Project Overview

Project Title:
TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning

Objective:
To develop a smart web-based system that estimates traffic volume using machine learning, helping with traffic management, urban planning, and commuter guidance.

Key Features:
- Accepts input like date, time, weather, and type of day
- Predicts traffic volume using a trained ML model
- User-friendly web interface
- Results shown with traffic-themed background visuals

Backend and Machine Learning Tools

1. Python:
Core language for data processing, model training, and backend scripting.

2. Machine Learning Libraries:
- Pandas - For data manipulation and preprocessing
- NumPy - Numerical computing
- Scikit-learn - For building and training the ML model
- Pickle - Saving/loading trained model and column transformers

Model Training Script (train_model.py):
- Reads dataset
- Encodes categorical data
- Splits data for training/testing
- Trains model and saves it (traffic_model.pkl and columns.pkl)

3. Flask:
Lightweight Python web framework.
Manages routing, form handling, and rendering HTML pages.
Loads the trained model and returns predictions.

Frontend and Deployment Tools

4. HTML/CSS:
Used for index.html (input form) and result.html (output page).
Clean layout with buttons, labels, and background traffic images.
HTML templates rendered through Flask.

5. Visual Elements:
Background images of Indian traffic jams and signals.
Used to enhance user experience on result page.

6. Project File Structure:
TrafficTelligence/
■■■ app.py
■■■ train_model.py
■■■ traffic_model.pkl
■■■ columns.pkl
■■■ data.csv
■■■ templates/
  ■■■ index.html
  ■■■ result.html

7. Development Tools:
- VS Code - Main code editor
- Command Prompt / PowerShell - To run Flask and train scripts
- Browser - To test and interact with the app locally