SQL PROJECT ON

Traffic and Accident Analysis

Introduction

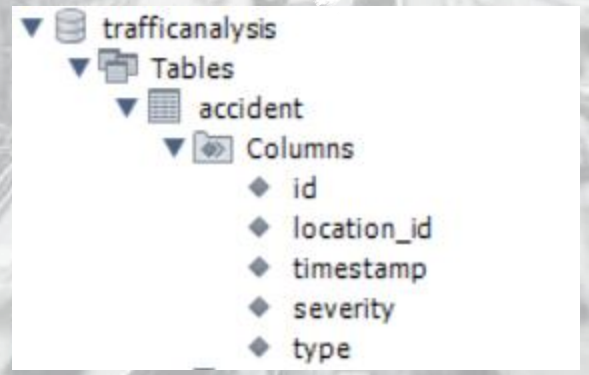
Purpose:

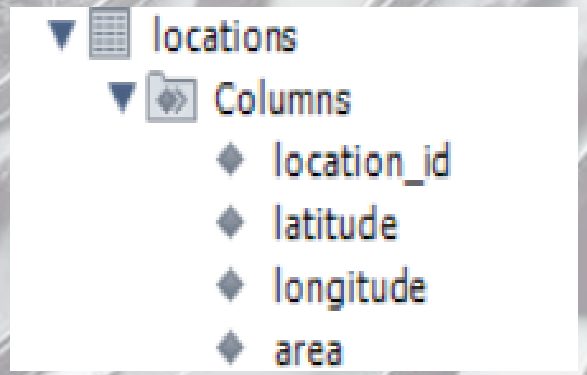
- The purpose of this SQL project on Traffic and Accident Analysis is to extract actionable insights from traffic data for better urban planning and safety improvements.

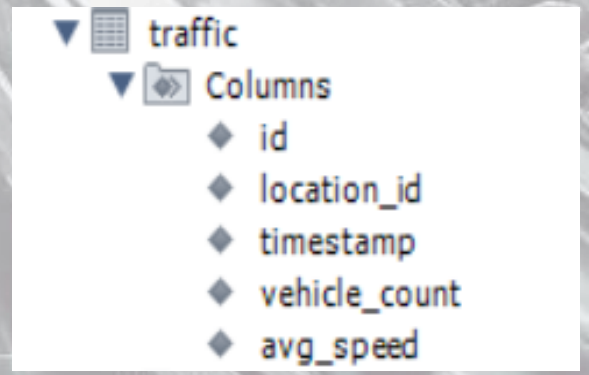
- By analyzing patterns in vehicle counts, accident frequencies, and peak hours across locations, this project identifies high-risk areas and times. The goal is to support data-driven decisions to reduce congestion, enhance safety measures, and optimize resource allocation.

- Through SQL queries, it provides a detailed view of traffic behavior and accident hotspots.

Databases


trafficanalysis
Tables
accident
Columns
id
location_id
timestamp
severity
type


locations
Columns
location_id
latitude
longitude
area


traffic
Columns
id
location_id
timestamp
vehicle_count
avg_speed

Calculate the total vehicle count in each location →

```sql
-- problem statement : 1
-- Total Vehicle Count in Each Location by descding order

SELECT location_id, SUM(vehicle_count) AS total_vehicles
FROM Traffic
GROUP BY location_id
ORDER BY total_vehicles DESC;
```

location_id	total_vehicles
L4	1350
L1	1260
L7	1150
L2	1045
L5	1010
L6	940
L8	910
L9	900
L3	785
L10	750

Retrieve average speed in each zone →

```sql
-- problem statement : 2
-- Average speed in each zone

SELECT L.area, AVG(T.avg_speed) as avg_speed
FROM Traffic as T
JOIN Locations as L
ON T.location_id = L.location_id
GROUP BY L.area;
```

area	avg_speed
Zone 1	48.782500
Zone 2	52.976667
Zone 3	53.463333

Retrieve average speed in each zone →

```
-- problem statement : 3
-- Total accidents in each zone

SELECT L.area, COUNT(A.id) as Total_accident
FROM Accident as A
JOIN Locations as L
ON A.location_id = L.location_id
GROUP BY L.area;
```

area	Total_accident
Zone 1	20
Zone 2	15
Zone 3	15

Extract the Peak traffic hours for each location →

```sql
-- problem statement : 4
-- extract the peak Traffic Hours for Each Location

-- (Gets the total number of vehicles for each location, broken down by hour.
-- It sorts the results so that the locations with the most vehicles show up first.)

SELECT location_id, HOUR(timestamp) AS hour, SUM(vehicle_count) AS vehicle_count
FROM Traffic
GROUP BY location_id, HOUR(timestamp)
ORDER BY vehicle_count DESC;
```

location_id	hour	vehicle_count
L1	8	420
L4	21	320
L2	9	310
L4	11	310
L4	12	300
L9	2	260
L1	9	250
L7	0	250
L9	12	250
L8	1	240
L8	11	240
L7	14	240
L7	10	230
L7	15	230
L1	14	230
L5	22	230
L4	17	220
L8	15	220
L3	10	210
L2	5	210
L10	13	210
L6	19	210
L5	12	210
L8	16	210
L5	13	200

Result 4

Extract Severity of accidents by types →

```sql
-- problem statement : 5
-- exctract Severity of Accidents by Type

SELECT Type, AVG(Severity) as avg_severity
FROM Accident
GROUP BY Type
ORDER BY avg_severity DESC;
```

Type	avg_severity
multi-vehicle	3.7500
single vehicle	3.4545
collision	3.0000
pedestrian incident	2.3636

Extract the highest accidents severity per zone →

```sql
-- problem statement : 6
-- Extract Highest Accident Severity per Zone
SELECT L.area, MAX(A.Severity) as max_severity
FROM Accident as A
JOIN Locations as L
ON A.location_id = L.location_id
GROUP BY L.area;
```

area	max_severity
Zone 1	5
Zone 2	5
Zone 3	5

Identify High-Risk Locations with vehicle count and accident frequency →

```sql
-- problem statement : 7
-- Identify High-Risk Locations (Locations with Both High Vehicle Count and Accident Frequency)
SELECT L.location_id, L.area, COUNT(A.id) AS accident_count, SUM(T.vehicle_count) AS total_vehicles
FROM Locations as L
JOIN Traffic as T
ON L.location_id = T.location_id

JOIN Accident as A
ON L.location_id = A.location_id
GROUP BY L.location_id, L.area
HAVING accident_count > 5 AND total_vehicles > 1000
ORDER BY accident_count DESC, total_vehicles DESC;
```

location_id	area	accident_count	total_vehicles
L1	Zone 1	30	6300
L2	Zone 2	30	5225
L3	Zone 3	30	3925
L4	Zone 1	25	6750
L7	Zone 1	25	5750
L5	Zone 2	25	5050
L6	Zone 3	25	4700
L8	Zone 2	20	4550
L9	Zone 3	20	4500
L10	Zone 1	20	3750

Retrieve the time of day with highest average accident severity →

```
-- problem statement : 8
-- Time of Day with the Highest Average Accident Severity
SELECT HOUR(timestamp) as hour, AVG(Severity) as avg_Severity
FROM Accident
GROUP BY HOUR(timestamp)
ORDER BY AVG(Severity) DESC;
```

hour	avg_Severity
16	4.2000
10	3.8000
14	3.8000
9	3.2000
11	3.2000
15	2.8000
13	2.6000
8	2.4000
12	2.4000
17	2.4000

Retrieve Top 5 locations with the lowest average speed during peak traffic hours →

```sql
-- problem statement : 9
-- Top 5 Locations with the Lowest Average Speed during Peak Traffic Hours
SELECT location_id, HOUR(timestamp) as hour, AVG(avg_speed) as avg_speed
FROM Traffic
GROUP BY location_id, HOUR(timestamp)
ORDER BY avg_speed ASC
LIMIT 5;
```

location_id	hour	avg_speed
L7	0	39.000000
L7	15	40.000000
L7	14	41.000000
L4	21	42.000000
L4	11	44.500000

Retrieve Top 3 locations with the most accidents by zone →

```sql
-- problem statement : 10
-- Top 3 Locations with the Most Accidents by zone

SELECT L.area, A.location_id, COUNT(A.severity) AS total_accidents
FROM Accident as  A
JOIN Locations L ON A.location_id = L.location_id
GROUP BY L.area, A.location_id
ORDER BY total_accidents DESC
LIMIT 3;
```

area	location_id	total_accidents
Zone 1	L1	5
Zone 2	L2	5
Zone 3	L3	5

Retrieve Top 3 locations with the most accidents by zone →

```sql
-- problem statement : 11
-- Zone-wise Accident Types Analysis with Average Speed Comparison

SELECT L.area, A.type, COUNT(A.id) AS total_accidents, AVG(T.avg_speed) AS avg_speed
FROM Accident as A
JOIN Locations as L
ON A.location_id = L.location_id
JOIN Traffic as T
ON A.location_id = T.location_id AND DATE(A.timestamp) = DATE(T.timestamp)
GROUP BY L.area, A.type
ORDER BY L.area, total_accidents DESC;
```

area	type	total_accidents	avg_speed
Zone 1	collision	10	48.995000
Zone 1	pedestrian incident	5	47.500000
Zone 1	multi-vehicle	3	49.033333
Zone 1	single vehicle	2	50.550000
Zone 2	pedestrian incident	4	51.762500
Zone 2	collision	4	52.875000
Zone 2	multi-vehicle	4	54.900000
Zone 2	single vehicle	3	52.166667
Zone 3	collision	7	53.171429
Zone 3	single vehicle	5	53.290000
Zone 3	pedestrian incident	3	54.433333


THANK YOU..!!!