2023

CAPSTONE PROJECT: 02

MOTOR VEHICLE CRASH REPORTING ANALYSIS

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IEC COHORT 8

Data Analytics

Contents

Introduction to Dataset

The dataset under examination provides a comprehensive record of motor vehicle accidents, encompassing a diverse array of variables such as incident timestamps, driver actions, vehicle attributes, and spatial details. The primary goal of this analysis is to derive valuable insights into the factors influencing accidents, contributing to informed strategies for enhancing road safety and accident prevention.

Acknowledging the considerable size of the original dataset, which posed challenges in terms of processing efficiency, a pragmatic approach was adopted. To streamline the analysis, a representative sample comprising 5000 rows was strategically selected. This decision ensures a balance between computational resource optimization and the derivation of meaningful insights during subsequent data exploration and analysis phases.

Link to Dataset:

https://docs.google.com/spreadsheets/d/1PeeeGfDyMqzTrQt55oqt-KMbDLnSl3lR/edit?usp=sharing&ouid=101103814249375977643&rtpof=true&sd=true

Problem Statement

To conduct a comprehensive analysis on motor vehicle accidents dataset, uncovering key factors impacting incidents. This involves identifying patterns, correlations, and risk factors related to driver behavior, vehicle traits, spatial distribution, and injury severity. The insights derived aim to contribute valuable information for improving road safety measures, guiding targeted interventions, and influencing policy decisions to mitigate the frequency and severity of car accidents..

Objectives

Descriptive Analysis:

- Explore the overall distribution of accidents.
- Analyze the frequency of accidents based on key categorical variables.

Spatial Analysis:

- Investigate the geographical distribution of accidents..
- Identify areas with a higher concentration of accidents.
- Explore the relationship between municipality and the number of accidents.

Driver and Vehicle Analysis:

- Investigate the role of driver-related factors and analyze the proportion of accidents where the driver is at fault.
- Explore the distribution of accidents based on Vehicle Year, Make, and Model.
- Investigate accidents involving parked vehicles and driverless vehicles.

Injury Analysis:

- Examine the distribution of injury severity levels.

- Investigate the relationship between injury severity and factors like weather, surface condition, and light.

Stakeholders

1. **Traffic and Transportation Authorities:**

Purpose: Enhance road safety measures and optimize traffic flow by identifying accident-prone areas, allowing for targeted infrastructure improvements and better traffic management.

2. **Law Enforcement Agencies:**

Purpose: Improve patrolling strategies and law enforcement efforts by understanding patterns and contributing factors behind accidents, leading to more effective accident prevention and response.

3. **City Planners and Urban Developers:**

Purpose: Inform urban development plans and design safer environments by identifying areas with high accident concentrations, contributing to the creation of safer and more accessible urban spaces.

Data Analysis Process

Data Cleaning

- Data Sampling
- Remove Duplicates
- Data type Validation
- Handling Missing Values
- Inconsistent data

SQL Queries

1. How many total accidents are recorded in the dataset?
```
SELECT COUNT(*) AS total_accidents
FROM car_accidents.dataset;
```

2. What is the distribution of accidents across different ACRS Report Types?
```
SELECT `ACRS Report Type`, COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `ACRS Report Type`;
```

3. What is the monthly distribution of accidents?
```
SELECT
  MONTH(`Crash Date/Time`) AS month,
  COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY month;
```

4. Which day of the week has the highest accident rate?
```
SELECT
```

```
    DAYNAME(`Crash Date/Time`) AS day_of_week,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY  day_of_week
ORDER BY accidents_count DESC
LIMIT 1;
```

5. What are the top 5 municipalities with the highest number of accidents?

```
SELECT
   Municipality,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY Municipality
ORDER BY accidents_count DESC
LIMIT 5;
```

6. How many accidents involve drivers at fault?

```
SELECT
   `Driver At Fault`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
WHERE `Driver At Fault` = 'Yes';
```

7. What is the distribution of accidents based on Driver Substance Abuse?

```
SELECT
   `Driver Substance Abuse`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Driver Substance Abuse`;
```

8. What are the most common Vehicle Makes and Models involved in accidents?

```
SELECT
   `Vehicle Make`,
   `Vehicle Model`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Vehicle Make`, `Vehicle Model`
ORDER BY accidents_count DESC
LIMIT 5;
```

9. How many accidents involve parked vehicles or driverless vehicles?

```
SELECT
   COUNT(*) AS accidents_count
```

```
FROM car_accidents.dataset
WHERE `Parked Vehicle` = 'Yes' OR `Driverless Vehicle` = 'Yes';
```

10. What is the distribution of injury severity levels?

```
SELECT
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Injury Severity`;
```

11. Is there a correlation between injury severity and weather conditions?

```
SELECT
   `Weather`,
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Weather`, `Injury Severity`;
```

12. What are the most common collision types?

```
SELECT
   `Collision Type`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Collision Type`
ORDER BY accidents_count DESC;
```

13. Are certain collision types more likely to result in severe injuries?

```
SELECT
   `Collision Type`,
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Collision Type`, `Injury Severity`;
```

14. How does the speed limit correlate with the severity of accidents?

```
SELECT
   `Speed Limit`,
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY  `Speed Limit`, `Injury Severity`
ORDER BY 'accidents_count' DESC;
```

15. What types of distractions are most commonly reported by drivers in accidents?

```
SELECT
   `Driver Distracted By`,
   COUNT(*) AS accidents_count
```

```
FROM car_accidents.dataset
GROUP BY `Driver Distracted By`
ORDER BY accidents_count DESC;
```

16. Is there a relationship between distracted driving and injury severity?

```
SELECT
   `Driver Distracted By`,
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Driver Distracted By`, `Injury Severity`;
```

17. What time of day has the highest accident rate?

```
SELECT
   HOUR(`Crash Date/Time`) AS hour_of_day,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY hour_of_day
ORDER BY accidents_count DESC
LIMIT 1;
```

18. How does the surface condition correlate with the frequency of accidents?

```
SELECT
   `Surface Condition`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Surface Condition`
ORDER BY accidents_count DESC;
```

19. Is there a relationship between surface condition and injury severity?

```
SELECT
   `Surface Condition`,
   `Injury Severity`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Surface Condition`, `Injury Severity`;
```

20. What types of traffic control are most associated with accidents?

```
SELECT
   `Traffic Control`,
   COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Traffic Control`
ORDER BY  accidents_count DESC;
```

21. How often are non-motorists involved in accidents?

```
SELECT
   `Related Non-Motorist`,
```

```
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
WHERE `Related Non-Motorist` IS NOT NULL
GROUP BY `Related Non-Motorist`
ORDER BY accidents_count DESC;
```

22. Is there a correlation between the age of vehicles and their involvement in accidents?

```
SELECT
    `Vehicle Year`,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Vehicle Year`
ORDER BY accidents_count DESC;
```

23. What are the common types of vehicle movements during accidents?

```
SELECT
    `Vehicle Movement`,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Vehicle Movement`
ORDER BY accidents_count DESC;
```

24. What is the distribution of vehicle damage extent in accidents?

```
SELECT
    `Vehicle Damage Extent`,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Vehicle Damage Extent`
ORDER BY accidents_count DESC;
```

25. Is there a correlation between damage extent and injury severity?

Done (not a direct relation)

```
SELECT
    `Vehicle Damage Extent`,
    `Injury Severity`,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Vehicle Damage Extent`, `Injury Severity`;
```

26. Which states contribute the most to accidents in the dataset?

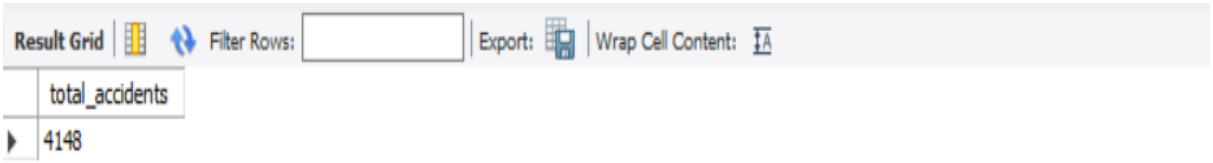
```
SELECT
    `Drivers License State`,
    COUNT(*) AS accidents_count
FROM car_accidents.dataset
GROUP BY `Drivers License State`
ORDER BY accidents_count DESC
LIMIT 5;
```

27. What is the distribution of accidents based on different road types?

```
SELECT
   `Route Type`,
   COUNT(*) AS accidents_count
FROM  car_accidents.dataset
GROUP BY `Route Type`
ORDER BY accidents_count DESC;
```

Results and Interpretation

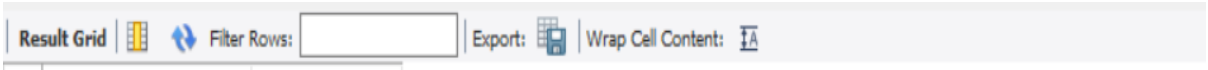
1. **How many total accidents are recorded in the dataset?**



total_accidents
4148

Interpretation: The dataset encompasses a total of 4148 recorded accidents.

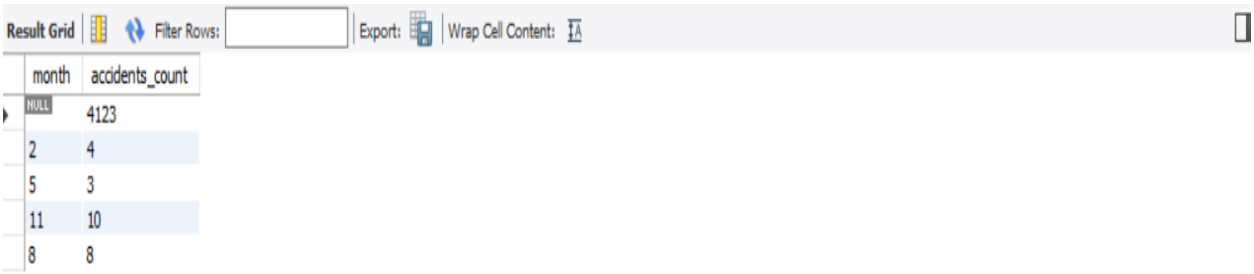
2. **What is the distribution of accidents across different ACRS Report Types?**



ACRS Report Type	accidents_count
Property Damage Crash	2535
Injury Crash	1595
Fatal Crash	18

Interpretation: The distribution of accidents across different ACRS Report Types reveals that there are 2535 Property Damage Crashes, 1595 Injury Crashes, and 18 Fatal Crashes, as classified by the Accident and Classification Reporting System (ACRS).

3. **What is the monthly distribution of accidents?**



month	accidents_count
NULL	4123
2	4
5	3
11	10
8	8

Interpretation: The monthly distribution of accidents highlights a predominant occurrence in months with NULL entries, signifying an unspecified month. Consequently, the absence of specific monthly data hinders the identification of a clear seasonal trend based on the available dataset.

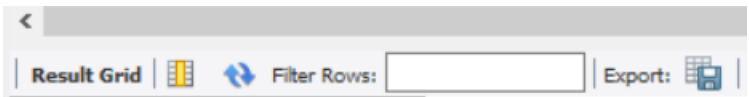
5. **What are the top 5 municipalities with the highest number of accidents?**

Municipality	accidents_count
N/A	3723
ROCKVILLE	189
GAITHERSBURG	151
TAKOMA PARK	34
CHEVY CHASE #4	14

Interpretation: Among the top 5 municipalities, including Rockville stands with 189 accidents, Gaithersburg follows with 151, Takoma Park with 34, Chevy Chase #4 records 14 accidents, and 3723 accidents with unrecognized municipalities.

(Municipalities refer to local areas or communities within a region or city that have their own local government. They often have distinct boundaries and are responsible for managing local services and infrastructure.)

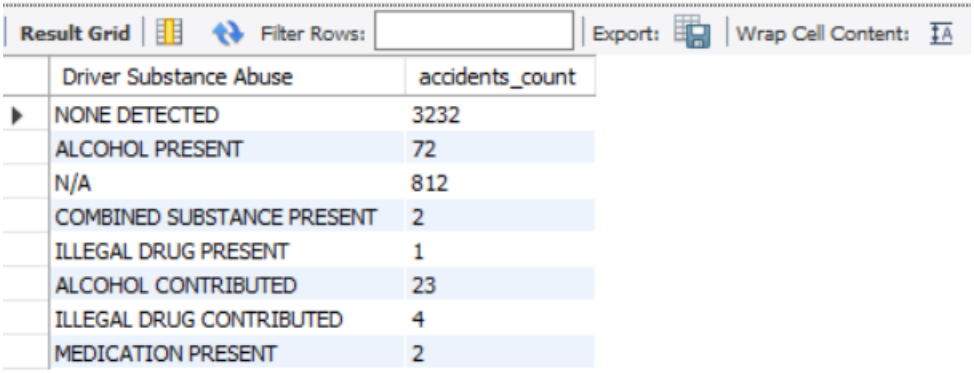
6. **How many accidents involve drivers at fault?**



Driver At Fault	accidents_count
Yes	2003

In the dataset, 2003 accidents involve drivers at fault.

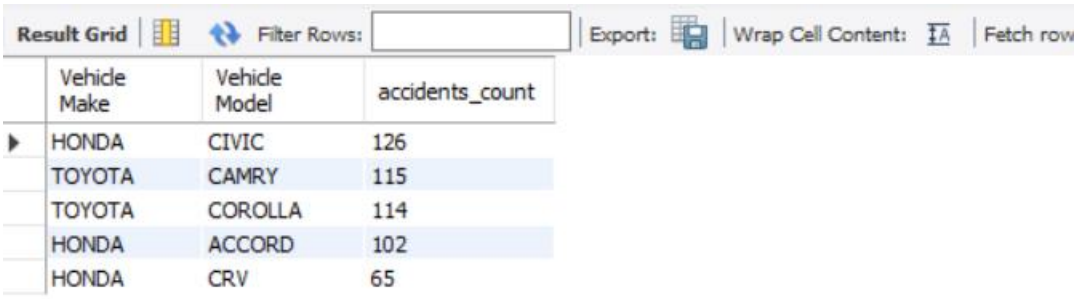
7. **What is the distribution of accidents based on Driver Substance Abuse?**



Driver Substance Abuse	accidents_count
NONE DETECTED	3232
ALCOHOL PRESENT	72
N/A	812
COMBINED SUBSTANCE PRESENT	2
ILLEGAL DRUG PRESENT	1
ALCOHOL CONTRIBUTED	23
ILLEGAL DRUG CONTRIBUTED	4
MEDICATION PRESENT	2

Interpretation: The data reveals a significant number of accidents involving drivers with no detected substance abuse (3232 cases) and an additional 72 accidents where alcohol was present. Furthermore, alcohol contributed to 23 accidents, emphasizing the role of alcohol-related factors in a subset of incidents.

8. **What are the most common Vehicle Makes and Models involved in accidents?**



Vehicle Make	Vehicle Model	accidents_count
HONDA	CIVIC	126
TOYOTA	CAMRY	115
TOYOTA	COROLLA	114
HONDA	ACCORD	102
HONDA	CRV	65

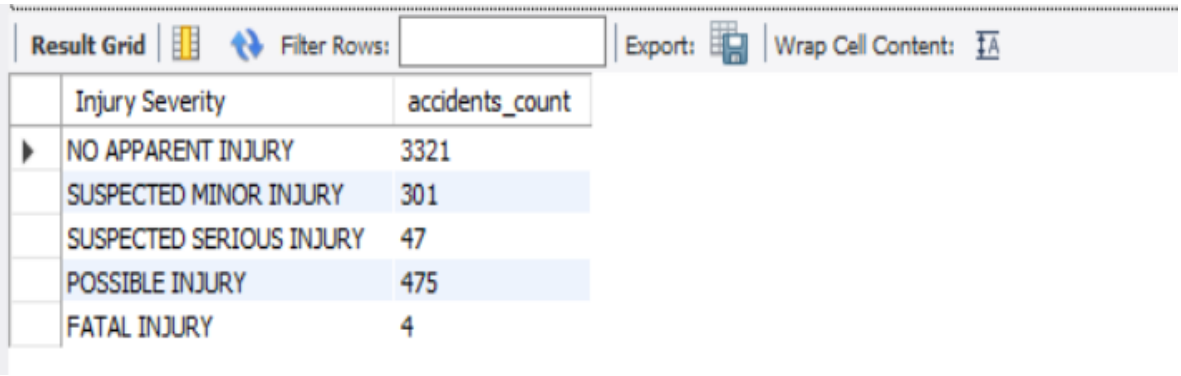
Interpretation: The data reveals that HONDA CIVIC, TOYOTA CAMRY, and TOYOTA COROLLA are the most frequently involved vehicle makes and models in accidents, indicating potential areas of focus for safety measures. The prominence of these models suggests the importance of targeted safety initiatives and regulations to reduce the occurrence of accidents involving these popular vehicles.

9. **How many accidents involve parked vehicles or driverless vehicles?**

accidents_count
36

Interpretation: The dataset records 36 accidents involving either parked or driverless vehicles.

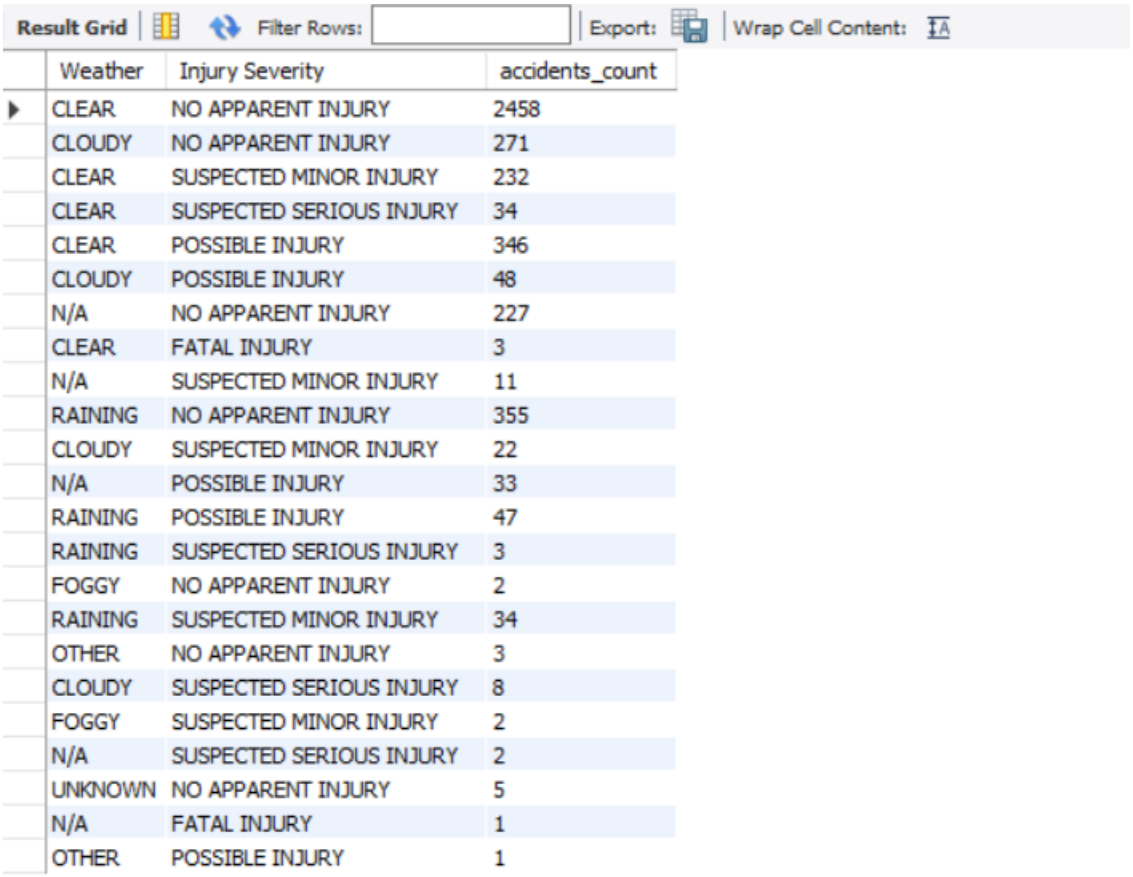
10. **What is the distribution of injury severity levels?**



Injury Severity	accidents_count
NO APPARENT INJURY	3321
SUSPECTED MINOR INJURY	301
SUSPECTED SERIOUS INJURY	47
POSSIBLE INJURY	475
FATAL INJURY	4

Interpretation: The breakdown of injury severity in the dataset is as follows: 3321 accidents with no apparent injury, 301 with suspected minor injury, 47 with suspected serious injury, 475 with possible injury, and 4 with fatal injury.

11. **Is there a correlation between injury severity and weather conditions?**



Weather	Injury Severity	accidents_count
CLEAR	NO APPARENT INJURY	2458
CLOUDY	NO APPARENT INJURY	271
CLEAR	SUSPECTED MINOR INJURY	232
CLEAR	SUSPECTED SERIOUS INJURY	34
CLEAR	POSSIBLE INJURY	346
CLOUDY	POSSIBLE INJURY	48
N/A	NO APPARENT INJURY	227
CLEAR	FATAL INJURY	3
N/A	SUSPECTED MINOR INJURY	11
RAINING	NO APPARENT INJURY	355
CLOUDY	SUSPECTED MINOR INJURY	22
N/A	POSSIBLE INJURY	33
RAINING	POSSIBLE INJURY	47
RAINING	SUSPECTED SERIOUS INJURY	3
FOGGY	NO APPARENT INJURY	2
RAINING	SUSPECTED MINOR INJURY	34
OTHER	NO APPARENT INJURY	3
CLOUDY	SUSPECTED SERIOUS INJURY	8
FOGGY	SUSPECTED MINOR INJURY	2
N/A	SUSPECTED SERIOUS INJURY	2
UNKNOWN	NO APPARENT INJURY	5
N/A	FATAL INJURY	1
OTHER	POSSIBLE INJURY	1

Interpretation: The data suggests certain associations between weather conditions and injury severity in car accidents. Clear weather predominates in accidents with no apparent injury, suspected minor injuries, and possible injuries. Cloudy conditions show instances of no apparent injury and suspected minor injuries, while raining conditions exhibit varied injury severities

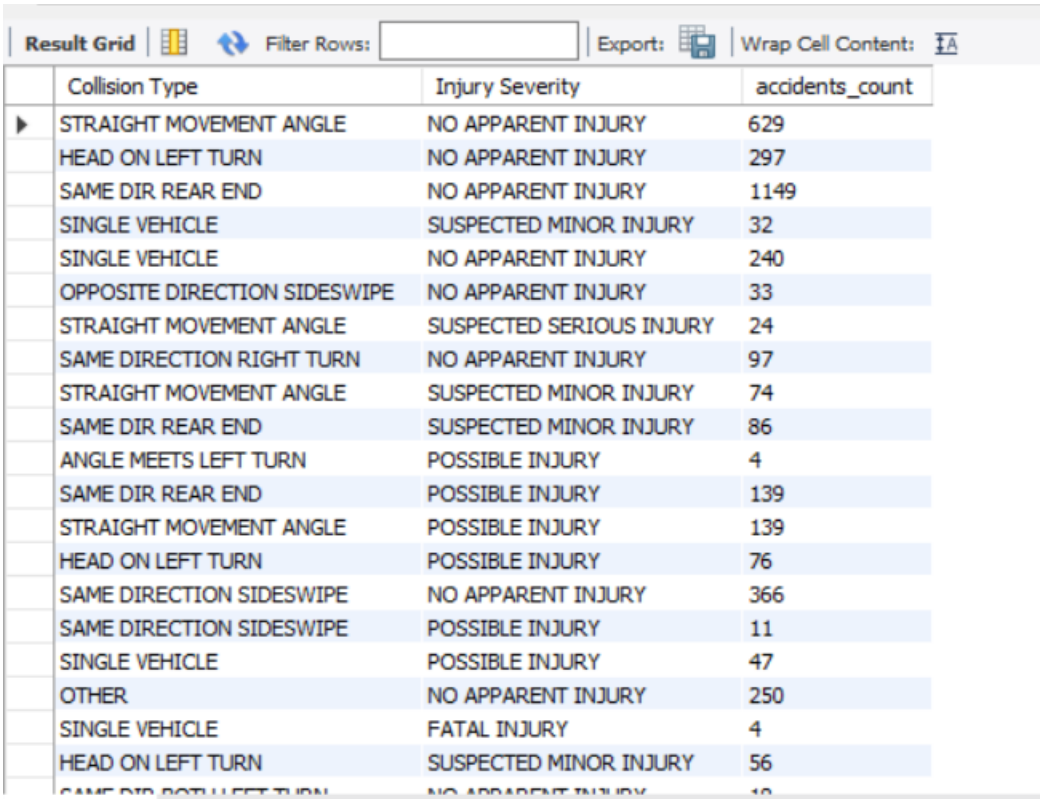
12. **What are the most common collision types?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Collision Type	accidents_count
SAME DIR REAR END	1380
STRAIGHT MOVEMENT ANGLE	866
HEAD ON LEFT TURN	432
SAME DIRECTION SIDESWIPE	386
SINGLE VEHICLE	329
OTHER	288
SAME DIRECTION RIGHT TURN	108
SAME DIRECTION LEFT TURN	85
HEAD ON	78
ANGLE MEETS LEFT TURN	52
OPPOSITE DIRECTION SIDES...	46
ANGLE MEETS RIGHT TURN	34
SAME DIR BOTH LEFT TURN	20
SAME DIR REND RIGHT TURN	13
ANGLE MEETS LEFT HEAD ON	11
SAME DIR REND LEFT TURN	10
OPPOSITE DIR BOTH LEFT TURN	7
UNKNOWN	3

Interpretation: The frequently occurring collision types comprise 1380 incidents of same-direction rear-end collisions, 866 incidents involving straight movement angles, 432 head-on left-turn collisions, 386 same-direction sideswipe collisions, and 329 single-vehicle incidents, among others.

13. **Are certain collision types more likely to result in severe injuries?**

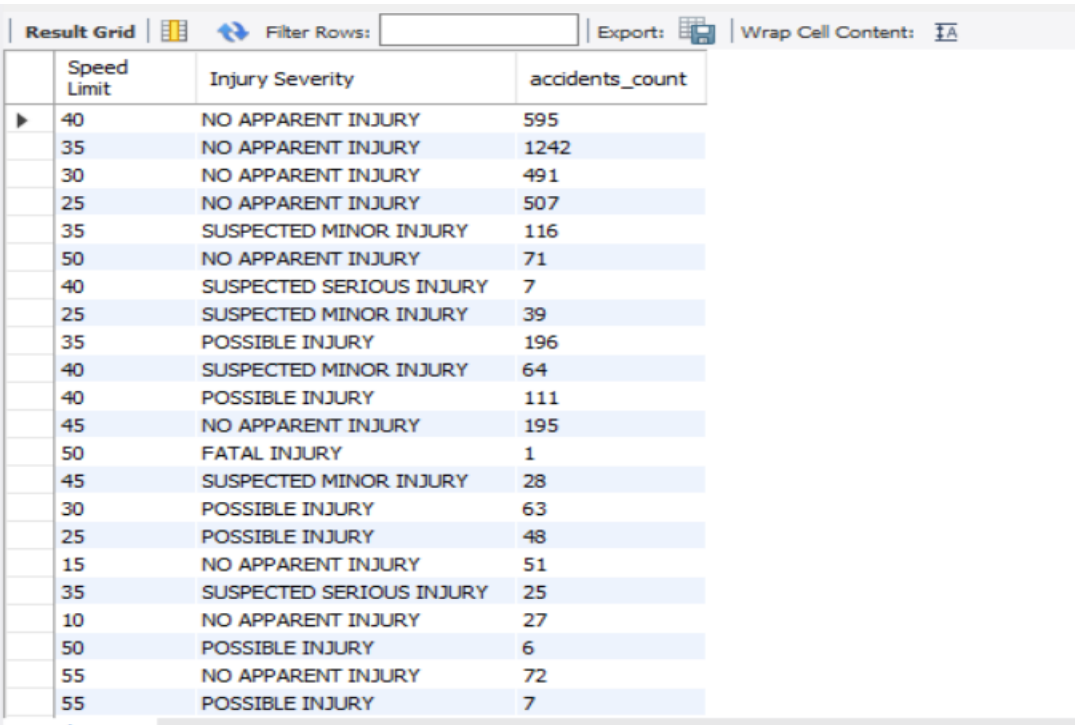


Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Collision Type	Injury Severity	accidents_count
STRAIGHT MOVEMENT ANGLE	NO APPARENT INJURY	629
HEAD ON LEFT TURN	NO APPARENT INJURY	297
SAME DIR REAR END	NO APPARENT INJURY	1149
SINGLE VEHICLE	SUSPECTED MINOR INJURY	32
SINGLE VEHICLE	NO APPARENT INJURY	240
OPPOSITE DIRECTION SIDESWIPE	NO APPARENT INJURY	33
STRAIGHT MOVEMENT ANGLE	SUSPECTED SERIOUS INJURY	24
SAME DIRECTION RIGHT TURN	NO APPARENT INJURY	97
STRAIGHT MOVEMENT ANGLE	SUSPECTED MINOR INJURY	74
SAME DIR REAR END	SUSPECTED MINOR INJURY	86
ANGLE MEETS LEFT TURN	POSSIBLE INJURY	4
SAME DIR REAR END	POSSIBLE INJURY	139
STRAIGHT MOVEMENT ANGLE	POSSIBLE INJURY	139
HEAD ON LEFT TURN	POSSIBLE INJURY	76
SAME DIRECTION SIDESWIPE	NO APPARENT INJURY	366
SAME DIRECTION SIDESWIPE	POSSIBLE INJURY	11
SINGLE VEHICLE	POSSIBLE INJURY	47
OTHER	NO APPARENT INJURY	250
SINGLE VEHICLE	FATAL INJURY	4
HEAD ON LEFT TURN	SUSPECTED MINOR INJURY	56

Interpretation: Certain collision types, including Straight Movement Angle, Same Direction Rear End, and Head On Left Turn, are linked to varying levels of injury severity, ranging from no apparent injuries to suspected minor and serious injuries. Notably, Single Vehicle collisions show instances of fatal injuries.

14. **How does the speed limit correlate with the severity of accidents?**

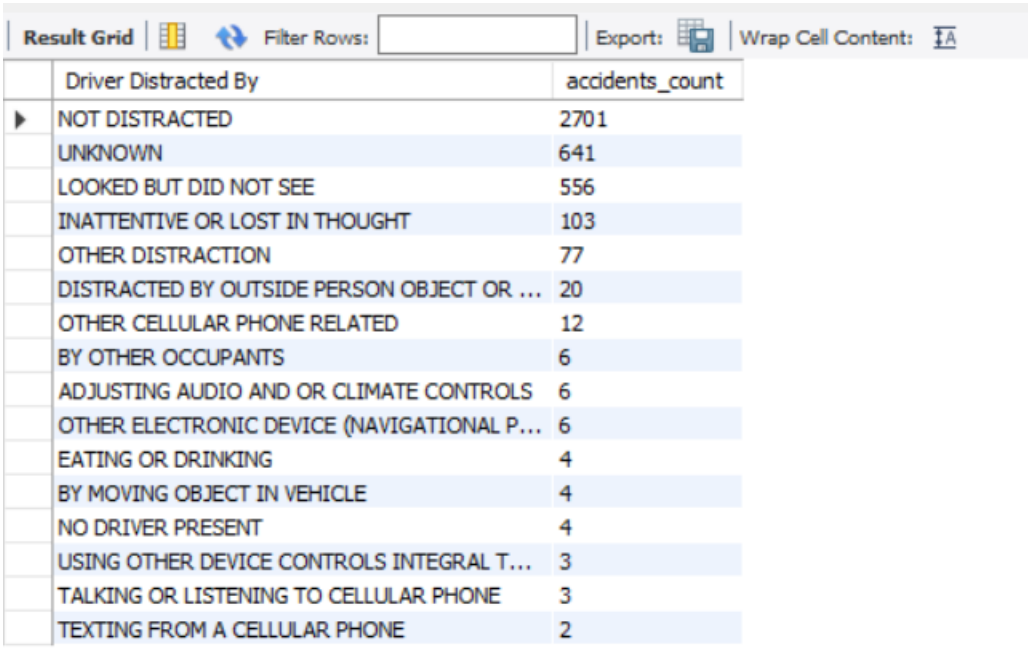


Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Speed Limit	Injury Severity	accidents_count
40	NO APPARENT INJURY	595
35	NO APPARENT INJURY	1242
30	NO APPARENT INJURY	491
25	NO APPARENT INJURY	507
35	SUSPECTED MINOR INJURY	116
50	NO APPARENT INJURY	71
40	SUSPECTED SERIOUS INJURY	7
25	SUSPECTED MINOR INJURY	39
35	POSSIBLE INJURY	196
40	SUSPECTED MINOR INJURY	64
40	POSSIBLE INJURY	111
45	NO APPARENT INJURY	195
50	FATAL INJURY	1
45	SUSPECTED MINOR INJURY	28
30	POSSIBLE INJURY	63
25	POSSIBLE INJURY	48
15	NO APPARENT INJURY	51
35	SUSPECTED SERIOUS INJURY	25
10	NO APPARENT INJURY	27
50	POSSIBLE INJURY	6
55	NO APPARENT INJURY	72
55	POSSIBLE INJURY	7

Interpretation: Accidents at lower speed limits (e.g., 35 mph) are primarily associated with no apparent injuries, while higher speed limits (e.g., 45, 50, 55 mph) show an increased likelihood of suspected minor injuries and, in some cases, suspected serious and fatal injuries.

15. **What types of distractions are most commonly reported by drivers in accidents?**



Driver Distracted By	accidents_count
NOT DISTRACTED	2701
UNKNOWN	641
LOOKED BUT DID NOT SEE	556
INATTENTIVE OR LOST IN THOUGHT	103
OTHER DISTRACTION	77
DISTRACTED BY OUTSIDE PERSON OBJECT OR ...	20
OTHER CELLULAR PHONE RELATED	12
BY OTHER OCCUPANTS	6
ADJUSTING AUDIO AND OR CLIMATE CONTROLS	6
OTHER ELECTRONIC DEVICE (NAVIGATIONAL P...	6
EATING OR DRINKING	4
BY MOVING OBJECT IN VEHICLE	4
NO DRIVER PRESENT	4
USING OTHER DEVICE CONTROLS INTEGRAL T...	3
TALKING OR LISTENING TO CELLULAR PHONE	3
TEXTING FROM A CELLULAR PHONE	2

Interpretation: The dataset indicates that the majority of accidents involve drivers not distracted (2701 cases), followed by 641 cases with an unknown distraction status, 556 with looked but didn't see distractions, and 103 with inattentive or lost-in-thought distractions. The remaining accidents are associated with various other types of distractions.

16. **Is there a relationship between distracted driving and injury severity?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Driver Distracted By	Injury Severity	accidents_count
NOT DISTRACTED	NO APPARENT INJURY	2154
LOOKED BUT DID NOT SEE	NO APPARENT INJURY	467
UNKNOWN	SUSPECTED MINOR INJURY	50
INATTENTIVE OR LOST IN THOUGHT	NO APPARENT INJURY	85
UNKNOWN	NO APPARENT INJURY	494
LOOKED BUT DID NOT SEE	SUSPECTED SERIOUS INJURY	4
NOT DISTRACTED	SUSPECTED MINOR INJURY	201
OTHER DISTRACTION	SUSPECTED MINOR INJURY	7
NOT DISTRACTED	POSSIBLE INJURY	323
LOOKED BUT DID NOT SEE	SUSPECTED MINOR INJURY	32
LOOKED BUT DID NOT SEE	POSSIBLE INJURY	53
INATTENTIVE OR LOST IN THOUGHT	POSSIBLE INJURY	8
USING OTHER DEVICE CONTROLS I...	NO APPARENT INJURY	3
UNKNOWN	POSSIBLE INJURY	76
UNKNOWN	FATAL INJURY	4
TEXTING FROM A CELLULAR PHONE	NO APPARENT INJURY	2
INATTENTIVE OR LOST IN THOUGHT	SUSPECTED MINOR INJURY	8
NOT DISTRACTED	SUSPECTED SERIOUS INJURY	23
OTHER DISTRACTION	NO APPARENT INJURY	61
DISTRACTED BY OUTSIDE PERSON ...	NO APPARENT INJURY	18
OTHER CELLULAR PHONE RELATED	NO APPARENT INJURY	10
OTHER DISTRACTION	POSSIBLE INJURY	8
TALKING OR LISTENING TO CELLUL...	POSSIBLE INJURY	2
BY OTHER OCCUPANTS	NO APPARENT INJURY	5
OTHER DISTRACTION	SUSPECTED SERIOUS INJURY	1
ADJUSTING AUDIO AND OR CLIMA...	NO APPARENT INJURY	5

Result 29

Interpretation: The data indicates a potential correlation between distracted driving and injury severity. Accidents involving distractions like looking but not seeing, unknown distractions, and inattentiveness are associated with suspected minor injuries, while instances of suspected serious and fatal injuries are observed in certain distracted driving scenarios.

18. **How does the surface condition correlate with the frequency of accidents?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Surface Condition	accidents_count
DRY	3454
WET	578
N/A	99
UNKNOWN	14
WATER(STANDING/MOVING)	2
MUD, DIRT, GRAVEL	1

Interpretation: Dry surfaces dominate accident occurrences with 3454 incidents, while wet surfaces contribute to 578 accidents. Other conditions, including N/A, water, mud/dirt/gravel, and unknown status, collectively contribute to 116 accidents.

19. **Is there a relationship between surface condition and injury severity?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Surface Condition	Injury Severity	accidents_count
DRY	NO APPARENT INJURY	2767
DRY	SUSPECTED MINOR INJURY	248
DRY	SUSPECTED SERIOUS INJURY	39
DRY	POSSIBLE INJURY	396
DRY	FATAL INJURY	4
WET	SUSPECTED MINOR INJURY	44
WET	NO APPARENT INJURY	460
N/A	NO APPARENT INJURY	79
WET	POSSIBLE INJURY	67
N/A	POSSIBLE INJURY	12
WET	SUSPECTED SERIOUS INJURY	7
N/A	SUSPECTED MINOR INJURY	7
UNKNOWN	NO APPARENT INJURY	14
WATER(STANDI...	NO APPARENT INJURY	1
WATER(STANDI...	SUSPECTED MINOR INJURY	1
MUD, DIRT, GRA...	SUSPECTED MINOR INJURY	1
N/A	SUSPECTED SERIOUS INJURY	1

Interpretation: Accidents on dry surfaces primarily result in no apparent injuries, but some instances include suspected minor, serious, and fatal injuries. Wet surfaces are associated with suspected minor and possible injuries, highlighting a potential correlation between surface conditions and varying injury severities.

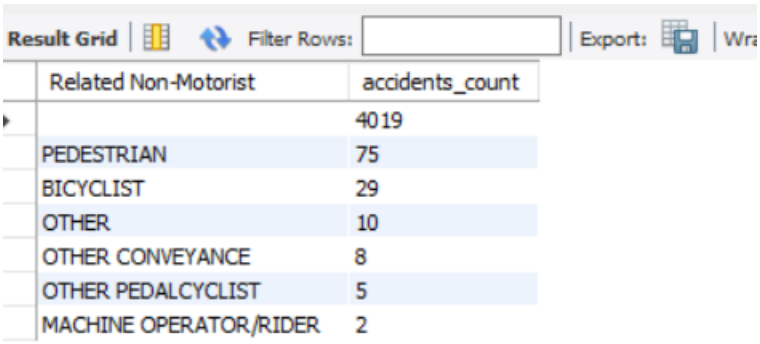
20. **What types of traffic control are most associated with accidents?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Traffic Control	accidents_count
TRAFFIC SIGNAL	1710
NO CONTROLS	1581
N/A	398
STOP SIGN	315
FLASHING TRAFFIC SIGNAL	64
OTHER	42
YIELD SIGN	21
UNKNOWN	8
PERSON	6
WARNING SIGN	2
SCHOOL ZONE SIGN DEVICE	1

Interpretation: Accidents are predominantly associated with intersections controlled by traffic signals (1710) and those with no specified controls (1581). Notably, the absence of traffic controls contributes significantly to accident occurrences, emphasizing the need for targeted safety measures at such intersections.

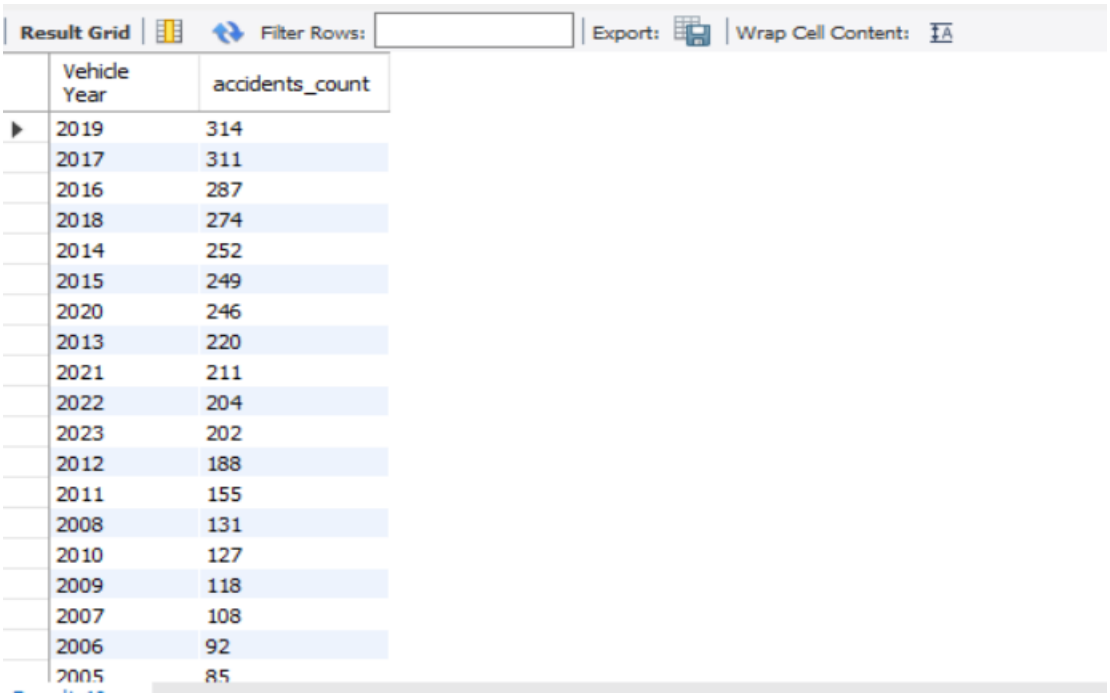
21. **How often are non-motorists involved in accidents?**



Related Non-Motorist	accidents_count
	4019
PEDESTRIAN	75
BICYCLIST	29
OTHER	10
OTHER CONVEYANCE	8
OTHER PEDALCYCLIST	5
MACHINE OPERATOR/RIDER	2

Interpretation: The data indicates that non-motorist involvement in accidents is challenging to interpret due to the majority being classified as unknown (4019 cases). The limited counts for pedestrians, bicyclists, and other non-motorist categories (combined total of 25) emphasize the data's constraints in providing detailed insights into the frequency and circumstances of non-motorist accidents.

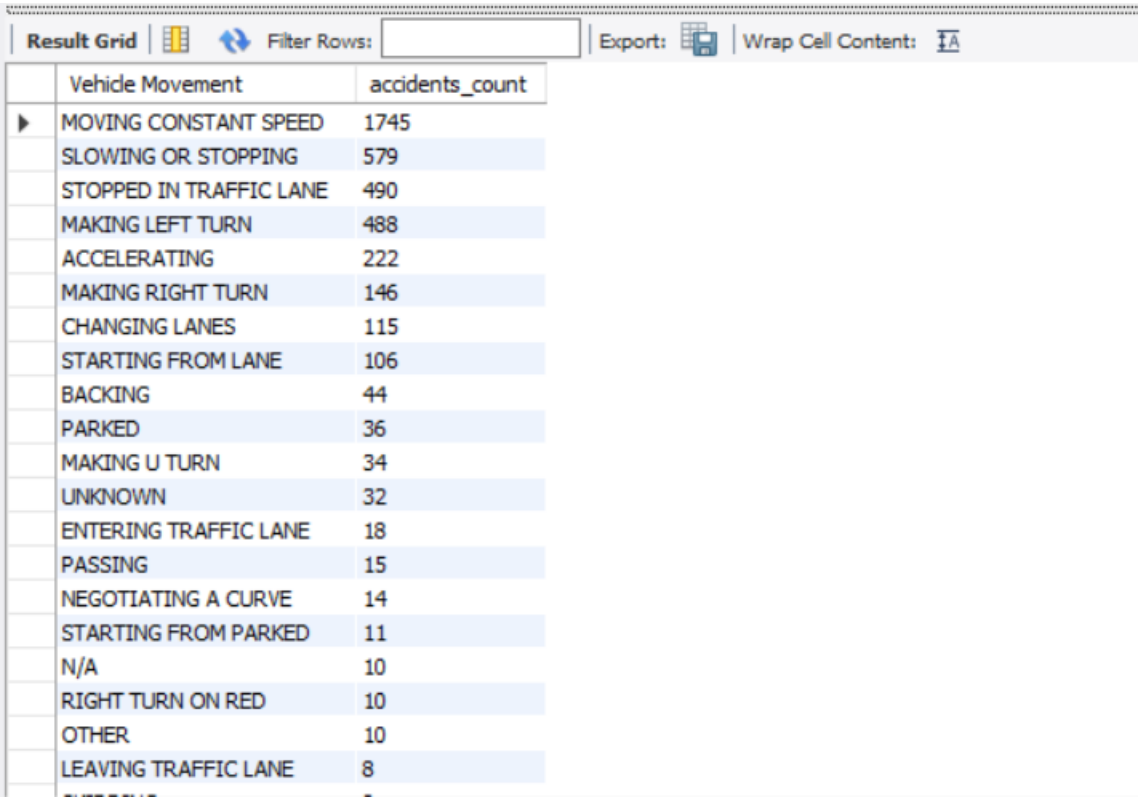
23. **Is there a correlation between the age of vehicles and their involvement in accidents?**



Vehicle Year	accidents_count
2019	314
2017	311
2016	287
2018	274
2014	252
2015	249
2020	246
2013	220
2021	211
2022	204
2023	202
2012	188
2011	155
2008	131
2010	127
2009	118
2007	108
2006	92
2005	85

Interpretation: The provided data on vehicle years suggests a potential correlation between the age of vehicles and their involvement in accidents. Newer vehicles from 2019, 2017, 2016, and 2018 exhibit higher accident counts, indicating a potential trend

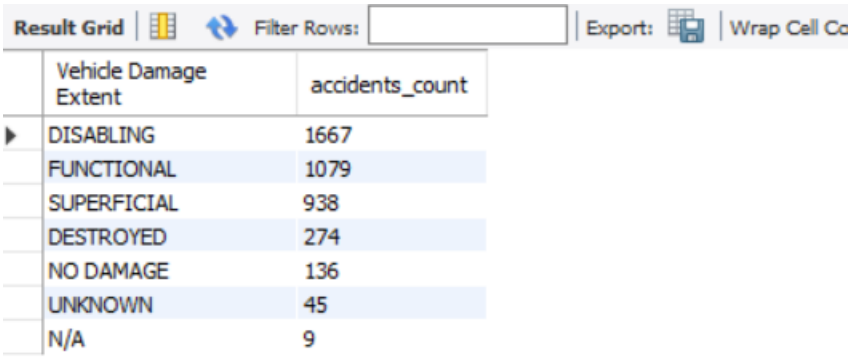
24. **What are the common types of vehicle movements during accidents?**



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Vehicle Movement	accidents_count
MOVING CONSTANT SPEED	1745
SLOWING OR STOPPING	579
STOPPED IN TRAFFIC LANE	490
MAKING LEFT TURN	488
ACCELERATING	222
MAKING RIGHT TURN	146
CHANGING LANES	115
STARTING FROM LANE	106
BACKING	44
PARKED	36
MAKING U TURN	34
UNKNOWN	32
ENTERING TRAFFIC LANE	18
PASSING	15
NEGOTIATING A CURVE	14
STARTING FROM PARKED	11
N/A	10
RIGHT TURN ON RED	10
OTHER	10
LEAVING TRAFFIC LANE	8

25. **What is the distribution of vehicle damage extent in accidents?**



Result Grid | Filter Rows: | Export: | Wrap Cell Co

Vehicle Damage Extent	accidents_count
DISABLING	1667
FUNCTIONAL	1079
SUPERFICIAL	938
DESTROYED	274
NO DAMAGE	136
UNKNOWN	45
N/A	9

Interpretation: The distribution of vehicle damage extent in accidents reveals 1667 incidents with disabling damage, 1079 with functional damage, 938 with superficial damage, 274 with destroyed vehicles, and 136 with no damage. Additionally, there are cases where the extent of vehicle damage is unknown.

26. **Is there a correlation between damage extent and injury severity?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Vehicle Damage Extent	Injury Severity	accidents_count
DISABLING	NO APPARENT INJURY	1175
FUNCTIONAL	NO APPARENT INJURY	946
DESTROYED	SUSPECTED MINOR INJURY	61
SUPERFICIAL	NO APPARENT INJURY	892
DESTROYED	SUSPECTED SERIOUS INJURY	24
DISABLING	SUSPECTED MINOR INJURY	176
DISABLING	POSSIBLE INJURY	293
NO DAMAGE	NO APPARENT INJURY	131
FUNCTIONAL	POSSIBLE INJURY	82
UNKNOWN	NO APPARENT INJURY	43
DISABLING	FATAL INJURY	2
DESTROYED	POSSIBLE INJURY	62
DESTROYED	NO APPARENT INJURY	125
SUPERFICIAL	POSSIBLE INJURY	33
FUNCTIONAL	SUSPECTED MINOR INJURY	50
NO DAMAGE	POSSIBLE INJURY	3
N/A	NO APPARENT INJURY	9
SUPERFICIAL	SUSPECTED MINOR INJURY	12
DISABLING	SUSPECTED SERIOUS INJURY	21
NO DAMAGE	SUSPECTED MINOR INJURY	2

Interpretation: There is no any correlation.

27. **Which states contribute the most to accidents in the dataset?**

Result Grid | Filter Rows: | Export: | Wrap Cell Co

Drivers License State	accidents_count
MD	3575
DC	148
VA	117
	85
XX	57

Interpretation: The states contributing the most to accidents are Maryland (MD) with 3575 incidents, followed by the District of Columbia (DC) with 148 cases, Virginia (VA) with 117 accidents, an unidentified state (XX) with 57, and 85 cases with an unknown state.

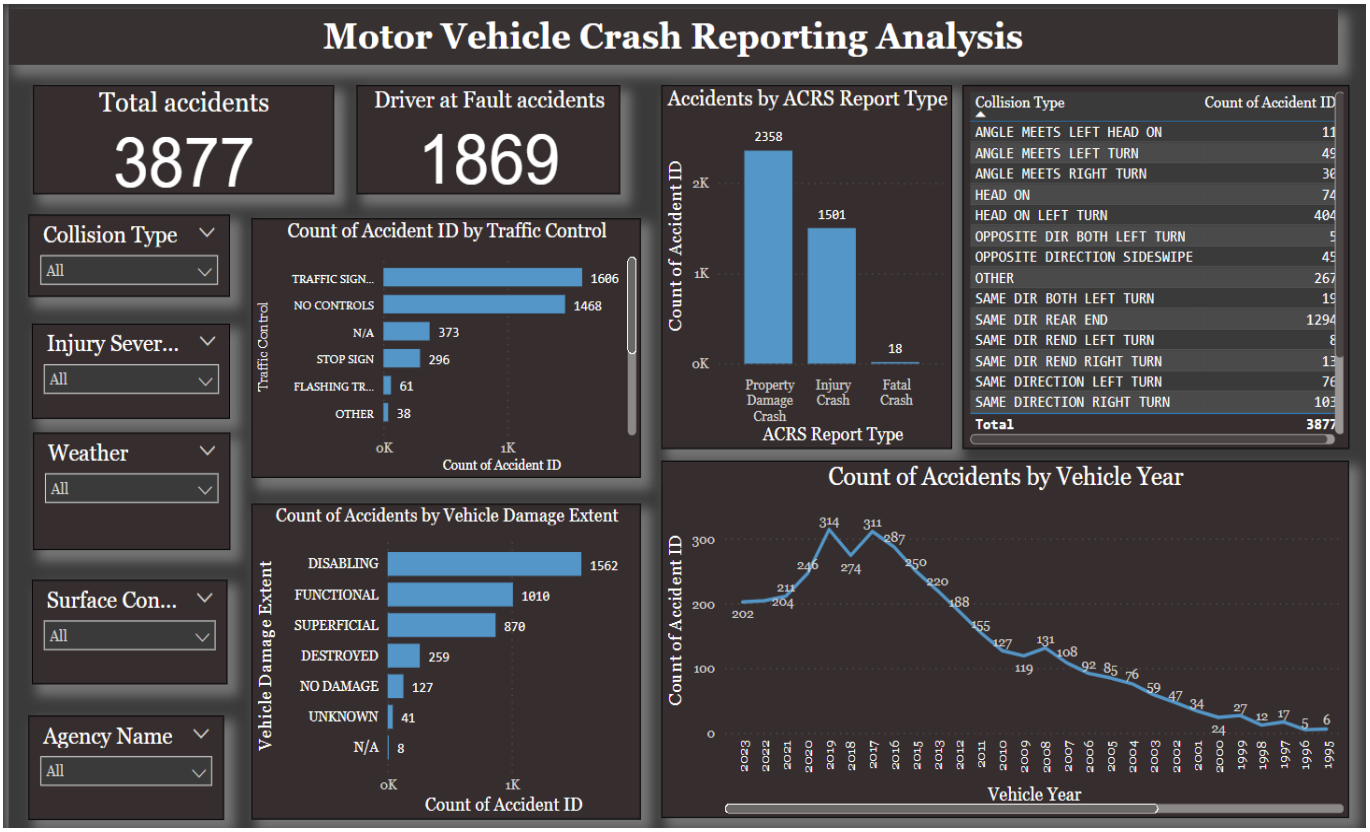
28. **What is the distribution of accidents based on different road types?**

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Route Type	accidents_count
Maryland (State)	2050
County	1544
US (State)	234
Municipality	173
Interstate (State)	56
	47
Other Public Roadway	21
Ramp	20
Government	3

Interpretation: Accidents are distributed across various road types, with Maryland (state) accounting for 2050 incidents, county roads for 1544, U.S. (state) roads for 234, municipality roads for 173, interstate (state) roads for 56, other public roadways for 21, ramps for 20, government roads for 3, and 47 cases with an unknown road type.

Visualizations



Key Insights and Recommendations

1. Localized Safety Priorities:

Insight: Certain municipalities, such as Rockville and Gaithersburg, experience higher accident rates.

Recommendation: Develop community-specific safety programs tailored to address local accident patterns effectively.

2**. Driver Education and Enforcement:**

Insight: A substantial number of accidents involve drivers at fault.

Recommendation: Strengthen driver education programs and law enforcement efforts to reduce at-fault accidents.

3. Substance Abuse Intervention:

Insight: Significant accidents involve drivers with no detected substance abuse and alcohol-related factors.

Recommendation: Implement targeted interventions for substance abuse-related accidents, with a focus on alcohol-related incidents.

4. **Vehicle-Specific Safety Measures:**

Insight: Certain vehicle makes and models (e.g., HONDA CIVIC, TOYOTA CAMRY) are frequently involved in accidents.

Recommendation: Advocate for and implement vehicle safety regulations targeting frequently involved models.

5. Intersection Safety Enhancement:

Insight: Accidents are prevalent at intersections, particularly those with traffic signals or lacking controls.

Recommendation: Improve safety at intersections by evaluating and enhancing signaling, signage, and traffic management.

7. Distracted Driving Awareness:

Insight: A significant number of accidents involve distractions like looking but not seeing and inattentiveness.

Recommendation: Launch awareness campaigns to educate the public about the dangers of distracted driving.

8. Surface Condition and Weather Preparedness:

Insight: Dry surfaces dominate accidents, and there's a correlation between surface conditions and injury severities.

Recommendation: Prioritize road maintenance and implement safety measures during adverse weather and varying surface conditions.

9. Stakeholder Collaboration:

Insight: Effective safety measures require collaboration between local authorities, law enforcement, and community stakeholders.

Recommendation: Encourage and facilitate collaboration to implement and monitor safety measures effectively.