Introduction : -

This is the analysis report on United Kingdom road accident data 2021-2022. The goal is to analyse the given data,provide insights and find factors to improve road infrastructure to reduce accidents.

Data Inspection : - (all data inspection was performed in python before using PowerBI)

I checked all the columns of the table for inconsistencies and these are the changes I made -

a) Junction_Control column : I changed the misspelled “Auto traffic sigl” to “Auto traffic signal”.

b) Accident_Severity column : I changed the misspelled “Fetal” to “Fatal”,

c) Carriageway_Hazards column : It had most of the column null but I still kept it.

d) Time : Time column has some null values.

Data Analysis Insights : -

Page 1 (Overview) -

1) KPI information -

a) Accident_Severity : Most accidents are “Slight”. The least accidents are “Fatal”. 0.15% accidents in the data are severe (“Serious” or “Fatal”).

Reason - This could be because most reported accidents are minor collisions especially as in urban areas there is high traffic so high speed accidents are very rare.

b) Vehicle_Type : Most common vehicle type in accidents is car.

Reason - This could be as car is the most common vehicle on roads in urban and rural areas and they are used in daily commutes and business like taxi.

c) Weather_Condition : Fine weather with no high winds is the most common weather condition for accidents.

Reason - Most people travel or go for work in fine weather thereby increasing vehicle density on road leading to more accidents.

d) Junction_Control : Give way or uncontrolled junction control have most number of accidents,

Reason - Since the junction is uncontrolled hence people approach them at high speed and also since there are no signals on the junction which might cause confusion in drivers and hamper their decision making leading to accidents.

2) Plot Information-

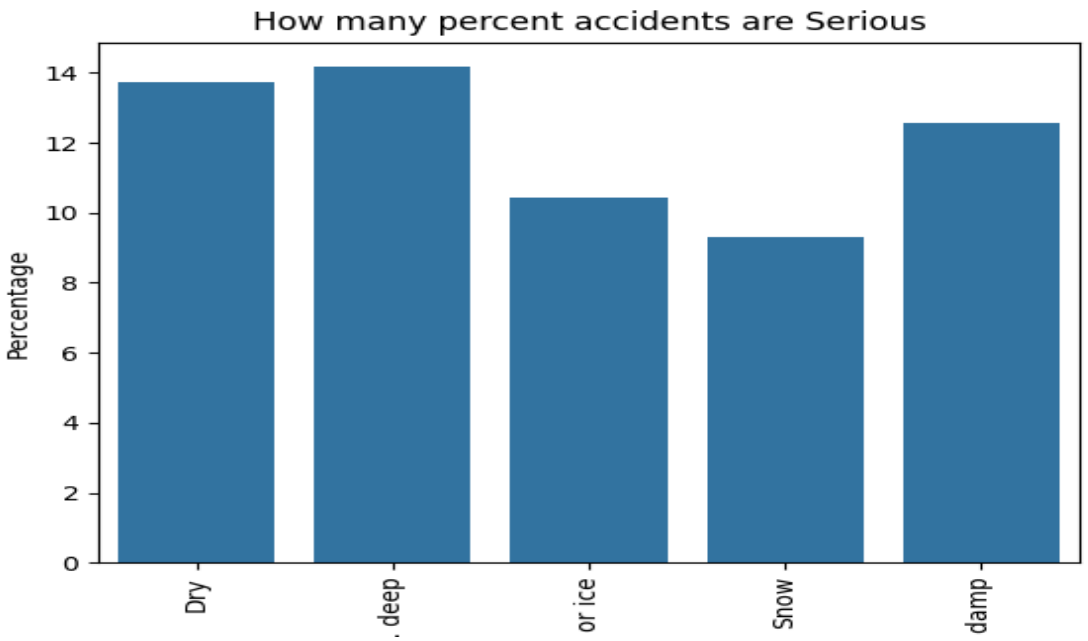
a) Accident count over YearMonth : We can see in the line chart that the number of accidents have decreased from 2021 to 2022 which is a good sign.
Reason - This might be because of post pandemic most people do work from home jobs reducing traffic density and better ADAS technologies in vehicle lead to less number of accidents.

b) Accident count over Urban or Rural Area : The pie chart shows that most number of accidents occur in urban areas compared to rural areas but number of fatal accidents in rural areas are more.
Reason - As there is more population in urban areas so traffic density is also more leading to less speed of vehicles hence rarity of high speed severe accidents. In rural area the road conditions might be bad and since less traffic so drivers drive in high speeds their by leading to fatal accidents and also in rural areas medical help might arrive late since it is far from urban area leading to more fatal accidents.

c) Geo Map : You can explore the map to see that bubbles are bigger densely populated urban areas. (bubble size indicates accident count)

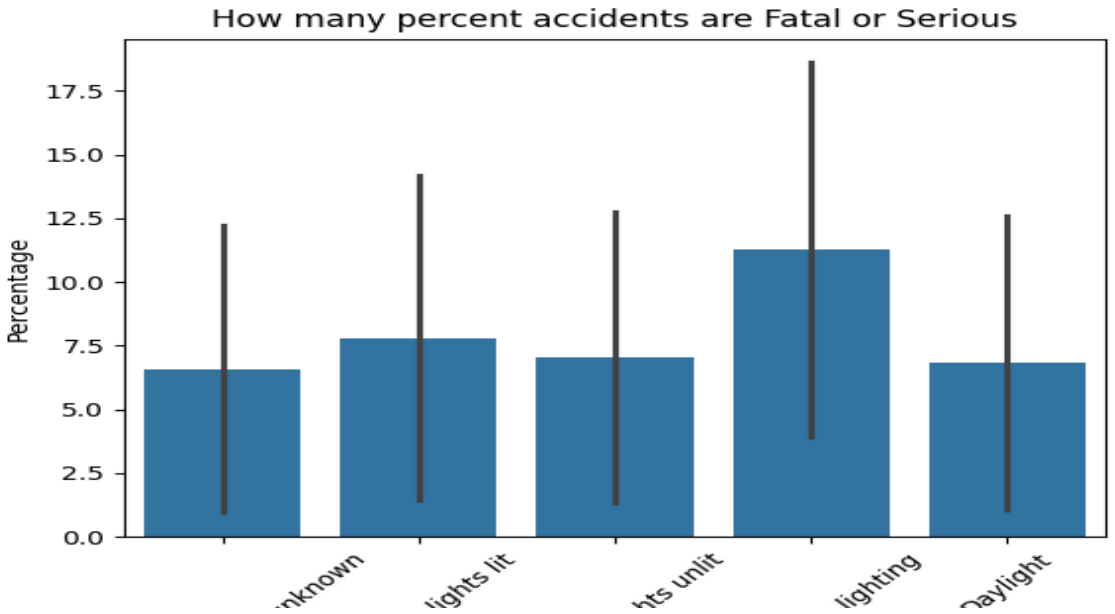
Page 2 (Effect of Road & Environmental factors on accidents) :

a) Accident Count over Light Condition : More number of accidents occur in Daylight because traffic density is high in daylight due to good visibility. Since more number of accidents occur in Daylight therefore fatal accidents are also more in Daylight but the percentage of Fatal and Serious accidents occur in Darkness - no lighting. This could be due to fatigue and poor lighting which hampers drivers judgement leading to accidents.
The graph below is not represented in dashboard. It was made in python.



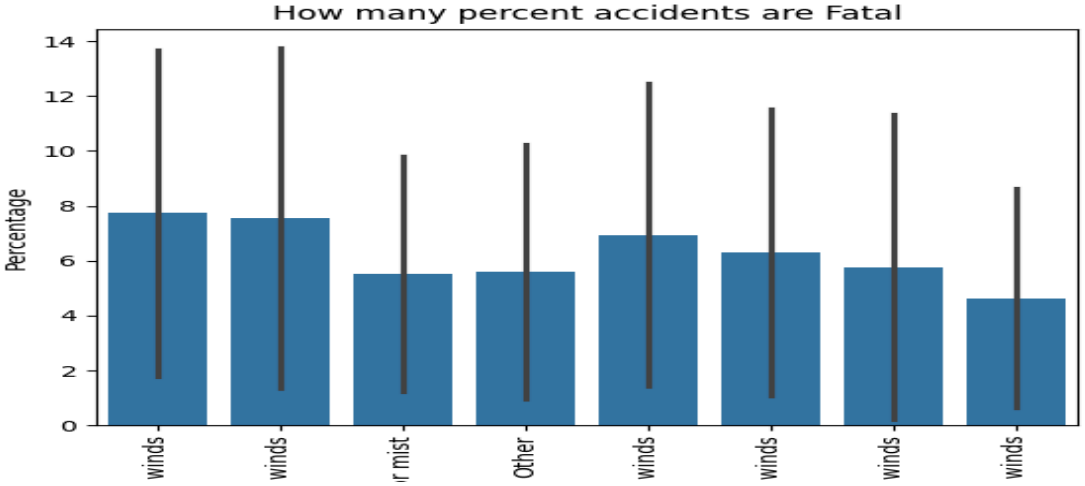
b) Accident Count over Road Type : Single carriageway is most common road type for all types of accidents.
Reason - Single carriageway is most common road type in urban and rural areas. They have limited spaces and due to high traffic density might lead to accidents.

c) Accident Count over Road Surface Condition : Dry condition is most common here for accidents but proportion wise more fatal accidents occur on flooded roads.



Reason - More people travel in dry condition hence more chances of accident. In flooded road there is less traction for tyres hence leading to more fatal accidents.
(Done in Python. Not shown in dashboard)

d) Accident Over Weather Conditions : Fine + no high wind is most common for accidents as discussed previously but proportion wise Fine + high wind weather leads to more severe accidents.
Reason - High speed winds make light cars and especially bikes and motorcycles unstable leading to more severe accidents.



e) Accident Count over speed limit : Most accidents occur in speed limit 30 . Most fatal and serious accidents in urban areas occur at speed limit 30 whereas in rural areas most fatal and serious accidents occur at speed limit 60.

Reason - As discussed before that traffic density is high in urban areas hence high speed accidents are rare but in congested areas and collision with pedestrians lead to severe accidents at slow speed too. In rural areas there is less traffic hence high speed accidents leading to serious injuries.

Page 3 (Time_Vehicle_Casualties_Junction) :

a) KPI Information -

1) Casualties per accident is 1.36. (1.80 - Fatal ,1.46 - Serious, 1.33 - Slight). So we can see as severity increases, number of casualties increase too.
2) Number of vehicles per accident is 1.83. Stays about similar for all severity.

b) Time Plots -

Here I have created a new feature Time_Zone using time column.

Most common day for accidents is Friday but more severe accidents occur on Saturday and Sunday. Most common month for accidents is November but for serious accidents it is September and for fatal accidents it is May. Most common time_zone for accidents is Afternoon but more severe accidents occur in evening and morning proportion wise.

Reason - Saturday and Sunday are weekends hence people might be travelling somewhere or drivers also might be intoxicated leading to more accidents. Maybe fogs occur in November so causing more accidents, September is when schools reopen so causing more traffic leading to more severe accidents and May has more clear roads (summer) hence chances of high speeding drivers leading to more fatal accidents.

c) Junction_Control -

Junctions where an authorised person or a traffic signal is present are safer.

Page 4 (District) :

Birmingham has the most number of accidents because it is highly populated but Westminster has more severe accidents maybe because of busy junctions.

<u>How to improve road infrastructure and reduce accidents</u> : -

1) In rural areas we need to install speed control measure and enhance better emergency response. In urban areas we need to improve pedestrian safety and junction management.
2) Implement better lane markings and barriers on single carriageways.
3) Improve drainage systems to prevent waterlogging and launch awareness campaigns about driving on wet surfaces.

4) Issue wind warnings and enforce speed restrictions during high wind conditions.
5) Enhance street lighting and visibility aids in accident-prone zones.
6) Conduct a micro-analysis of specific junctions and pedestrian areas in Districts with high rate of severe accidents for targeted interventions.
7) Look into uncontrolled junction and authorise a person there to care of traffic or install a signal at such junctions.
8) Make people aware about the risky days and time zones to travel and enforce safety rules during such zones ,days and months where there are high chances of accidents.