TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning

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Team Size : 4

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Project Description:

TrafficTelligence is an advanced system that uses machine learning algorithms to estimate and predict traffic volume with precision. By analyzing historical traffic data, weather patterns, events, and other relevant factors, TrafficTelligence provides accurate forecasts and insights to enhance traffic management, urban planning, and commuter experiences.

By the end of this project:

You'll be able to understand the problem to classify if it is a regression or a classification kind of problem.

You will be able to know how to pre-process/clean the data using different data pre-processing techniques.

You will able to analyze or get insights into data through visualization.

Applying different algorithms according to a dataset and based on visualization.

You will be able to know how to find the accuracy of the model.

You will be able to know how to build a web application using the Flask framework.

Requirements:

Data Collection.

Collect the dataset or Create the dataset

Data Pre-processing.

Import the Libraries.

Importing the dataset.

Checking for Null Values.

Data Visualization.

Taking care of Missing Data.

Feature Scaling.

Splitting Data into Train and Test.

Model Building.

Import the model building Libraries.

Initializing the model.

Training and testing the model.

Evaluation of Model.

Save the Model.

Application Building.

Create an HTML file.

Build a Python Code.

Run the App.

This project contains various configuration files and a dataset related to traffic volume.

Files Included:

- **MultipleFiles/config.json**: A JSON file specifying the project's template.
- **MultipleFiles/prompt**: A binary file, likely containing input or instructions for a process.

- **MultipleFiles/launch.json**: A Visual Studio Code launch configuration file for debugging purposes, specifically for launching Chrome against a local server.
- **MultipleFiles/traffic volume.csv**: A CSV (Comma Separated Values) file containing traffic volume data.

Data Overview (MultipleFiles/traffic volume.csv):

The **traffic volume.csv** file contains time-series data related to traffic volume and various environmental factors. Each row represents a specific hour, and the columns provide the following information:

- **holiday**: Indicates if the day is a holiday (e.g., "None", "Columbus Day", "Thanksgiving Day", "Veterans Day", "Christmas Day", "New Years Day", "Washingtons Birthday").
- **temp**: Temperature in Kelvin.
- **rain**: Amount of rain in mm.
- **snow**: Amount of snow in mm.
- **weather**: Description of the weather conditions (e.g., "Clouds", "Clear", "Rain", "Mist", "Drizzle", "Haze", "Thunderstorm", "Fog", "Snow", "Squall").
- **date**: The date of the observation in **DD-MM-YYYY** format.
- **Time**: The time of the observation in **HH:MM:SS** format.

- **traffic_volume**: The recorded traffic volume for that hour.

1. Prerequisites:

- **Visual Studio Code (VS Code)**: Recommended for development and debugging, especially with the provided **launch.json** file.
- **Web Browser (Chrome)**: The **launch.json** configuration is set up for Chrome.

2. Running the Project :

The **launch.json** file suggests a web-based application. To run this project, you would typically:

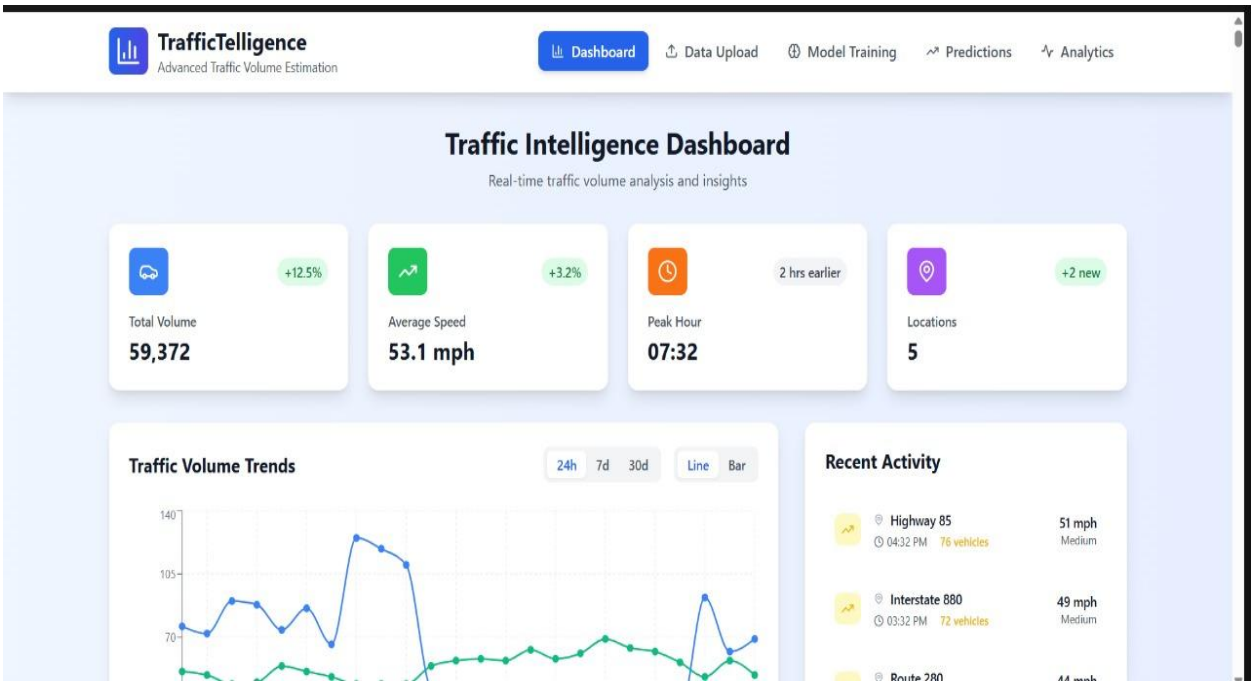
- **Install Dependencies**: If this is a web project, you might need to install Node.js and then run **npm install** or **yarn install** in the project directory.
- **Start the Development Server**: The **launch.json** points to **http://localhost:8080**. You would need to start a development server that serves your application on this port. This is usually done with a command like **npm start** or **yarn dev**, depending on the project's setup (indicated by **"template": "bolt-vite-react-ts"** in **config.json**).
- **Launch Debugger**: In VS Code, go to the "Run and Debug" view (Ctrl+Shift+D or Cmd+Shift+D) and select "Launch

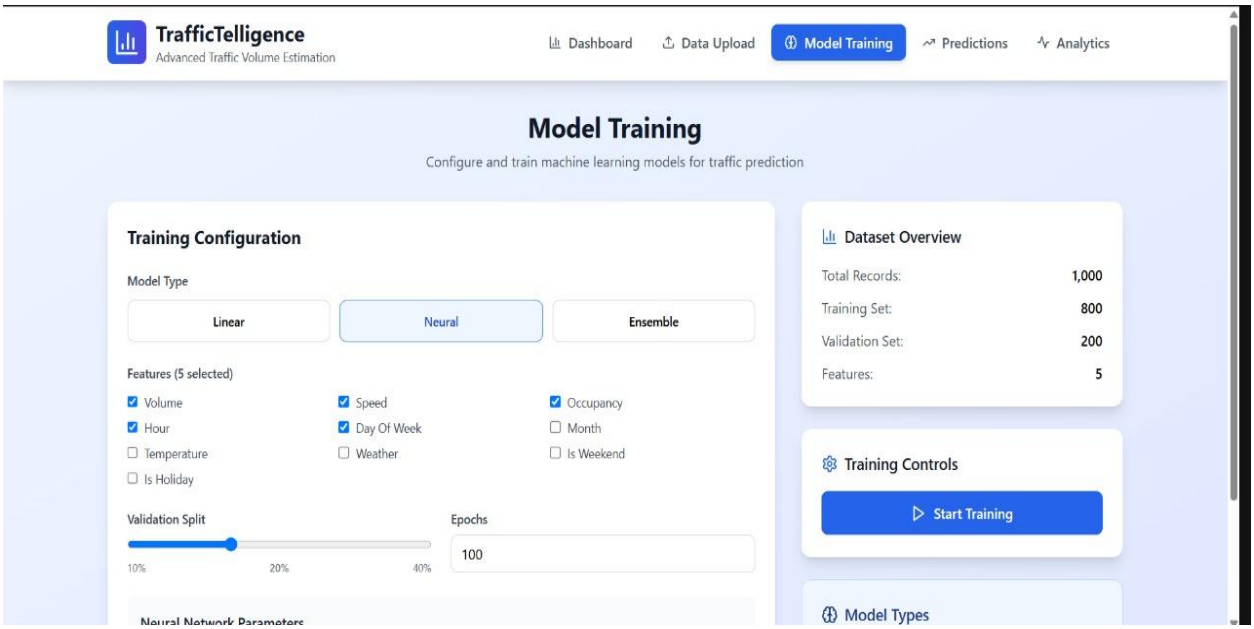
Chrome against localhost" from the dropdown, then click the green play button.

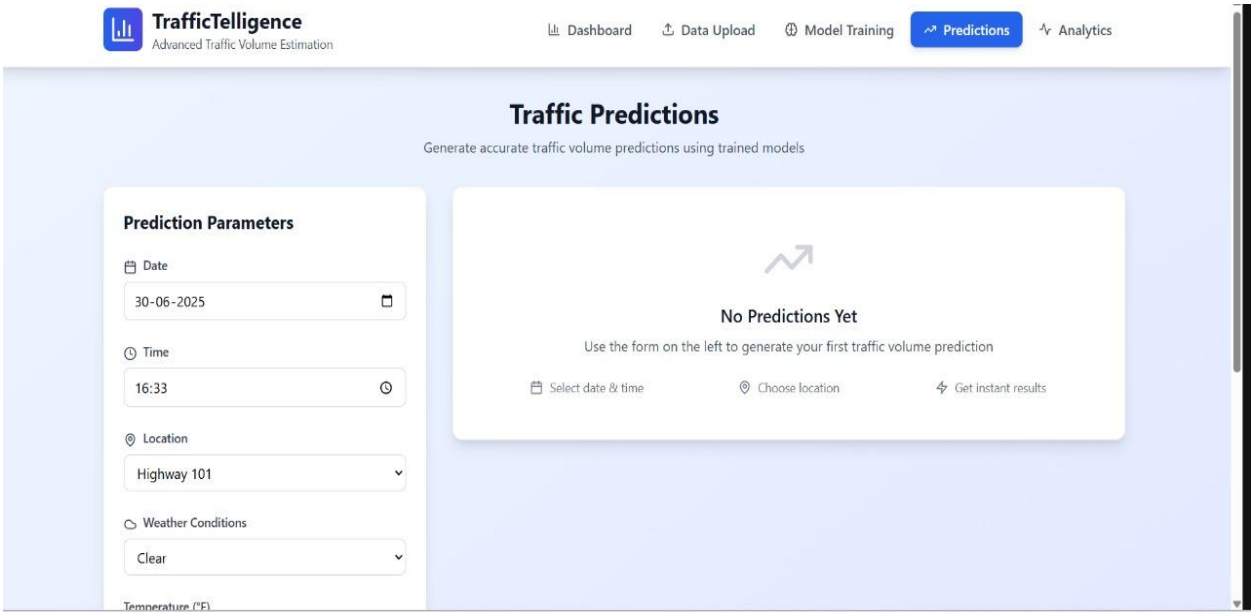
The **traffic volume.csv** file can be analyzed using various tools and programming languages (e.g., Python with pandas, R, Excel) to gain insights into traffic patterns, weather impacts, and holiday effects.

Project Structure:

```
├── MultipleFiles/
|   ├── config.json
|   ├── prompt
|   ├── launch.json
|   └── traffic volume.csv
└── README.md
```


TrafficTelligence
Advanced Traffic Volume Estimation
Dashboard
Data Upload
Model Training
Predictions
Analytics
Traffic Intelligence Dashboard
Real-time traffic volume analysis and insights
+12.5%
Total Volume
59,372
+3.2%
Average Speed
53.1 mph
2 hrs earlier
Peak Hour
07:32
+2 new
Locations
5
Traffic Volume Trends
24h
7d
30d
Line
Bar
140
105
70
Recent Activity
Highway 85
04:32 PM
76 vehicles
51 mph
Medium
Interstate 880
03:32 PM
72 vehicles
49 mph
Medium


TrafficTelligence
Advanced Traffic Volume Estimation
Dashboard
Data Upload
Model Training
Predictions
Analytics
Model Training
Configure and train machine learning models for traffic prediction
Training Configuration
Model Type
Linear
Neural
Ensemble
Features (5 selected)
Volume
Speed
Occupancy
Hour
Day Of Week
Month
Temperature
Weather
Is Weekend
Is Holiday
Validation Split
10%
20%
40%
Epochs
100
Neural Network Parameters
Dataset Overview
Total Records:
1,000
Training Set:
800
Validation Set:
200
Features:
5
Training Controls
Start Training
Model Types


TrafficTelligence
Advanced Traffic Volume Estimation
Dashboard
Data Upload
Model Training
Predictions
Analytics
Traffic Predictions
Generate accurate traffic volume predictions using trained models
Prediction Parameters
Date
30-06-2025
Time
16:33
Location
Highway 101
Weather Conditions
Clear
Temperature (°F)
No Predictions Yet
Use the form on the left to generate your first traffic volume prediction
Select date & time
Choose location
Get instant results