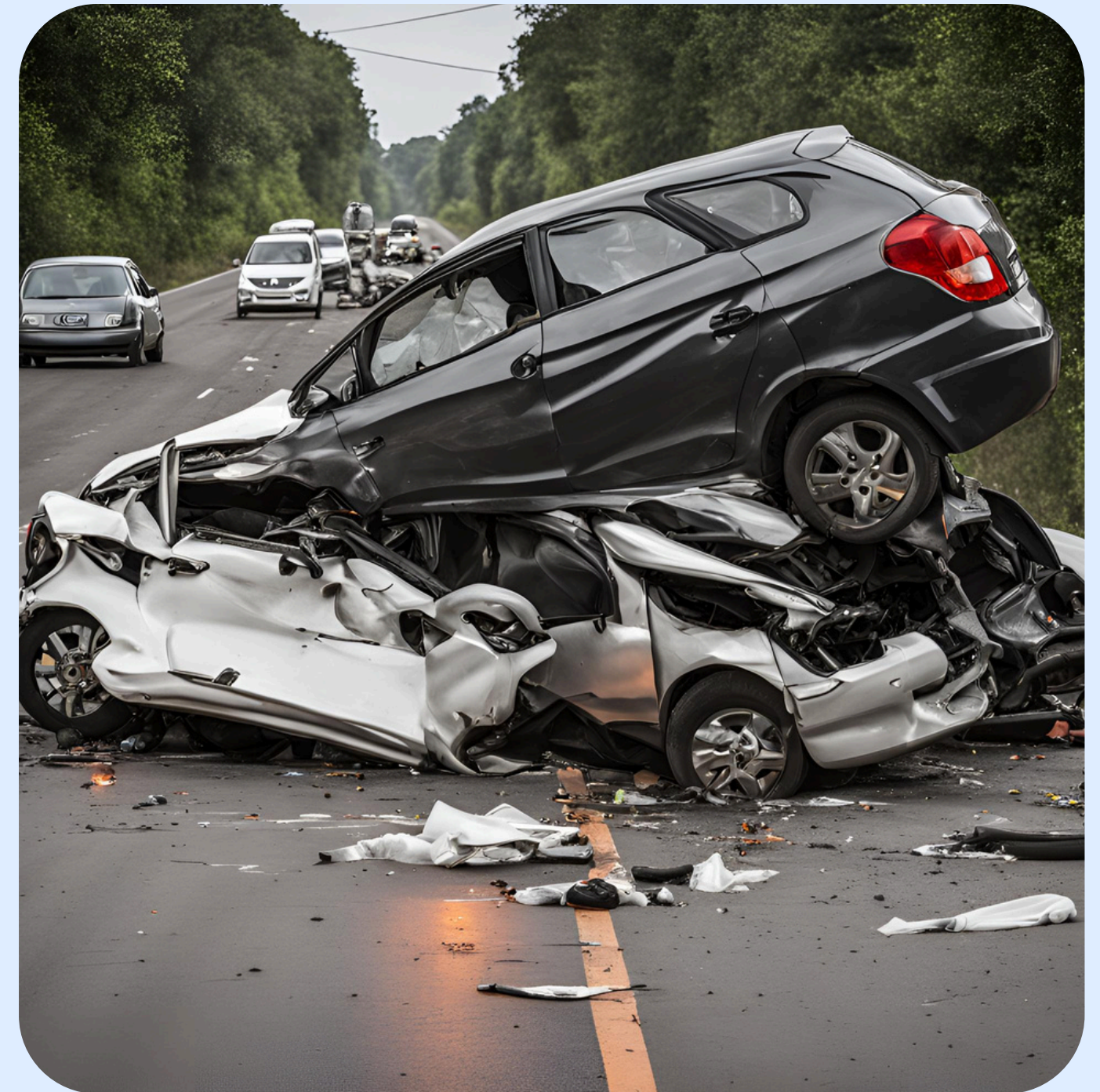# ROAD ACCIDENT ANALYSIS

Insights for Government Policy & Road Safety

USING SQL

BY AMIT

INTRODUCTION

Road accidents remain a significant public safety concern, causing numerous casualties each year. This project leverages road accident data to analyze critical factors such as accident severity, weather conditions, road types, and more. The insights gained can help governments make informed decisions to improve road infrastructure, set safety guidelines, and implement preventive measures

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FACTORS ANALYZED

- Accident Severity
- Weather Conditions
- Light Conditions
- Road Surface Conditions
- Road Type
- Vehicle Involvement
- District Area
- Casualties
- Time of Day
- Urban vs Rural Areas
- Pedestrian Involvement
- Yearly Trends

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KEY FINDINGS

- **Weather Conditions**: Rainy weather was a significant contributor to accidents, especially on wet road surfaces.
- District Hotspots: Urban areas, particularly Kensington, reported the highest accident frequency.
- **Light Conditions**: Accidents in daylight are more frequent, but nighttime accidents tend to be more severe.
- **Road Surface**: Wet and damp roads resulted in higher accident severity compared to dry conditions.
- **Vehicle Involvement:** Cars were the most involved vehicle type, especially during adverse weather conditions.

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What is the total number of accidents recorded in the database ?

```sql
SELECT
    COUNT(Number_of_Casualties) AS total_accidents
FROM
    accident_data
```

total_accidents
642809

District areas with the highest number of accidents ?

```sql
SELECT
    District_Area,
    SUM(Number_of_Casualties) AS highest_number_of_accidents
FROM
    accident_data
GROUP BY District_Area
ORDER BY highest_number_of_accidents DESC
```

District_Area	highest_number_of_accidents
Birmingham	18015
Leeds	12301
Bradford	9204
Manchester	8779
Liverpool	8480
Sheffield	7612
Kirklees	6975
Westminster	6417
Glasgow City	5939
Doncaster	5793

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Most common weather conditions during accidents

```sql
SELECT
    Weather_Conditions AS common_weather_conditions,
    SUM(Number_of_Casualties) AS total_accidents
FROM
    accident_data
GROUP BY Weather_Conditions
ORDER BY total_accidents DESC
```

common_weather_conditions	total_accidents
Fine no high winds	699707
Raining no high winds	111658
Other	23075
Raining + high winds	13547
Fine + high winds	11794
Snowing no high winds	8328
Fog or mist	5091
Snowing + high winds	1246

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Most common weather conditions during accidents

```sql
SELECT
    Road_Type, SUM(Number_of_Casualties) AS total_accidents
FROM
    accident_data
GROUP BY Road_Type
ORDER BY total_accidents DESC
```

Road_Type	total_accidents
Single carriageway	649738
Dual carriageway	144516
Roundabout	54569
One way street	15790
Slip road	9833

Accidents involving wet or damp road surfaces

```sql
SELECT
    Road_Surface_Conditions,
    SUM(Number_of_Casualties) AS total_accidents
FROM
    accident_data
WHERE
    Road_Surface_Conditions = 'Wet or damp'
GROUP BY Road_Surface_Conditions
ORDER BY total_accidents DESC
```

Road_Surface_Conditions	total_accidents
Wet or damp	259748

Vehicle types most commonly involved in accidents

```sql
SELECT
    Vehicle_Type, SUM(Number_of_Casualties) AS accidents
FROM
    accident_data
GROUP BY Vehicle_Type
ORDER BY accidents DESC
```

Vehicle_Type	accident
Car	659998
Van / Goods 3.5 tonnes mgw or under	45142
Motorcycle over 500cc	34043
Bus or coach (17 or more pass seats)	34009
Goods 7.5 tonnes mgw and over	22841
Motorcycle 125cc and under	19824
Taxi/Private hire car	17767
Motorcycle over 125cc and up to 500cc	10052
Motorcycle 50cc and under	9956
Goods over 3.5t. and under 7.5t	8083

Number of vehicles involved in accidents by road type

```sql
SELECT
    Road_Type, COUNT(Vehicle_Type) AS number_of_vehicle
FROM
    accident_data
GROUP BY Road_Type
ORDER BY number_of_vehicle DESC
```

Vehicle_Type	accidents
Car	659998
Van / Goods 3.5 tonnes mgw or under	45142
Motorcycle over 500cc	34043
Bus or coach (17 or more pass seats)	34009
Goods 7.5 tonnes mgw and over	22841

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Accidents with the highest number of vehicles by district area

```sql
SELECT
    District_Area,
    MAX(Number_of_Vehicles) AS highest_number_of_vehicle
FROM
    accident_data
GROUP BY District_Area
ORDER BY highest_number_of_vehicle DESC
```

District_Area	highest_number_of_vehicle
Purbeck	32
Dover	28
Oldham	19
Bromsgrove	16
Leeds	16
County Durham	16
Watford	16
South Gloucestershire	15
Taunton Deane	14
Wychavon	14

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Severity of accidents by urban and rural areas

```sql
SELECT
    Accident_Severity,
    Urban_or_Rural_Area,
    SUM(Number_of_Casualties) AS accidents
FROM
    accident_data
GROUP BY Accident_Severity , Urban_or_Rural_Area
ORDER BY accidents DESC
```

Accident_Severity	Urban_or_Rural_Area	accidents
Slight	Urban	457662
Slight	Rural	273278
Serious	Urban	65339
Serious	Rural	61928
Fatal	Rural	11555
Fatal	Urban	4671
Slight	Unallocated	12
Serious	Unallocated	1

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top 5 Casualties based on weather and light conditions

```sql
SELECT
    Weather_Conditions,
    Light_Conditions,
    SUM(Number_of_Casualties) AS accidents
FROM
    accident_data
GROUP BY Weather_Conditions , Light_Conditions
ORDER BY accidents DESC
LIMIT 5;
```

Weather_Conditions	Light_Conditions	accidents
Fine no high winds	Daylight	528845
Fine no high winds	Darkness - lights lit	125149
Raining no high winds	Daylight	69323
Fine no high winds	Darkness - no lighting	38632
Raining no high winds	Darkness - lights lit	31439

Fatal accidents based on weather conditions

```sql
SELECT
    Accident_Severity,
    Weather_Conditions,
    SUM(Number_of_Casualties) AS accidents
FROM
    accident_data
WHERE
    Accident_Severity = 'Fatal'
GROUP BY Accident_Severity , Weather_Conditions
ORDER BY accidents DESC
```

Accident_Severity	Weather_Conditions	accidents
Fatal	Fine no high winds	13232
Fatal	Raining no high winds	1731
Fatal	Other	371
Fatal	Fine + high winds	319
Fatal	Raining + high winds	285
Fatal	Fog or mist	215
Fatal	Snowing no high winds	65
Fatal	Snowing + high winds	8

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Top five locations with the most accidents

```sql
SELECT
    District_Area AS locations,
    SUM(Number_of_Casualties) AS accidents
FROM
    accident_data
GROUP BY District_Area
ORDER BY accidents DESC
LIMIT 5;
```

locations	accidents
Birmingham	18015
Leeds	12301
Bradford	9204
Manchester	8779
Liverpool	8480

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Number of vehicles in accidents with Snowing + high winds weather

```sql
SELECT
    Weather_Conditions,
    SUM(Number_of_Casualties) AS total_accidents
FROM
    accident_data
WHERE
    Weather_Conditions = 'Snowing + high winds'
GROUP BY Weather_Conditions
ORDER BY total_accidents DESC
```

Weather_Conditions	total_accidents
Snowing + high winds	1246

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Top five accident-prone district areas

```sql
SELECT
    District_Area AS accident_prone_areas,
    COUNT(*) AS total_accidents
FROM
    accident_data
GROUP BY District_Area
ORDER BY total_accidents DESC
```

accident_prone_areas	total_accidents
Birmingham	12980
Leeds	8785
Manchester	6217
Bradford	6155
Westminster	5660

Average casualties in serious accidents

```sql
SELECT
    Accident_Severity,
    AVG(Number_of_Casualties) AS avg_casualties
FROM
    accident_data
WHERE
    Accident_Severity = 'Fatal'
GROUP BY Accident_Severity
ORDER BY avg_casualties DESC
```

Accident_Severity	avg_casualties
Fatal	1

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Accidents involving more than 3 vehicles

```sql
SELECT
    *
FROM
    accident_data
WHERE
    Number_of_Vehicles > 3;
```

District_Area	Longitude	Number_of_Casualties	Number_of_Vehicles	Road_Surface_Conditions	Road_Type
Kensington and Chelsea	-0.202730998396873	1	4	Dry	Single carriageway
Kensington and Chelsea	-0.174272000789642	1	4	Dry	Single carriageway
Kensington and Chelsea	-0.173445001244545	1	4	Snow	Single carriageway
Kensington and Chelsea	-0.173589006066322	1	5	Dry	Single carriageway
Kensington and Chelsea	-0.208334997296333	1	4	Dry	One way street
Kensington and Chelsea	-0.202730998396873	2	4	Dry	Single carriageway

Percentage of accidents with only 1 casualty

```sql
SELECT
    COUNT(*) * 100 / (SELECT
                COUNT(*)
        FROM
                accident_data) AS Percentage_One_Casualty
FROM
    accident_data
WHERE
    Number_of_Casualties = 1;
```

Percentage_One_Casualty
76

Number of accidents during rainy weather

```sql
SELECT
    COUNT(*) AS Rainy_Accidents
FROM
    accident_data
WHERE
    Weather_Conditions LIKE '%Rain%';
```

Rainy_Accidents
88820

Distribution of accidents based on the number of lanes on the road

```sql
SELECT
    Road_Type, COUNT(*) AS accidents
FROM
    accident_data
WHERE
    Road_Type IN ('Single carriageway' , 'Dual carriageway',
        'One way street',
        'Roundabout',
        'Slip road')
GROUP BY Road_Type
ORDER BY accidents DESC
```

Road_Type	accidents
Single carriageway	482284
Dual carriageway	97648
Roundabout	42761
One way street	13223
Slip road	6893

Top factors (light condition, weather, road type) contributing to accidents involving more than 5 vehicles

```sql
SELECT
    Weather_Conditions,
    Road_Type,
    Light_Conditions,
    COUNT(*) AS accident_numbers
FROM
    accident_data
WHERE
    Number_of_Vehicles > 5
GROUP BY Weather_Conditions , Road_Type , Light_Conditions
ORDER BY accident_numbers DESC
```

Weather_Conditions	Road_Type	Light_Conditions	accident_numbers
Fine no high winds	Dual carriageway	Daylight	401
Fine no high winds	Single carriageway	Daylight	277
Fine no high winds	Single carriageway	Darkness - lights lit	123
Fine no high winds	Dual carriageway	Darkness - no lighting	78
Raining no high winds	Dual carriageway	Daylight	68
Fine no high winds	Dual carriageway	Darkness - lights lit	64
Raining no high winds	Dual carriageway	Darkness - no lighting	33
Raining no high winds	Single carriageway	Daylight	27
Raining no high winds	Dual carriageway	Darkness - lights lit	23
Fine no high winds	Single carriageway	Darkness - no lighting	13

Monthly accident trend analysis

```sql
SELECT
    MONTH(Accident_Date) AS months, COUNT(*) AS total_accidents
FROM
    accident_data
GROUP BY MONTH(Accident_Date)
ORDER BY months ASC
```

months	total_accidents
1	51316
2	48128
3	52696
4	50416
5	54862
6	54947
7	55914
8	52524
9	55044
10	57983
11	58691
12	50288

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Which month records the highest number of accidents

```sql
SELECT
    MONTH(Accident_Date) AS months, COUNT(*) AS total_accidents
FROM
    accident_data
GROUP BY MONTH(Accident_Date)
ORDER BY total_accidents DESC
LIMIT 1
```

months	total_accidents
11	58691

Based on the conditions (weather, light, road surface), what percentage of accidents are likely to result in serious or fatal injuries

```sql
SELECT
    Weather_Conditions,
    Light_Conditions,
    Road_Surface_Conditions,
    COUNT(CASE
        WHEN Accident_Severity IN ('Serious' , 'Fatal') THEN 1
    END) * 100 / COUNT(*) AS Serious_or_Fatal_Percentage
FROM
    accident_data
GROUP BY Weather_Conditions , Light_Conditions , Road_Surface_Conditions;
```

Weather_Conditions	Light_Conditions	Road_Surface_Conditions	Serious_or_Fatal_Percentage
Raining + high winds	Darkness - no lighting	Dry	16
Snowing + high winds	Darkness - lighting unknown	Frost or ice	0
Snowing no high winds	Daylight	Snow	8
Snowing + high winds	Darkness - no lighting	Snow	14
Fine + high winds	Darkness - lighting unknown	Flood over 3cm. deep	50
Fine no high winds	Darkness - no lighting	Frost or ice	15
Fog or mist	Darkness - lighting unknown	Wet or damp	6
Fine + high winds	Daylight	Frost or ice	8
Fog or mist	Darkness - no lighting	Snow	14
Snowing + high winds	Darkness - no lighting	Frost or ice	14

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How do accidents vary by time of day (Daylight vs Darkness)

```sql
SELECT
    Light_Conditions, COUNT(*) AS accidents_occured
FROM
    accident_data
WHERE
    Light_Conditions IN ('Daylight' , 'Darkness - lights lit',
        'Darkness - no lighting',
        'Darkness - lighting unknown')
GROUP BY Light_Conditions
ORDER BY accidents_occured DESC
```

Light_Conditions	accidents_occured
Daylight	471934
Darkness - lights lit	126769
Darkness - no lighting	36868
Darkness - lighting unknown	4766

RECOMMENDATIONS

- **Improve Road Infrastructure**: Prioritize areas with high accident rates by enhancing road quality and safety features.

- **Weather-Specific Warnings:** Implement weather-based speed limits and warning systems during extreme conditions.

- **Lighting in Urban Areas:** Install better lighting in accident-prone areas to reduce nighttime accident severity.

- **Public Awareness Campaigns:** Educate the public about safe driving practices, especially in poor weather or low visibility.

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CONCLUSION

This analysis highlights the importance of various factors, including weather, road types, and vehicle involvement, in contributing to road accidents. Governments can use these insights to make data-driven decisions to reduce accidents, improve road safety, and protect citizens. By focusing on preventive measures, we can make roads safer for everyone.

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THANK YOU

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