://auburnexaminer.com/when-are-the-most-common-times-for-fatal-car-accidents/

https://www.states101.com/populations

https://www.census.gov/popclock/data_tables.php?component=growth