Project Initialization and Planning Phase

Date	17 June 2025
Team ID	LTVIP2025TMID44033
Project Title	TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning
Maximum Marks	3 Marks

Project Proposal (Proposed Solution) template

The project will center on forecasting traffic volume within an urban road network by leveraging both historical and real-time data. It will include developing predictive models, training them using past traffic patterns, and evaluating their performance using suitable accuracy metrics. The ultimate goal is to optimize traffic flow, minimize congestion, and improve overall transportation efficiency.

We are going to apply machine learning techniques on historical traffic data and live sensor feeds. We will use advanced predictive models to try to forecast traffic volume. Proactive traffic management, dynamic signal control, and shifting resources for public transport and parking are the many things that can be done properly. The importance of these predictions, the approach we plan to take, and the potential impact on urban mobility and commuter experience will be detailed in the project.

Project Overview

Objective	This project aims to develop a model for estimating traffic volume by utilizing multiple data sources. As urbanization continues to grow, there is a rising demand for accurate traffic forecasts among city traffic managers, transportation authorities, and urban planners. To address this need, we will apply machine learning techniques to train predictive models using historical traffic data, sensor readings, and other relevant variables.

Scope	This project focuses on forecasting traffic volume across urban road networks by leveraging both historical and real-time data. It will involve building predictive models, training them using past traffic data, and assessing their accuracy through relevant performance metrics. Key objectives include improving traffic flow, minimizing congestion, and enhancing the overall efficiency of urban transportation systems.	
Resource Type	**Description**	**Specification/Allocation**
Hardware		
Computing Resources	CPU/GPU specifications, number of cores	e.g., 2 x NVIDIA V100 GPUs

Problem Statement	
Description	Develop accurate predictive models to estimate traffic volume using diverse data sources, and optimize strategies for traffic management and urban planning. This paper presents a methodology aimed at delivering reliable traffic volume forecasts, which can support city traffic managers, transportation authorities, and urban planners in enhancing operational efficiency, reducing congestion, and improving overall transportation systems.

Impact	Accurate traffic volume prediction models will enable enhanced operational efficiency, reduced congestion through proactive traffic control, better allocation of public transportation and parking resources, and more informed urban planning. Ultimately, this contributes to sustainable urban mobility and significantly improves the overall commuting experience.
Proposed Solution	
Approach	The proposed methodology includes preprocessing the data to handle missing values and performing feature engineering to identify key traffic-related variables. These features will then be used to train machine learning models such as regression analysis, random forest, and gradient boosting to predict traffic volume. Model performance will be evaluated using metrics like Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE). The final goal is to deploy a dependable forecasting system that supports the optimization of traffic management strategies and urban planning initiatives.
Key Features	What sets this proposal apart is its integration of machine learning models with both historical and real-time traffic data to predict traffic volume. This approach enables greater operational efficiency, supports proactive traffic management, and informs reliable urban planning decisions. It represents a significant step forward in promoting sustainable urban mobility through the use of powerful predictive technologies.

Resource Requirements

Memory	RAM specifications	e.g., 8 GB
Storage	Disk space for data, models, and logs	e.g., 1 TB SSD
Software		

Frameworks	Python frameworks	e.g., Flask

Libraries	Additional libraries	e.g., scikit-learn, pandas, numpy
Development Environment	IDE, version control	e.g., Jupyter Notebook, Git
Data		
Data	Source, size, format	e.g., Kaggle dataset, 10,000 images