Introduction and Problem statement

A traffic collision, also called a motor vehicle collision, car accident, or car crash, occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree, pole or building. Traffic collisions often result in injury, disability, death, and property damage as well as financial costs to both society and the individuals involved.[1]

Every year the lives of approximately 1.35 million people are cut short as a result of a road traffic crash. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury.[2]

Road traffic injuries cause considerable economic losses to individuals, their families, and to nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. Road traffic crashes cost most countries 3% of their gross domestic product.[2]

More than 90% of road traffic deaths occur in low- and middle-income countries. Road traffic injury death rates are highest in the African region. Even within high-income countries, people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes. Road traffic injuries are the leading cause of death for children and young adults aged 5-29 years. From a young age, males are more likely to be involved in road traffic crashes than females. About three quarters (73%) of all road traffic deaths occur among young males under the age of 25 years who are almost 3 times as likely to be killed in a road traffic crash as young females.[2]

Due to huge losses caused by traffic collision, it is quite important to know the impacts of different factors which result in these collisions and make some effective recommendations to prevent these tragedies.

Usually, a number of factors contribute to the risk of collisions, including vehicle design, speed of operation, road design, road environment, driving skills, impairment due to alcohol or drugs, and behavior, notably distracted driving, speeding and street racing.[1][3]

Generally, there are two tpyes of factors. One is related to the personal behaviors like over-confidence, speeding, driving skills, drinking alcohol, etc. The other one is related to environmental conditions such as road design, road environment, weather and light.

Given that the importance of personal behaviors has been recognized by the public from long time ago, there are a lot of educational methods and legal regulations to reduce traffic collisions. This project aims to analyze the influences of environmental conditions on traffic collisions and then provide more specific recommendations to urban planners or traffic department to improve the conditions to reduce traffic collisions.

[1]https://en.wikipedia.org/wiki/Traffic_collision
[2]https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries
[3]https://www.sciencedirect.com/science/article/pii/S0001457518300873#:~:text=What%20are%20the%20main%20contributing,the%20collisions%20of%20older%20drivers

Data description

The dataset used in this project is "Data-Collisions.csv" from week 1 in this course. You can get data by clicking HERE.

There are 37 attributes in the given table, which include location (X and Y), timestamps, severity types, weather, light, road conditions, etc.

Among these attributes:

- SEVERITYCODE, PERSONCOUNT and COLLISIONTYPE can be used as dependent variables to indicate the severity of the traffic collisions;
- WEATHER, ROADCOND, LIGHTCOND, ADDRTYPE can be used as independent variables to show how environmental conditions influence the severity of the collisions;
- INCDATE, X and Y can be used as temporal and spatial variables to show how the severity of collisions change along temporal and spatial dimensions.

With the data, it is possible to realize the goal of this project, which is to analyze the influences of environmental conditions on traffic collisions and then provide more specific recommendations to urban planners or traffic department to improve the conditions to reduce traffic collisions.