PRESENTATION

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PRESENTED BY:-(MEMBERS)
SIDDHANT SINGH – 202410101150003
ADITYA KUMAR – 202410101150020
B.TECH CS(DS+AI)
31,32

PRESENTED TO:-
MRS. DEEPIKA TIWARI
FACULTY OF IBM
DATA ANALYTICS AND REPORTING

INTRODUCTION

•**Why Road Accident Analysis?**

Road accidents are one of the major causes of death and injuries globally. Identifying key

• contributing factors can help policymakers and transport authorities design preventive measures.

•**Objectives of the Project:**

•Analyze road accident trends across states and cities.

•Identify the influence of factors like weather, road type, and time of day.

•Study severity patterns and casualty distributions.

•Provide actionable recommendations based on the findings.

•**Research Questions:**

•Which regions have the highest accident rates?

•How do road type and weather affect accident outcomes?

•What correlation exists between vehicles involved and severity?

DATASET OVERVIEW

Source of Data: IBM Data Analytics dataset (1,000 records).
Total Attributes: 13 columns describing each accident:
Categorical: State/UT, City, Weather_Condition, Road_Type, Vehicle_Type, Severity, Cause, Time_of_Day.
Numerical: No_of_Vehicles_Involved, No_of_Persons_Injured, No_of_Persons_Killed.
Data Statistics:
Total Records: **1,000**
Average Persons Injured: **2.54**
Average Persons Killed: **1.45**
Median Vehicles Involved: **2**
Maximum Persons Killed: **3**
Observations:
Data is well-balanced and contains no missing or null values.
All data types were consistent and ready for analysis.

TOOLS AND LIBRARIES

Programming Language:

Python – chosen for its versatility and strong data ecosystem.

Libraries Employed:

Pandas: Data cleaning, manipulation, and summarization.

NumPy: Handling numerical operations and arrays efficiently.

Matplotlib & Seaborn: Creating insightful plots and charts.

Statistics Methods: For descriptive and inferential statistical analysis.

Key Purpose:

These tools streamlined the workflow — from importing raw CSV files to visualizing trends and drawing meaningful insights through code-based analysis.

DATA CLEANING AND PREPARATION

•**Data Validation:**
Checked for null, duplicate, or inconsistent values using .info() and .isnull().
Found **0 missing values**, confirming dataset integrity.
•**Data Transformation:**
•Converted data types (e.g., object → int for numerical columns).
•Standardized date format for time-based analysis.
•Replaced missing or outlier values using **mean, median, or forward-fill methods**.
•**Filtering:**
•Extracted high-severity accidents (more than 1 death).
•Sorted data by city, weather, and accident severity for comparison.
•**Derived Columns:**
Created pivot tables for:
•Average persons killed by city.
•Injuries grouped by vehicle type and road condition.

ANALYSIS AND INSIGHTS

City-Wise Fatality Insights:
Highest: Lucknow (1.68 avg. deaths), Bengaluru (1.67)
Lowest: Bhopal (1.26)
Indicates urban congestion and rural exposure as key risk drivers.
Weather Influence:
Clear weather conditions showed the **highest number of accidents** (possible due to high traffic volume).
Foggy and rainy conditions also contributed significantly to fatal outcomes.
Road Type Patterns:
Rural roads and highways reported higher accidents and fatalities.
City roads recorded more injuries but fewer deaths.
Vehicle-Type Trends:
Cars and two-wheelers involved in most accidents.
Heavy vehicles often correlated with higher injury severity.

VISULATION AND RESULTS

Bar Graphs:

Vehicle Type vs. Persons Injured

Road Type vs. Persons Injured

Pivot Table Results:

City-wise average persons killed and injured visualized for 10 major cities.

Rural highways show a higher injury rate per incident.

Data Distribution Charts:

Clear dominance of 2–4 vehicle involvement per accident.

Accidents more frequent during daytime hours compared to night.

Key Findings:

48% of fatal accidents occurred on rural or highway roads.

Average injuries per accident: **2–3 persons**.

Policy intervention is needed for road infrastructure and public awareness.

CONCLUSIONS AND RECOMMENDATIONS

- **Conclusions Drawn:**

1. Road type and weather condition are major determinants of accident severity.
2. Rural and highway accidents result in more fatalities than city ones.
3. Clear weather doesn’t ensure safety — overconfidence and speed play roles.
4. Data-driven decisions can improve road safety policies and awareness campaigns.

- **Recommendations:**

1. Install better lighting and visibility systems on rural roads.
2. Increase patrolling and speed monitoring on highways.
3. Encourage use of safety gear and compliance with traffic rules.
4. Enhance emergency response time and trauma care facilities.
5. Launch government awareness programs on safe driving practices.

- **Future Scope:**

1. Incorporate real-time traffic and weather data for predictive modeling.
2. Use machine learning to predict accident-prone zones and timings.