Phase-3 Submission Template

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Department: B.TECH (AI&DS)

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Github Repository Link: https://github.com/sahana230810/sahanaaji.git

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1. Problem Statement

Road traffic accidents cause significant fatalities, injuries, and economic losses globally. Existing methods based on Static historical analysis are insufficient for proactive intervention. The project aims to use AI and machine learning to Predict accident occurrence and severity, enabling authorities to act early and enhance road safety

2. Abstract

This project focuses on predicting the likelihood and severity of road accidents using machine learning techniques Applied to a global road accident dataset. The methodology includes data collection, preprocessing, EDA, model training And evaluation, and visualizations. By identifying patterns and high-risk zones, the model supports authorities in Implementing timely safety measures. The final application is deployed using a web interface for interpretability and access

3. System requirements

Hardware:

- Minimum: 4GB RAM, Intel i3 or AMD equivalent
- Recommended: 8GB RAM or higher

Software:

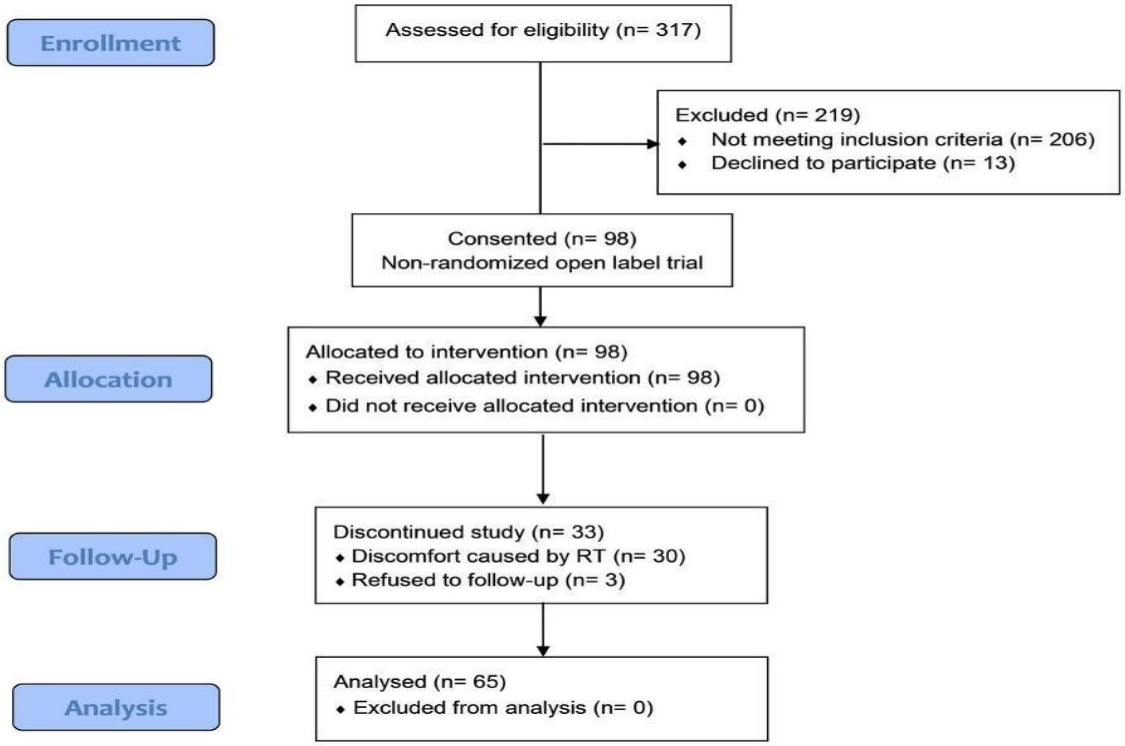
- Python 3.10+
- IDE: Google Colab or Jupyter Notebook

4. Project objectives

Predict accident severity and likelihood using AI . Identify accident hotspots . Visualize patterns through dashboards and maps. Support real-world traffic safety planning through decision-support tools

5. Flowchart of the work flow

Data Collection → Data Preprocessing → Exploratory Data Analysis → Feature Engineering → Model Building → Model Evaluation → Visualization & Insights



6. Data description

Source: Kaggle

Format: CSV (Tabular)

Records: Thousands

Features: Time, location, weather, severity, etc.

Target Variables: Accident severity (regression), accident occurrence (classification)

Nature: Static, offline dataset

7. Data Preprocessing

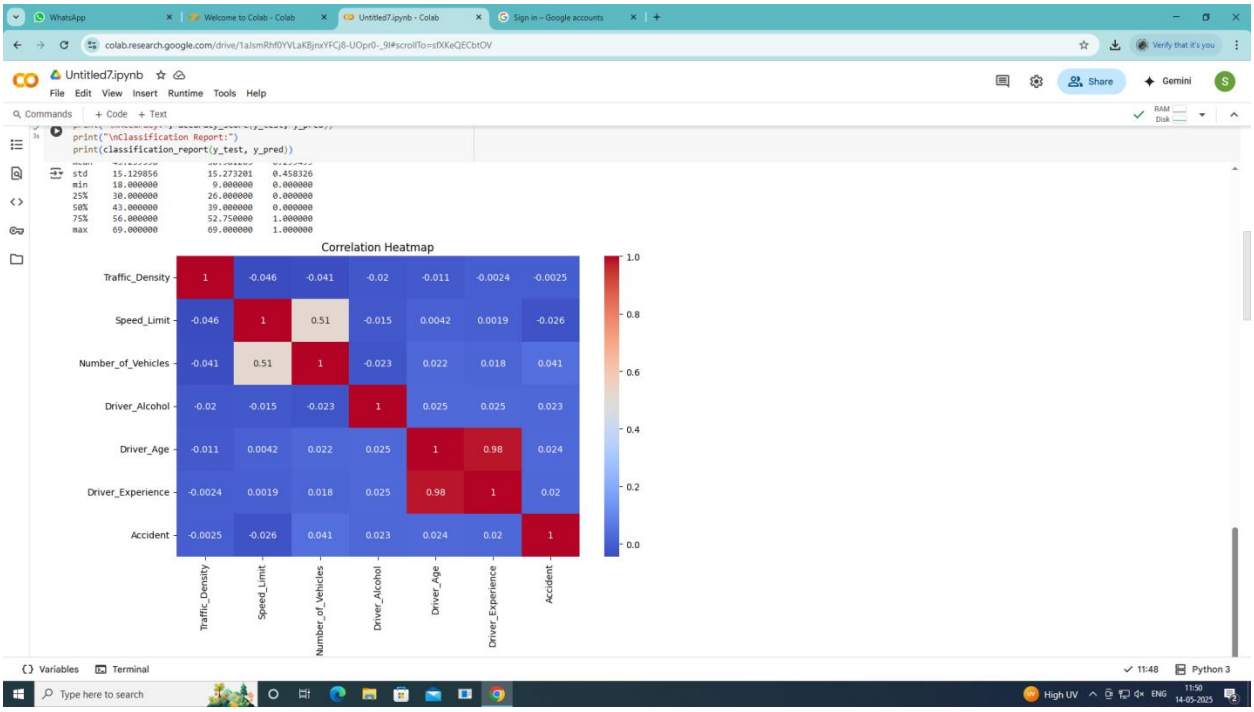
Missing values: Filled or removed– Outliers: Removed using IQR and Z-scores– Encoding: Label + one-hot encoding– Normalization: Min-Max and Z-score scaling– Date time & Unit Standardization: Applied to ensure consistent

8. Exploratory data analysis (EDA)

[Build and compare multiple models to solve the defined problem.]

***Techniques**: Histograms, boxplots, heatmaps, time-series plots, geospatial maps*

Insights: Most accidents occur during rainy evenings and at intersections. High severity is linked with poor lighting and Wet roads.



9. Feature engineering

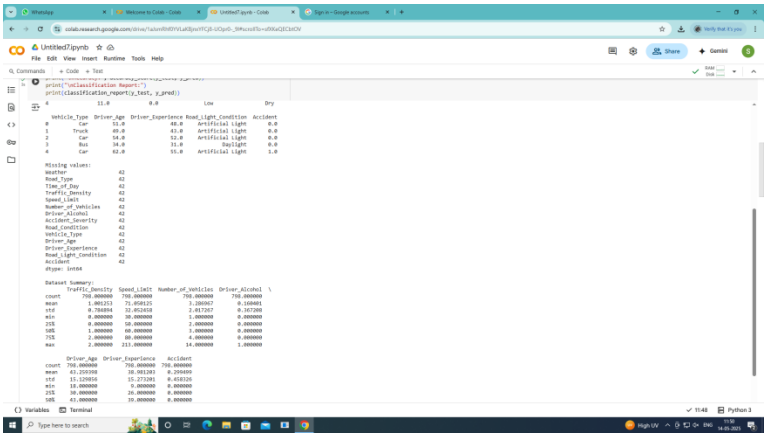
New Features: *Time groupings, weather severity index*

Transformations*: Log transform, binning*

Dimensionality *Reduction: PCA (optional)*

10. Model buliding

Classification: Logistic Regression, Random Forest, XGBoost . Regression: Linear Regression, Random Forest Regressed



11. Model evaluation

Classification: *Accuracy, Precision, Recall, F1-score, ROC-AUC*

Regression*: MAE, RMSE, R^2*

Visuals*: Confusion matrix, SHAP plots, residuals, risk map*

12. Deployment

Public link: https://ec9f250af598c09e9f.gradio.live/

Method: Stream lit Web App

Features: Accepts input, predicts severity/risk, visualizes high-risk zones

Hosting: Stream lit Cloud, Firebase, or local demo

13. Source code

https://colab.research.google.com/drive/1aJsmRhf0YVLaKBjnxYFCj8-UOpr0-_9l#scrollTo=sfXKeQECbtOV&line=9&uniqifier=1

14. Team members and Roles

Name	Role	Contributions
1.Sahana A.	Project Manager	Oversight, coordination ,Model development and evaluation
2.Shanmugapriya S.	Data Scientist	Data preparation ,EDA, feature engineering
4.Sindhumathi E.	ML Engineer	Model tuning, deployment, visualization