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TRAFFIC ACCIDENT DATA ANALYSIS

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ABSTRACT

Traffic accidents are a major public safety problem that cause loss of life, injuries, and property damage every year. The purpose of this project is to analyse traffic accident data in order to identify patterns, causes, and possible prevention methods. In this project, accident data is collected and analysed using data analysis techniques to understand how factors such as road conditions, weather, time of day, vehicle type, and driver behaviour contribute to accidents. The analysis is performed using the Python programming language with data analysis libraries such as Pandas, NumPy, and Matplotlib. These tools help in cleaning the dataset, processing information, and visualizing accident trends through graphs and charts. The results of this study help in identifying high-risk areas, peak accident times, and major factors responsible for accidents. This information can be useful for traffic authorities and government agencies to take preventive measures such as improving road safety rules, better traffic management, and public awareness programs. The main goal of this project is to use data analysis techniques to improve road safety and reduce the number of traffic accidents by making data-driven decisions.

I INTRODUCTION

Road traffic accidents are one of the major problems faced by many countries around the world. Every year, thousands of people lose their lives and many more are injured due to traffic accidents. These accidents not only cause loss of life but also lead to property damage, traffic congestion, and economic loss. Therefore, it is very important to understand the causes of accidents and find ways to reduce them. Traffic Accident Data Analysis is the process of collecting, studying, and interpreting accident-related data to identify patterns and trends. By analysing accident data, we can understand the factors that contribute to accidents such as

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driver behaviour, road conditions, weather, vehicle type, and time of occurrence. This analysis helps in identifying high-risk locations and situations where accidents occur frequently. With the help of modern data analysis techniques, large amounts of accident data can be processed easily. In this project, the analysis is performed using the Python programming language along with data analysis tools such as Pandas, NumPy, and Matplotlib. These tools help in organizing data, performing calculations, and visualizing accident trends through graphs and charts. The main objective of this project is to analyse traffic accident data to discover useful insights that can help improve road safety. By understanding the main causes and patterns of accidents, government authorities and traffic departments can take preventive measures such as improving road infrastructure, implementing stricter traffic rules, and increasing public awareness about safe driving. Traffic Accident Data Analysis plays an important role in reducing accidents and creating a safer transportation system for society.

II LITERATURE SURVEY

Traffic Accident Data Analysis has a wide scope in improving road safety and understanding the causes of road accidents. With the increasing number of vehicles on roads, accidents have become a serious issue. By analysing accident data, useful information can be obtained to help reduce accidents and improve traffic management. One important scope of traffic accident data analysis is identifying the major causes of accidents. By studying accident data, it becomes possible to determine factors such as over-speeding, drunk driving, poor road conditions, weather conditions, and lack of traffic rule awareness that lead to accidents. Another scope is identifying accident-prone areas. Through data analysis, locations where accidents occur frequently can be detected. This information helps traffic authorities and government organizations take preventive measures such as improving road design, installing traffic signals, and placing warning signs. Traffic accident data analysis also helps in understanding accident patterns and trends. For example, accidents may occur more often at certain times of the day, during specific weather conditions, or in particular seasons. Identifying these patterns helps in planning better traffic control strategies. The use of modern technologies and data analysis tools also increases the scope of this field. Tools such as the Python programming language and libraries like Pandas, NumPy, and Matplotlib help in processing large datasets and presenting the results through graphs and charts. Another important scope is supporting decision-making for road safety policies. The insights obtained from accident data analysis help government authorities, traffic police, and policymakers design effective safety measures, enforce traffic rules, and create awareness programs for drivers and pedestrians. Furthermore, traffic accident data analysis can be used in predictive

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analysis, where future accident risks can be estimated based on past data. This helps in taking preventive actions before accidents occur. In conclusion, the scope of Traffic Accident Data Analysis is very broad as it helps in identifying accident causes, improving road safety measures, assisting authorities in decision-making, and ultimately reducing the number of road accidents in society.

III SYSTEM ANALYSIS

The **Traffic Accident Data Analysis System** is designed to collect, store, and analyze traffic accident data from various sources such as police reports, traffic cameras, and citizen reports. The existing system often relies on manual record-keeping, which is time-consuming, prone to errors, and makes it difficult to identify accident patterns or high-risk locations. The proposed system automates data collection, provides real-time analysis, and generates reports that help authorities understand accident trends, identify hotspots, and implement preventive measures. By integrating statistical analysis and visualization tools, the system improves decision-making, enhances traffic safety, and reduces response time during emergencies.

Existing system

The existing system for managing traffic accident data is primarily manual and paper-based. Accident reports are collected at police stations or traffic offices, entered into registers, and occasionally stored in simple spreadsheets. This process is time-consuming, prone to human errors, and often results in incomplete or inconsistent data. Moreover, retrieving historical accident information, analyzing trends, or identifying high-risk locations is difficult and slow. The system lacks real-time monitoring and advanced analytical capabilities, making it challenging for authorities to take timely preventive measures or respond effectively to accident-prone areas.

Disadvantages of existing system

- Manual data entry is time-consuming and inefficient.
- High risk of human errors and inconsistent records.
- Difficulty in retrieving historical accident data quickly.
- Lack of real-time monitoring of traffic incidents.
- Limited ability to analyze trends or identify accident-prone locations.

Proposed system

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The proposed Traffic Accident Data Analysis System is an automated and digital solution designed to efficiently collect, store, and analyze accident data in real time. It integrates inputs from multiple sources such as police reports, traffic sensors, and citizen reports into a centralized database. The system uses analytical tools and visualization techniques to identify accident patterns, high-risk locations, and trends over time. This enables authorities to make informed decisions, implement preventive measures, and respond quickly to accidents. By reducing manual work, improving accuracy, and providing actionable insights, the proposed system enhances traffic safety and overall efficiency in accident management.

Advantages of proposed system

- Automates data collection, reducing manual effort and errors.
- Provides accurate and consistent accident records.
- Enables real-time monitoring of traffic incidents.
- Facilitates quick retrieval and analysis of historical data.
- Identifies accident-prone areas and patterns effectively.

IV METHODOLOGY

The methodology followed in this project includes the following steps:

Step 1 – Data Collection The dataset contains information about accidents including: accident date location weather condition number of vehicles involved severity

Step 2 – Data Cleaning Handling missing values and removing duplicate records.

Step 3 – Data Processing Converting date columns into proper formats and creating additional features.

Step 4 – Exploratory Data Analysis Analysing accident patterns using statistical methods.

Step 5 – Data Visualization Creating graphs and charts for better understanding.

System Architecture

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V RESULTS & OUTPUT

Traffic Accident Dataset Preview

Date	Time	Location	Weather	Vehicles	Severity
01-05-2024	08:15	Los Angeles	Clear	2	Medium
01-07-2024	17:40	Chicago	Snow	3	High
01-10-2024	13:25	Miami	Rain	2	Low
01-12-2024	22:10	New York	Fog	4	High
01-15-2024	09:50	Dallas	Clear	1	Medium
01-18-2024	18:15	Seattle	Rain	3	High

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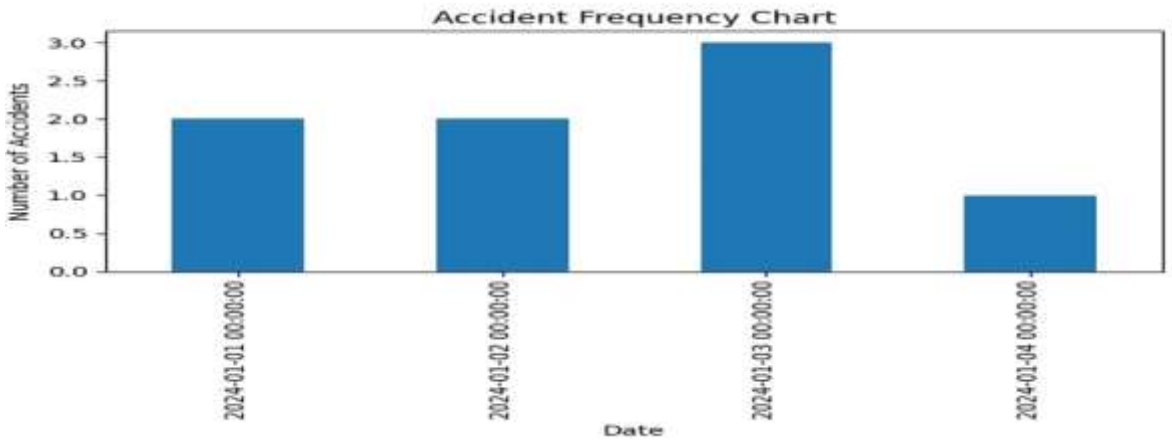

VI CONCLUSION

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The Traffic Accident Data Analysis project has successfully demonstrated how large datasets containing accident information can be processed, analysed, and visualized using Python and associated data analytics tools. By applying techniques such as data cleaning, exploratory data analysis, and visualization, the project has been able to uncover critical insights regarding accident patterns, contributing factors, and high-risk areas. Key outcomes include the identification of: Accident-prone locations and times The impact of weather conditions and road types on accident severity Vehicle types most frequently involved in accidents These insights can guide authorities and policymakers in implementing effective safety measures, planning infrastructure improvements, and allocating emergency resources more efficiently. Additionally, the project highlights.

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