Enhancing Road Safety with Ai-Driven Traffic accident method for Traffic accident analysis and prediction

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1.Problem Statement

- Road traffic accidents remain a significant public health concern, causing widespread loss of life and economic damage globally.
- Existing accident analysis and prevention strategies often rely on reactive measures after accidents have occurred, leaving a gap in proactive, data-driven approaches to improve road safety.
- Developing predictive models using machine learning algorithms to identify areas with a higher likelihood of accidents based on historical data, traffic flow, weather conditions, and other relevant factors.
- Predicting the severity of potential accidents, allowing for more targeted interventions and resource allocation.

2.Objectives of the Project

- Building predictive models that can identify high-risk areas, times, and situations based on various factors.
- Implementing AI-powered systems for real-time traffic monitoring, dynamic route optimization, and automated incident detection.
- Using AI insights to inform infrastructure improvements, law enforcement strategies, and public awareness campaigns.

- Gathering data from various sources, including sensors, cameras, and vehicle telementry.Gathering historical accident data from various sources (e.g., police reports, traffic management systems).

- Building and implementing AI models for accident prediction, traffic flow optimization, and safety alert.

3.Scope of the project:

- Cleaning and preparing the data for analysis, including handling missing values and outliers.

- Identifying relevant features from the data that can predict accidents (e.g., time of day, weather conditions, traffic volume, road conditions.

- Developing predictive models using machine learning algorithms (e.g., supervised learning predicting accident severity, unsupervised learning for identifying patterns.

- Deploying the models to predict potential accident locations and severity.

- Exploring new machine learning techniques and models.

- Integrating real-time data from sensors and cameras to improve prediction accuracy.

4.existing system

Predictive analytics:analysing historical accident data to identify high risk areas and predict potential accidents.

Real time monitoring:using sensors ,cameras and iot devices to monitor traffic conditons and detect potential accidents.

Computer vision:analysing traffic footage to detect incidents,track vehicles,and identify potential hazards.

5. proposed system

Data collection module:gathering data from various sources ,such as traffic cameras,sensors,weather reports ,accident reports,social media feeds.

Data preprocessing module:cleaning processing ,integrating collected data for analysis

Alert the notification system:sending alerts to authorities,emergency services,and drivers in case of predicted or detected accidents.

6.Data Source

- **Source:kaggle-https://www.kaggle.com/datasets/sobhanmoosavi/us-accidents**
- **Type of data:structured data**
- **Nature of data: Historical accident data collected from various source such as traffic APIs and government records.it includes information like time,location,severity,weather,road condition,traffic flow.**
- **Dataset link:link unavailable**

7.High level methodology:

- **Data collection:gathering relevant data from various source,**
- **Traffic cameras,sensors,accident report,weather data,traffic patterns.**
- **Data preprocessing:clean and preprocess the collected data to ensure the quality and consistency.**
- **Feature Engineering:extract the relavent feature from the preprocessed data that can be used for prediction**

- **Model development:develop and train and AI model using the exteacted feature to predict high -risk areas and optimise emergency response.**
- **Model Evalution:evalute the performance of the developed model using metrics such as accuracy,precaution and recall.**
- **Deployment:deploy the developed model in production-ready environment,integrating it with existing traffic management systems.**

8.Tools and Technologies

- Programming languages:pandas,numpy and matplotlib
- **Libraries**
- **Data visualisation:matplotlib,seaborn**
- **Business intelligence tools:power Bi**
- **Containerization:deployment and intergration**
- **Api development:utilize frame work for traffic management system.**
- **Other tools and technologies:**
- **Gis and mapping tools**
- **real time data processing.**
- **Some popular AI tools**
- **Google cloud ai platform**
- **Tensor flow**
- **Pytroch**
- **Keras**
- **Apache spark**

9. Team members and roles:

1. S.sushmitha-**Data collection and integration:**responsible for sourcing data sets,conncting Apis,and preparing the initial

2. M.keerthana-**Data cleaning and EDA:**cleans and preprocesses data ,performs exploratory analysis and generates initial insights.

3. k.charushree-**Feature engineering and modeling**:works on feature extraction and selection develops and trains machine learning models.

4. S.gayathri-**Evaluation and optimization** :tunes hyper parameters ,valid dates models and documents performance metrices.

5.k.lakshmi-**Documentation and presentation** :compiles reports,prepares visualizations ,and handles presentation and optional development.