INTRODUCTION TO DATA MANAGEMENT

PROJECT REPORT

(Project Semester January-April 2025)

CRASH REPORTING

Submitted by

Ritik Raushan

Registration No:- **12300915**

Section:- **K23GW**

Course Code:- **INT127**

Under the Guidance of

Baljinder Kaur 27952

Discipline of CSE/IT

Lovely School of Computer Science Engineering

Lovely Professional University, Phagwara

CERTIFICATE

This is to certify that **Ritik Raushan** bearing Registration no. **12300915** has completed **INT127** project titled, **"Crash Reporting"** under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Baljinder Kaur
Professor
School of Computer Science Engineering
Lovely Professional University
Phagwara, Punjab.

Date: 13 April, 2025

DECLARATION

I, **Ritik Raushan**, student of B.tech under CSE/IT Discipline at, Lovely Professional University, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date: 13 April, 2025 Signature

Registration No. 12300915 Ritik Raushan

1. Introduction

This report presents an analysis of car crash incidents based on the data visualized in the provided dashboard. The dashboard offers insights into various aspects of these incidents, including the count of crashes on different routes, the types of collisions, the average speed under different surface conditions, and the nature of injuries sustained. The analysis aims to identify key trends and patterns that can contribute to a better understanding of the factors influencing car crashes.

2. Source of Dataset

The dataset used for this analysis, "Crash Reporting - Drivers Data," was sourced from Montgomery County's crash reporting system. This publicly available dataset can be accessed through the following link:

- Link: https://catalog.data.gov/dataset/crash-reporting-drivers-data

The data encompasses a period from 2015 to 2023. It comprises over 40 features, offering a comprehensive view of crash incidents. Key attributes include:

- Collision Type
- Weather Conditions
- Crash Date
- Speed Limits
- Extent of Damage

The primary purpose of this dataset is to facilitate the study of crash patterns and to determine the key factors that influence road safety within Montgomery County. This analysis leverages the aggregated and visualized information from this dataset as presented in the dashboard.

3. Dataset Preprocessing

The dataset was preprocessed to ensure it was suitable for analysis and visualization. The cleaning process involved identifying and addressing missing values in key fields, such as route type and collision type. Incomplete or ambiguous records were either corrected, imputed, or removed based on their relevance to the analysis. Duplicate entries were also detected and eliminated to prevent inflated counts. Data transformation steps included standardizing and categorizing route types for uniform representation and reclassifying collision types into predefined categories for consistency. To generate meaningful insights, crash data was aggregated by route type and collision type, which formed the basis for the "Count of Crashes on Different Routes" and "Count of Collision Types" metrics on the dashboard. Finally, the cleaned and

transformed dataset was cross-verified against raw data samples to ensure accuracy and consistency, and statistical summaries were generated to confirm that preprocessing steps did not introduce any significant biases or errors. These efforts ensured the dataset was reliable and ready for effective visualization and analysis.

4. Analysis on Dataset

Based on the visualizations presented in the dashboard, the following analysis can be made:

General Description:

The dashboard provides a multi-faceted view of car crash incidents, focusing on crash frequency across different routes, the types of collisions that occur, the severity of injuries resulting from these crashes, and the relationship between average speed and surface conditions. Filters for surface condition, collision type, and crash date allow for more granular exploration of the data.

Specific Requirements & Analysis Results:

- **Count of Crashes on Different Routes:**
    - Visualization: A bar chart titled "Count of Crashes on different Route" is displayed.
    - Analysis: The chart shows a significantly higher number of crashes occurring on "Other" routes compared to other categories like "Bicycle Route", "Busway", "Chartered Bus", "Expressway", "Interstate", "Local Road", "Major Arterial", "Minor Arterial", "Other Freeway or Expressway", "Other State Highway", "US Highway", and "Unknown". The "Other" category appears to have approximately 100,000 crashes, while most other categories have significantly fewer, often below 20,000. This suggests that the "Other" route category warrants further investigation to understand the specific characteristics contributing to the higher crash frequency.
- **Count of Collision Type:**
    - Visualization: A bar chart titled "Count of Collision Type" is presented.
    - Analysis: The most frequent collision type appears to be "ANGLE" with a count of approximately 60,000. Other notable collision types include "REAR END" (around 40,000) and "SIDESWIPE, SAME DIRECTION" (around 20,000). Less frequent collision types include "SAME DIR REAR LEFT TURN", "SAME DIR REAR RIGHT TURN", "OPPOSITE DIRECTION SIDESWIPE", "HEAD ON", "ANGLE MEETS RIGHT TURN", and "UNKNOWN", all with counts below 10,000. This highlights "ANGLE" collisions as a significant area of concern.
- **Types of Injury:**
    - Visualization: A pie chart titled "Types of Injury" is displayed.

- Analysis: The pie chart shows the distribution of injury types. The largest proportion is "POSSIBLE INJURY" (approximately 43%), followed by "SUSPECTED MINOR INJURY" (around 34%) and "SUSPECTED SERIOUS INJURY" (around 19%). "FATAL INJURY" represents a smaller proportion (around 4%). This indicates that while a significant number of crashes result in possible or minor injuries, serious and fatal injuries are also a concerning aspect.

- **Average Speed on Surface Condition:**
  - Visualization: A line chart titled "Average Speed on Surface Condition" is shown.
  - Analysis: The chart plots average speed against different surface conditions ("DRY", "ICE", "ICE/FROST", "MUD, DIRT, GRAVEL", "OTHER", "SAND", "SLUSH", "SNOW", "UNKNOWN", "WATER (STANDING, MOVING)", and "WATER/ICE"). The average speed appears to be relatively consistent across most surface conditions, generally ranging between 30 and 40. However, there might be slight variations depending on the specific conditions. It's important to note that this chart displays average speed and might not capture the impact of speed variations within each surface condition category.
- **Filters:**
  - Surface Condition: A filter allows users to select specific surface conditions (e.g., Dry, Ice, Snow) to analyze the data for those conditions only.
  - Collision Type: A filter enables the selection of specific collision types (e.g., Angle, Rear End) to focus the analysis on those types.
  - Crash Date: A date filter allows users to analyze crash data within a specific date range (from 01/13/2015 to 01/13/2023 as visible in the dropdown).

Visualization:

The dashboard effectively uses various chart types (bar charts, pie chart, and line chart) and filters to present the car crash data in an understandable format. The use of color and clear labels enhances the readability of the visualizations. The interactive filters allow for a more dynamic exploration of the relationships between different variables.

5. Conclusion

The analysis of the car crash dashboard reveals several key insights:

- A disproportionately high number of crashes occur on routes categorized as "Other," suggesting a need for further investigation into the characteristics of these routes.

- "Angle" collisions are the most frequent type of crash, indicating a potential focus area for safety interventions.
- While most injuries are classified as possible or minor, a significant percentage still involve serious or fatal outcomes.
- The average speed appears relatively consistent across different surface conditions, but further analysis of speed distributions might be necessary.

The interactive filters provide valuable tools for further exploration of the data and for identifying specific patterns related to surface conditions, collision types, and timeframes.

6. Future Scope

To enhance this analysis and gain deeper insights, the following could be considered:

- Detailed Data Source Information: Obtaining more information about the data source, collection methodology, and specific definitions of categories (e.g., "Other" routes) is crucial.
- Geospatial Analysis: If location data is available, incorporating maps to visualize crash hotspots could be highly beneficial.
- Temporal Analysis: Analyzing trends over time, including seasonal variations and the impact of any safety interventions, would provide valuable insights.
- Driver and Vehicle Characteristics: Incorporating data on driver demographics, vehicle types, and contributing factors (e.g., driver impairment, weather conditions) could lead to more targeted safety measures.
- Statistical Analysis: Applying statistical methods to identify significant correlations and causal relationships between different variables.
- Predictive Modeling: Developing models to predict the likelihood of crashes based on various factors.

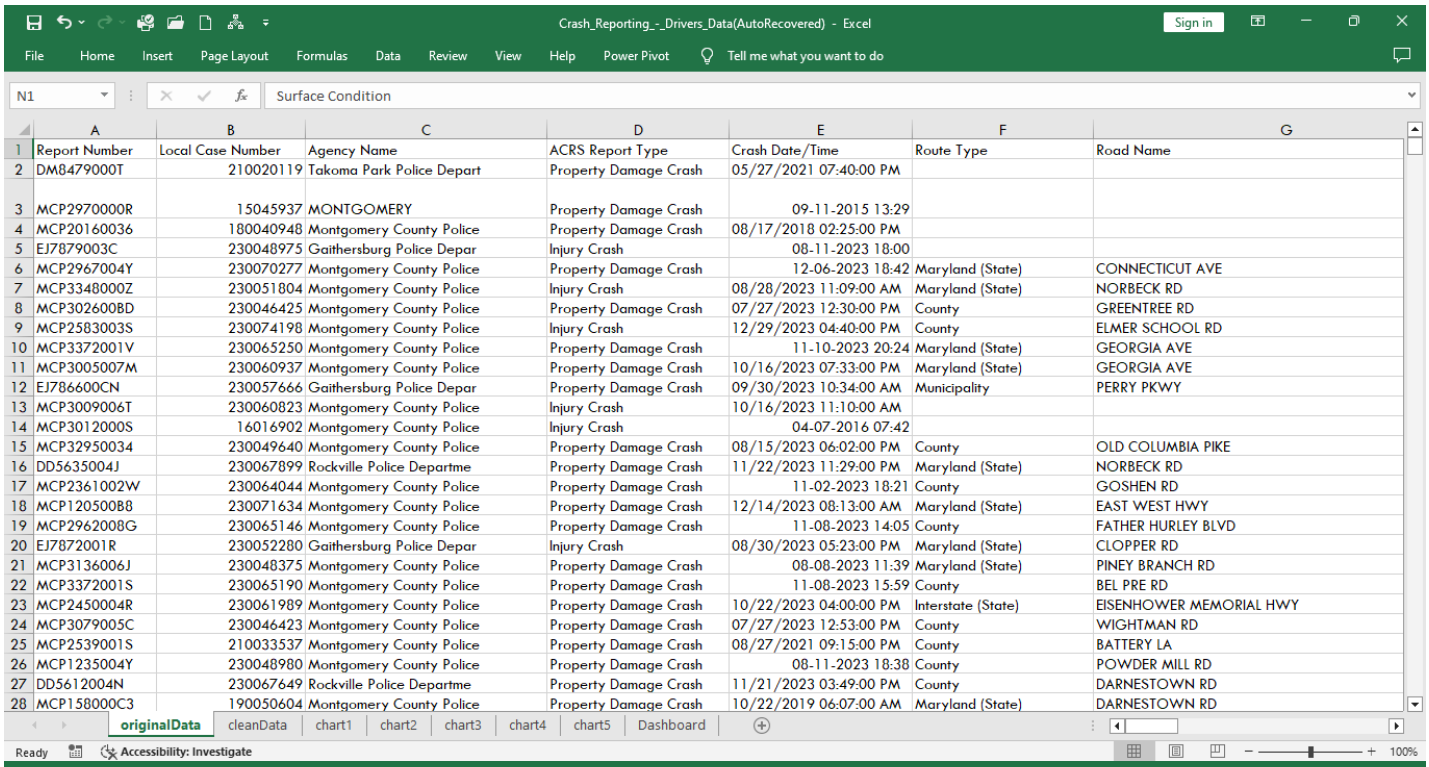
7. References

Dataset link:

https://catalog.data.gov/dataset/crash-reporting-drivers-data

LinkedIn Link:-

https://www.linkedin.com/posts/activity-7317615091070242817-bz16?utm_source=share&utm_medium=member_desktop&rcm=ACoAAE3OhDwB-V7AgxJNsGy0EL80ysUPWrDIxoU



Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel

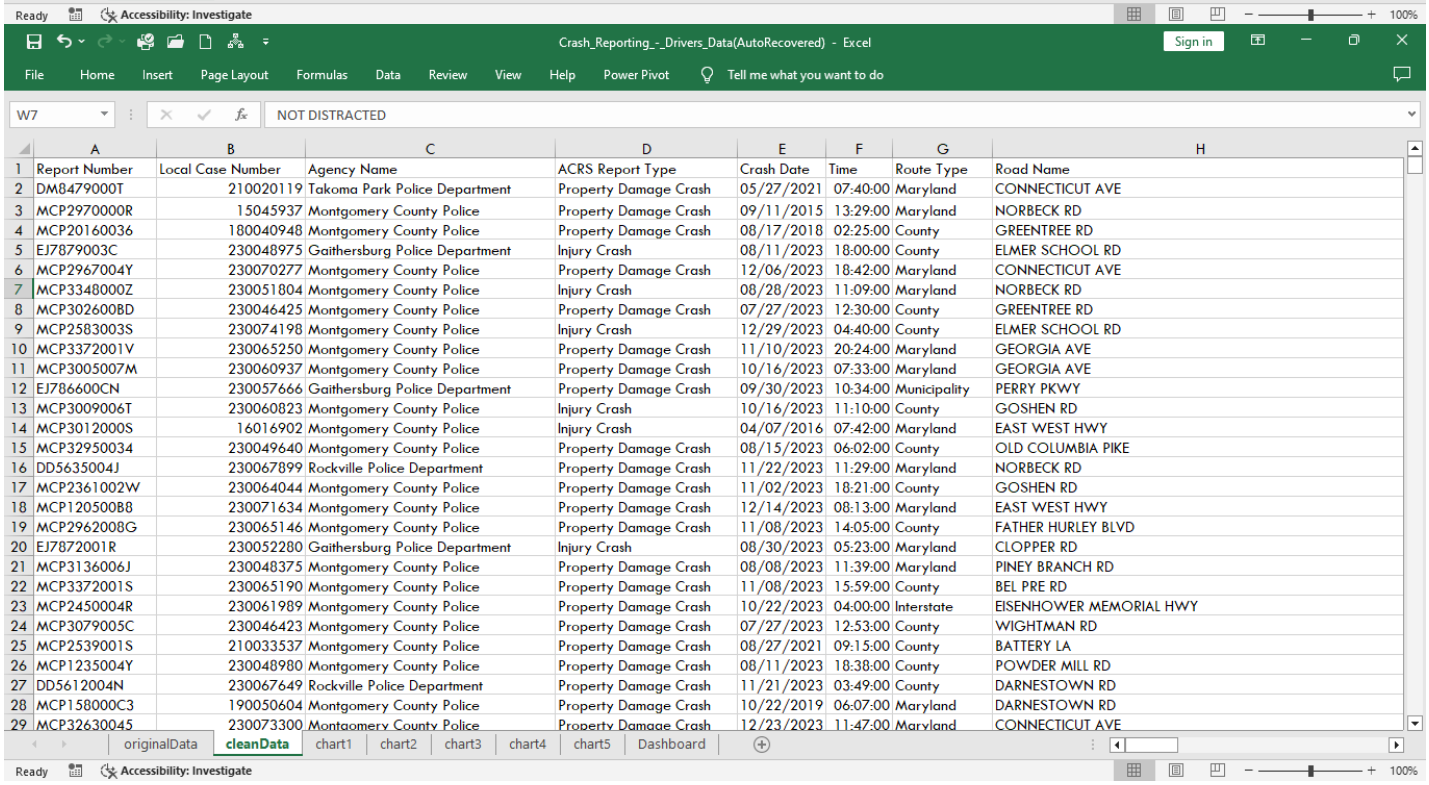
File Home Insert Page Layout Formulas Data Review View Help Power Pivot Tell me what you want to do

N1 | Surface Condition

	A	B	C	D	E	F	G
1	Report Number	Local Case Number	Agency Name	ACRS Report Type	Crash Date/Time	Route Type	Road Name
2	DM8479000T	210020119	Takoma Park Police Depart	Property Damage Crash	05/27/2021 07:40:00 PM		
3	MCP2970000R	15045937	MONTGOMERY	Property Damage Crash	09-11-2015 13:29		
4	MCP20160036	180040948	Montgomery County Police	Property Damage Crash	08/17/2018 02:25:00 PM		
5	EJ7879003C	230048975	Gaithersburg Police Depar	Injury Crash	08-11-2023 18:00		
6	MCP2967004Y	230070277	Montgomery County Police	Property Damage Crash	12-06-2023 18:42	Maryland (State)	CONNECTICUT AVE
7	MCP3348000Z	230051804	Montgomery County Police	Injury Crash	08/28/2023 11:09:00 AM	Maryland (State)	NORBECK RD
8	MCP302600BD	230046425	Montgomery County Police	Property Damage Crash	07/27/2023 12:30:00 PM	County	GREENTREE RD
9	MCP2583003S	230074198	Montgomery County Police	Injury Crash	12/29/2023 04:40:00 PM	County	ELMER SCHOOL RD
10	MCP3372001V	230065250	Montgomery County Police	Property Damage Crash	11-10-2023 20:24	Maryland (State)	GEORGIA AVE
11	MCP3005007M	230060937	Montgomery County Police	Property Damage Crash	10/16/2023 07:33:00 PM	Maryland (State)	GEORGIA AVE
12	EJ786600CN	230057666	Gaithersburg Police Depar	Property Damage Crash	09/30/2023 10:34:00 AM	Municipality	PERRY PKWY
13	MCP3009006T	230060823	Montgomery County Police	Injury Crash	10/16/2023 11:10:00 AM		
14	MCP3012000S	16016902	Montgomery County Police	Injury Crash	04-07-2016 07:42		
15	MCP32950034	230049640	Montgomery County Police	Property Damage Crash	08/15/2023 06:02:00 PM	County	OLD COLUMBIA PIKE
16	DD5635004J	230067899	Rockville Police Departme	Property Damage Crash	11/22/2023 11:29:00 PM	Maryland (State)	NORBECK RD
17	MCP2361002W	230064044	Montgomery County Police	Property Damage Crash	11-02-2023 18:21	County	GOSHEN RD
18	MCP120500B8	230071634	Montgomery County Police	Property Damage Crash	12/14/2023 08:13:00 AM	Maryland (State)	EAST WEST HWY
19	MCP2962008G	230065146	Montgomery County Police	Property Damage Crash	11-08-2023 14:05	County	FATHER HURLEY BLVD
20	EJ7872001R	230052280	Gaithersburg Police Depar	Injury Crash	08/30/2023 05:23:00 PM	Maryland (State)	CLOPPER RD
21	MCP3136006J	230048375	Montgomery County Police	Property Damage Crash	08-08-2023 11:39	Maryland (State)	PINEY BRANCH RD
22	MCP3372001S	230065190	Montgomery County Police	Property Damage Crash	11-08-2023 15:59	County	BEL PRE RD
23	MCP2450004R	230061989	Montgomery County Police	Property Damage Crash	10/22/2023 04:00:00 PM	Interstate (State)	EISENHOWER MEMORIAL HWY
24	MCP3079005C	230046423	Montgomery County Police	Property Damage Crash	07/27/2023 12:53:00 PM	County	WIGHTMAN RD
25	MCP2539001S	210033537	Montgomery County Police	Property Damage Crash	08/27/2021 09:15:00 PM	County	BATTERY LA
26	MCP1235004Y	230048980	Montgomery County Police	Property Damage Crash	08-11-2023 18:38	County	POWDER MILL RD
27	DD5612004N	230067649	Rockville Police Departme	Property Damage Crash	11/21/2023 03:49:00 PM	County	DARNESTOWN RD
28	MCP158000C3	190050604	Montgomery County Police	Property Damage Crash	10/22/2019 06:07:00 AM	Maryland (State)	DARNESTOWN RD

originalData | cleanData | chart1 | chart2 | chart3 | chart4 | chart5 | Dashboard

Ready Accessibility: Investigate 100%



Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel

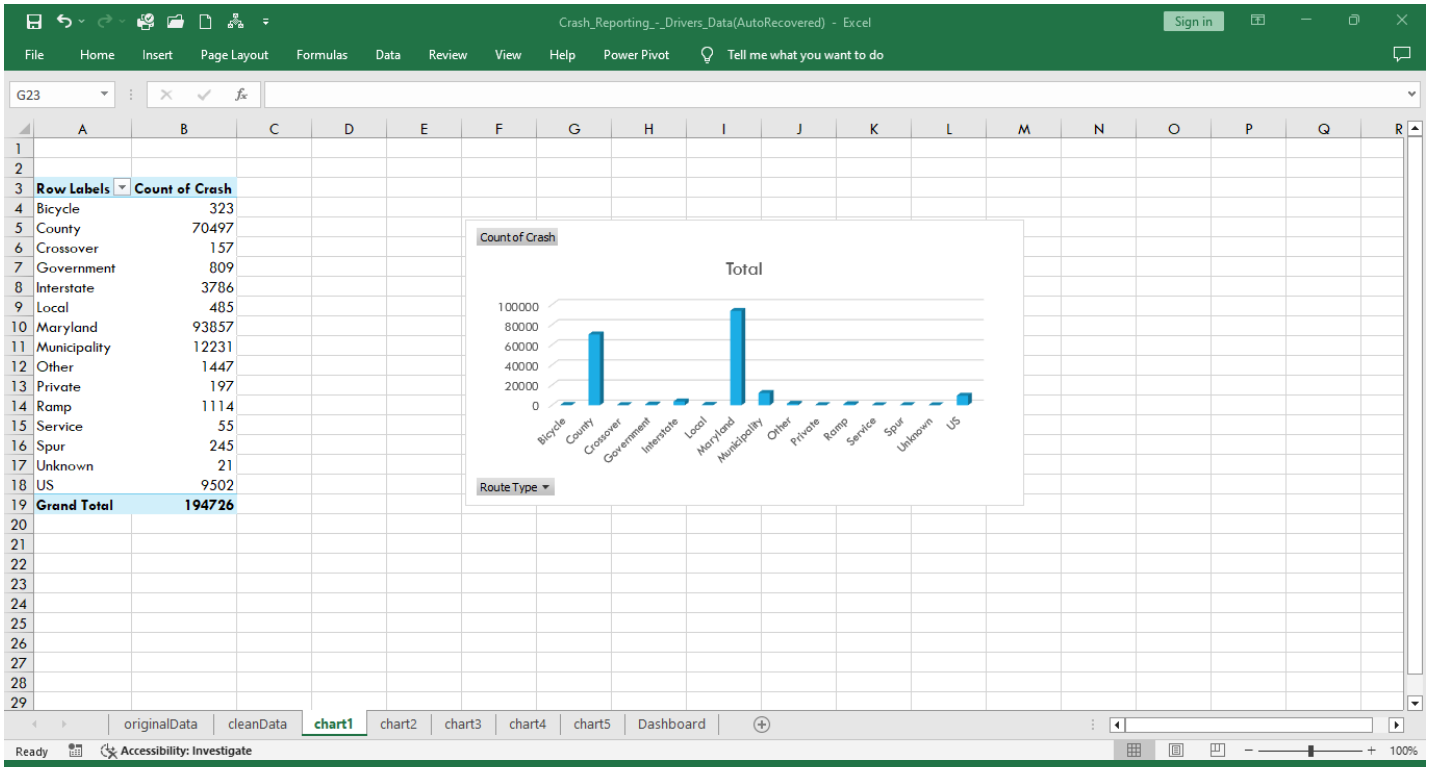
File Home Insert Page Layout Formulas Data Review View Help Power Pivot Tell me what you want to do

W7 | NOT DISTRACTED

	A	B	C	D	E	F	G	H
1	Report Number	Local Case Number	Agency Name	ACRS Report Type	Crash Date	Time	Route Type	Road Name
2	DM8479000T	210020119	Takoma Park Police Department	Property Damage Crash	05/27/2021	07:40:00	Maryland	CONNECTICUT AVE
3	MCP2970000R	15045937	Montgomery County Police	Property Damage Crash	09/11/2015	13:29:00	Maryland	NORBECK RD
4	MCP20160036	180040948	Montgomery County Police	Property Damage Crash	08/17/2018	02:25:00	County	GREENTREE RD
5	EJ7879003C	230048975	Gaithersburg Police Department	Injury Crash	08/11/2023	18:00:00	County	ELMER SCHOOL RD
6	MCP2967004Y	230070277	Montgomery County Police	Property Damage Crash	12/06/2023	18:42:00	Maryland	CONNECTICUT AVE
7	MCP3348000Z	230051804	Montgomery County Police	Injury Crash	08/28/2023	11:09:00	Maryland	NORBECK RD
8	MCP302600BD	230046425	Montgomery County Police	Property Damage Crash	07/27/2023	12:30:00	County	GREENTREE RD
9	MCP2583003S	230074198	Montgomery County Police	Injury Crash	12/29/2023	04:40:00	County	ELMER SCHOOL RD
10	MCP3372001V	230065250	Montgomery County Police	Property Damage Crash	11/10/2023	20:24:00	Maryland	GEORGIA AVE
11	MCP3005007M	230060937	Montgomery County Police	Property Damage Crash	10/16/2023	07:33:00	Maryland	GEORGIA AVE
12	EJ786600CN	230057666	Gaithersburg Police Department	Property Damage Crash	09/30/2023	10:34:00	Municipality	PERRY PKWY
13	MCP3009006T	230060823	Montgomery County Police	Injury Crash	10/16/2023	11:10:00	County	GOSHEN RD
14	MCP3012000S	16016902	Montgomery County Police	Injury Crash	04/07/2016	07:42:00	Maryland	EAST WEST HWY
15	MCP32950034	230049640	Montgomery County Police	Property Damage Crash	08/15/2023	06:02:00	County	OLD COLUMBIA PIKE
16	DD5635004J	230067899	Rockville Police Department	Property Damage Crash	11/22/2023	11:29:00	Maryland	NORBECK RD
17	MCP2361002W	230064044	Montgomery County Police	Property Damage Crash	11/02/2023	18:21:00	County	GOSHEN RD
18	MCP120500B8	230071634	Montgomery County Police	Property Damage Crash	12/14/2023	08:13:00	Maryland	EAST WEST HWY
19	MCP2962008G	230065146	Montgomery County Police	Property Damage Crash	11/08/2023	14:05:00	County	FATHER HURLEY BLVD
20	EJ7872001R	230052280	Gaithersburg Police Department	Injury Crash	08/30/2023	05:23:00	Maryland	CLOPPER RD
21	MCP3136006J	230048375	Montgomery County Police	Property Damage Crash	08/08/2023	11:39:00	Maryland	PINEY BRANCH RD
22	MCP3372001S	230065190	Montgomery County Police	Property Damage Crash	11/08/2023	15:59:00	County	BEL PRE RD
23	MCP2450004R	230061989	Montgomery County Police	Property Damage Crash	10/22/2023	04:00:00	Interstate	EISENHOWER MEMORIAL HWY
24	MCP3079005C	230046423	Montgomery County Police	Property Damage Crash	07/27/2023	12:53:00	County	WIGHTMAN RD
25	MCP2539001S	210033537	Montgomery County Police	Property Damage Crash	08/27/2021	09:15:00	County	BATTERY LA
26	MCP1235004Y	230048980	Montgomery County Police	Property Damage Crash	08/11/2023	18:38:00	County	POWDER MILL RD
27	DD5612004N	230067649	Rockville Police Department	Property Damage Crash	11/21/2023	03:49:00	County	DARNESTOWN RD
28	MCP158000C3	190050604	Montgomery County Police	Property Damage Crash	10/22/2019	06:07:00	Maryland	DARNESTOWN RD
29	MCP32630045	230073300	Montgomery County Police	Property Damage Crash	12/23/2023	11:47:00	Maryland	CONNECTICUT AVE

originalData | cleanData | chart1 | chart2 | chart3 | chart4 | chart5 | Dashboard

Ready Accessibility: Investigate 100%



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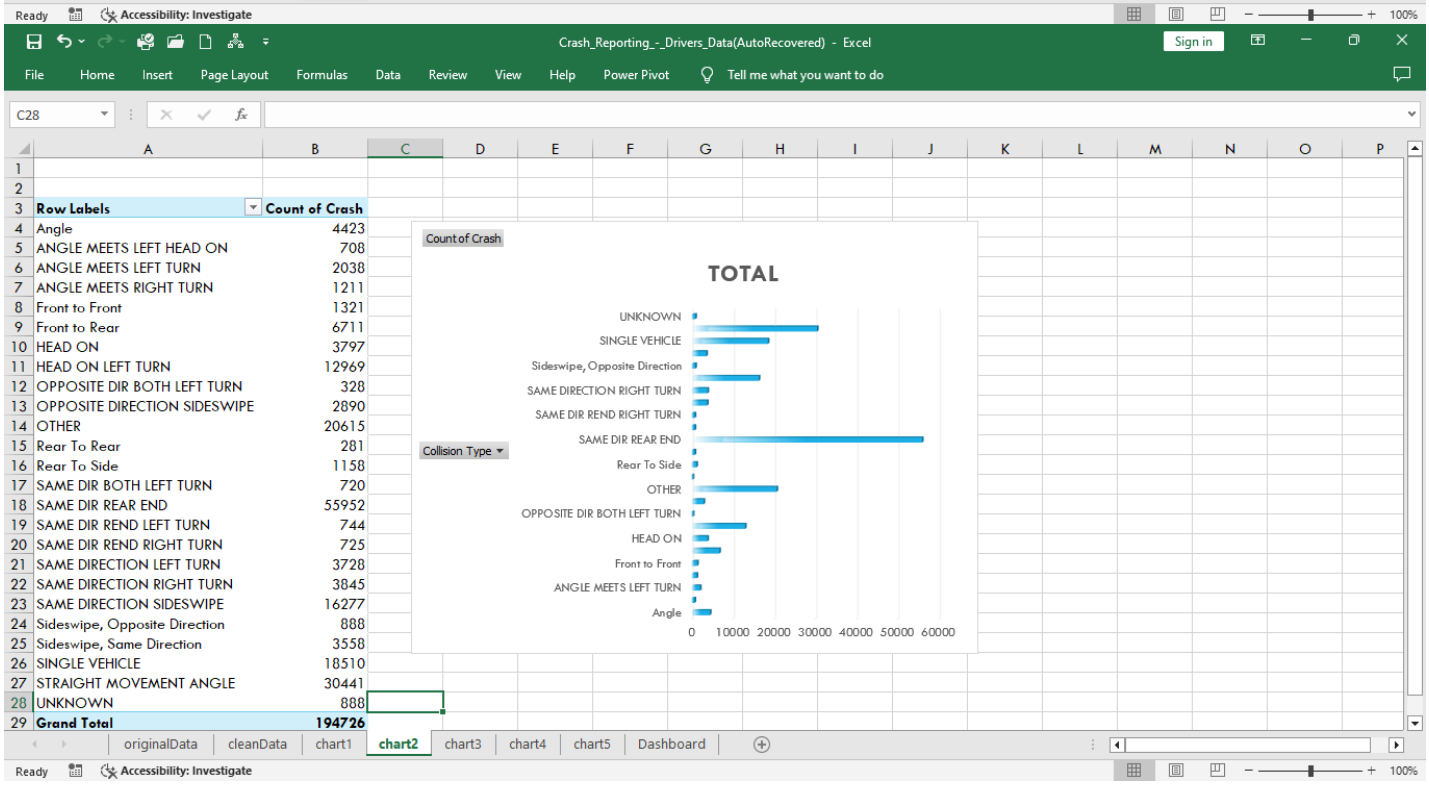
Bicycle	323
County	70497
Crossover	157
Government	809
Interstate	3786
Local	485
Maryland	93857
Municipality	12231
Other	1447
Private	197
Ramp	1114
Service	55
Spur	245
Unknown	21
US	9502
Grand Total	**194726**



Row Labels	Count of Crash
Angle	4423
ANGLE MEETS LEFT HEAD ON	708
ANGLE MEETS LEFT TURN	2038
ANGLE MEETS RIGHT TURN	1211
Front to Front	1321
Front to Rear	6711
HEAD ON	3797
HEAD ON LEFT TURN	12969
OPPOSITE DIR BOTH LEFT TURN	328
OPPOSITE DIRECTION SIDESWIPE	2890
OTHER	20615
Rear To Rear	281
Rear To Side	1158
SAME DIR BOTH LEFT TURN	720
SAME DIR REAR END	55952
SAME DIR REND LEFT TURN	744
SAME DIR REND RIGHT TURN	725
SAME DIRECTION LEFT TURN	3728
SAME DIRECTION RIGHT TURN	3845
SAME DIRECTION SIDESWIPE	16277
Sideswipe, Opposite Direction	888
Sideswipe, Same Direction	3558
SINGLE VEHICLE	18510
STRAIGHT MOVEMENT ANGLE	30441
UNKNOWN	888
Grand Total	**194726**

Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel

Row Labels	Count of Crash Date
DRY	155328
ICE	1187
Ice/Frost	172
MUD, DIRT, GRAVEL	58
OIL	36
OTHER	233
SAND	8
SLUSH	319
SNOW	1269
UNKNOWN	582
Water (standing, moving)	10
WATER(STANDING/MOVING)	50
WET	35474
Grand Total	**194726**

originalData | cleanData | chart1 | chart2 | chart3 | chart4 | chart5 | Dashboard

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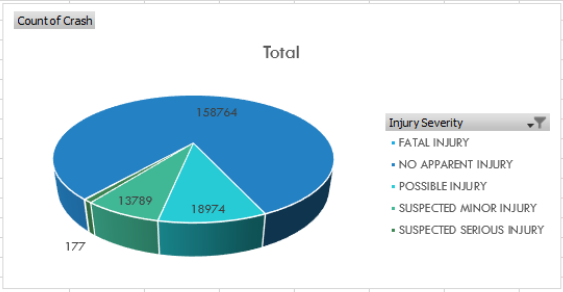
Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel

Row Labels	Count of Crash
FATAL INJURY	177
NO APPARENT INJURY	158764
POSSIBLE INJURY	18974
SUSPECTED MINOR INJURY	13789
SUSPECTED SERIOUS INJURY	1595
Grand Total	**193299**



originalData | cleanData | chart1 | chart2 | chart3 | chart4 | chart5 | Dashboard

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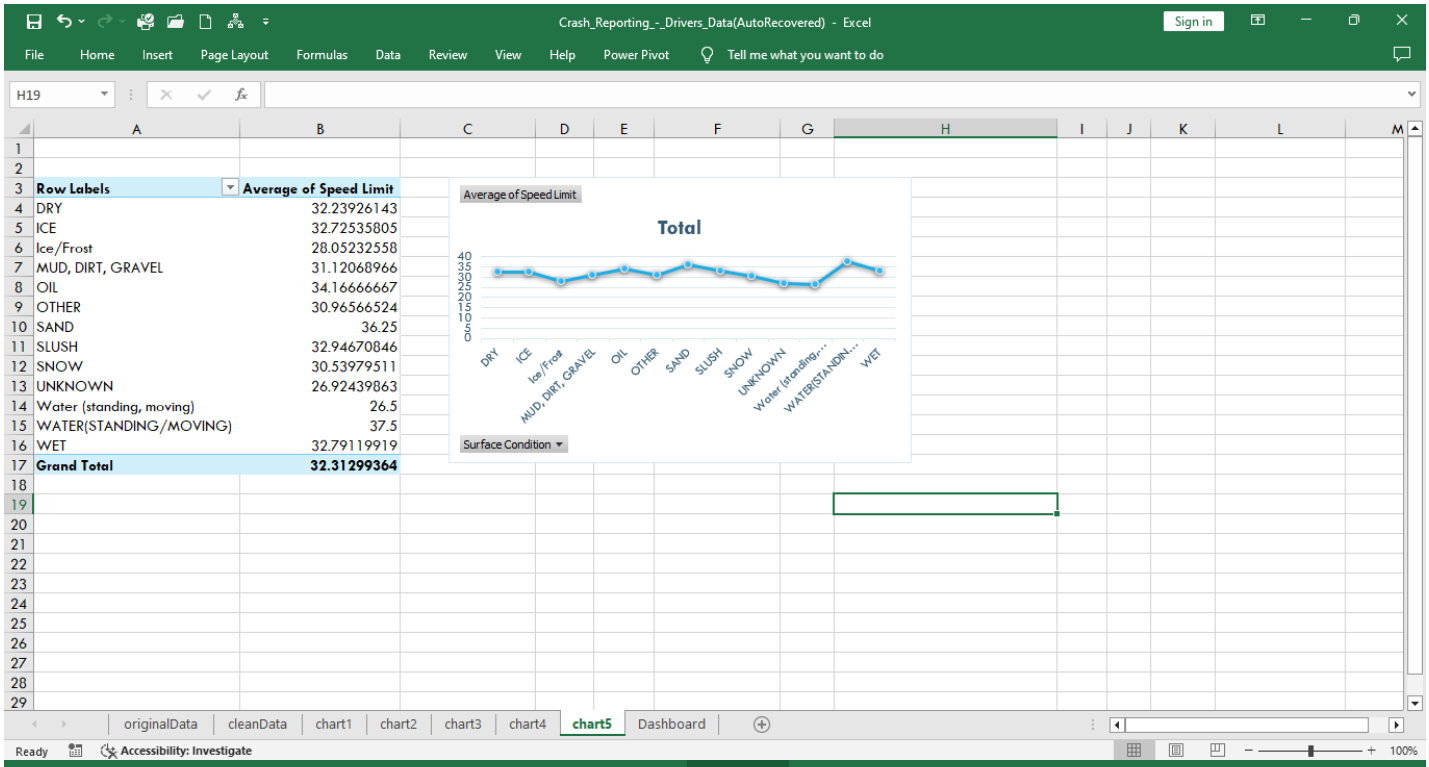
Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel
Sign in
File Home Insert Page Layout Formulas Data Review View Help Power Pivot Tell me what you want to do
H19
Row Labels | Average of Speed Limit
DRY 32.23926143
ICE 32.72535805
Ice/Frost 28.05232558
MUD, DIRT, GRAVEL 31.12068966
OIL 34.16666667
OTHER 30.96566524
SAND 36.25
SLUSH 32.94670846
SNOW 30.53979511
UNKNOWN 26.92439863
Water (standing, moving) 26.5
WATER(STANDING/MOVING) 37.5
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Average of Speed Limit
Total
Surface Condition
originalData cleanData chart1 chart2 chart3 chart4 chart5 Dashboard
Ready
Accessibility: Investigate
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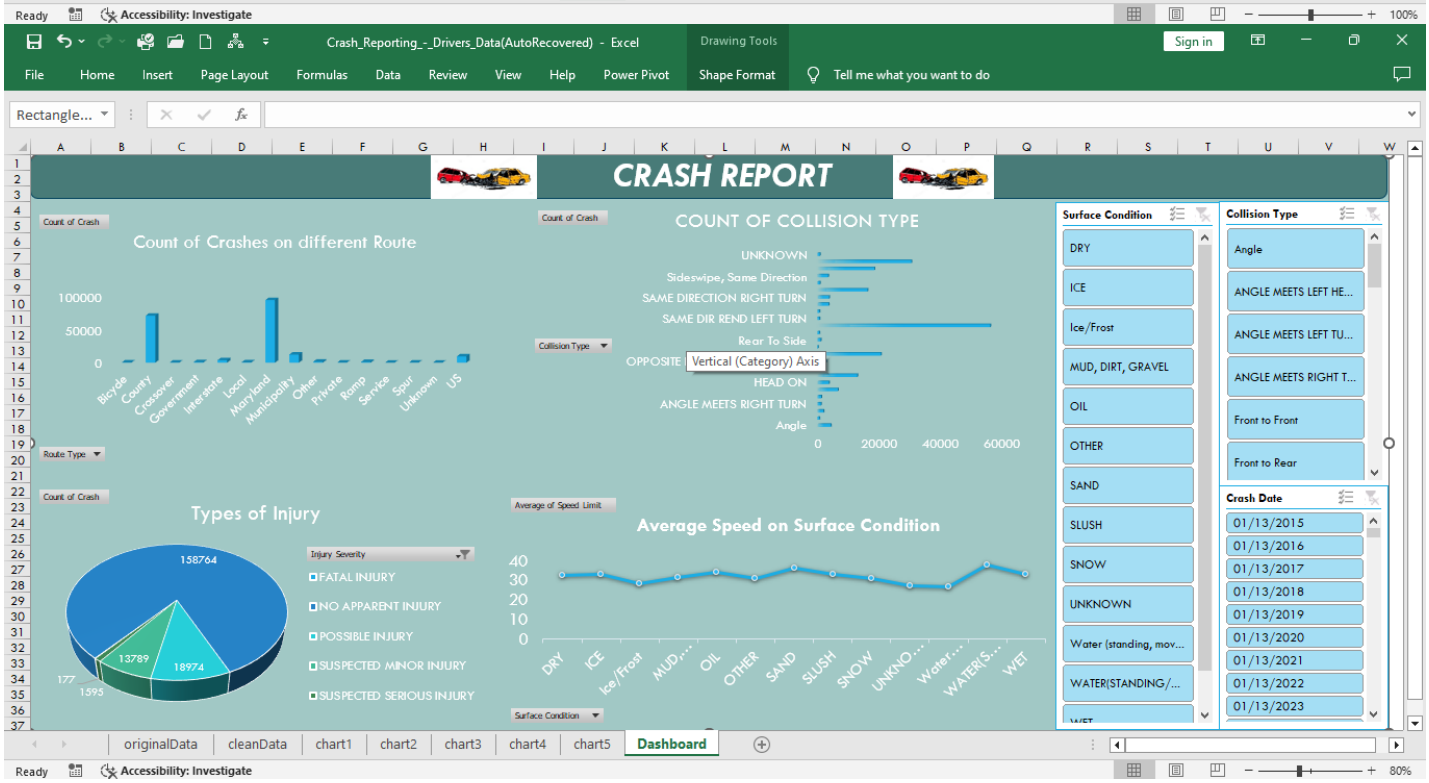
Crash_Reporting_-_Drivers_Data(AutoRecovered) - Excel
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Shape Format
Sign in
File Home Insert Page Layout Formulas Data Review View Help Power Pivot Tell me what you want to do
Rectangle...
CRASH REPORT
Count of Crashes on different Route
COUNT OF COLLISION TYPE
Types of Injury
Average Speed on Surface Condition
Surface Condition
Collision Type
Crash Date
originalData cleanData chart1 chart2 chart3 chart4 chart5 Dashboard
Ready
Accessibility: Investigate
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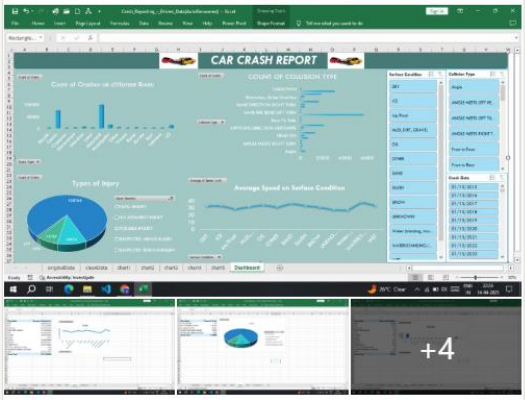
📊 Data Management Project: Crash Reporting Analysis
Analyzed crash data (Montgomery County) focusing on route types, collision types (Angle most frequent), injury severity, and speed vs. surface conditions. Key takeaway: "Other" routes had a high crash count. Thanks to @BALJINDER KAUR for guidance.
#DataManagement #CrashAnalysis #LPU #CSE #Project



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