

Artificial Intelligence and Machine Learning

Project Documentation

1. Introduction

- Project Title: TrafficTelligence – Predictive Traffic Volume Estimation Using Machine Learning
- Team ID: LTVIP2025TMID59638
- Team Size: 4
- Team Leader: Bethapudi Hema Jessy
- Team Members:
 - Amarthaluri Varshitha
 - Annangi Harsha
 - Abdul Anees

2. Project Overview

- **Purpose:**

To develop a machine learning-based system that can predict traffic volume using structured data (e.g., climate, holiday, weather conditions) without the need for CCTV cameras or sensors.

- **Features:**

- Predicts traffic volume using historical and contextual features
- Visualizes predictions with performance metrics
- No hardware or sensor dependency
- Easily upgradable to include real-time inputs in future versions

3. Architecture

- **Frontend:**

Basic interface (html and minimal Python UI) used to run the model and view predictions.

- **Backend:**

Implemented in Python for data preprocessing, model training, and prediction result display.

- **Database:**

No database used. Data is loaded from CSV files during runtime.

4. Setup Instructions

• Prerequisites:

Python 3.8+, pip, pandas, scikit-learn, matplotlib, pandas, numpy, matplotlib, scikit-learn, xgboost.

• Installation Steps:

git clone <https://github.com/annuu005/TrafficTelligence-Advanced-Traffic-Volume-Estimation-with-Machine-Learning.git>

```
cd "TrafficTelligence:Advanced Traffic Volume Estimation using MachineLearning"
```

```
pip install -r requirements.txt
```

```
python app.py
```

5. Folder Structure

Name	Type	Date Modified
> .ipynb_checkpoints	File Folder	11-12-2021 13:07
✓ Flask	File Folder	10-02-2022 11:35
> templates	File Folder	10-02-2022 11:35
app.py	py File	10-02-2022 11:35
encoder.pkl	pkl File	11-12-2021 13:01
model.pkl	pkl File	11-12-2021 13:01
✓ IBM	File Folder	15-02-2022 14:58
> Flask	File Folder	31-01-2022 10:30
traffic volume_ibm_scoring end point.ipynb	ipynb File	31-01-2022 10:27
Requirements.txt	txt File	15-12-2021 10:57
Traffic volume estimation.docx	docx File	15-02-2022 15:04
traffic volume.csv	csv File	10-12-2021 11:08
traffic volume.ipynb	ipynb File	11-12-2021 13:03

6. Running the Application

Run the following command in terminal:

```
-cd "TrafficTelligence:Advanced Traffic Volume Estimation using MachineLearning\Flask"  
-python app.py
```

7. API Documentation

No APIs currently implemented. Future versions may include endpoints using FastAPI or Flask.

8. Authentication

Not applicable in the current version.

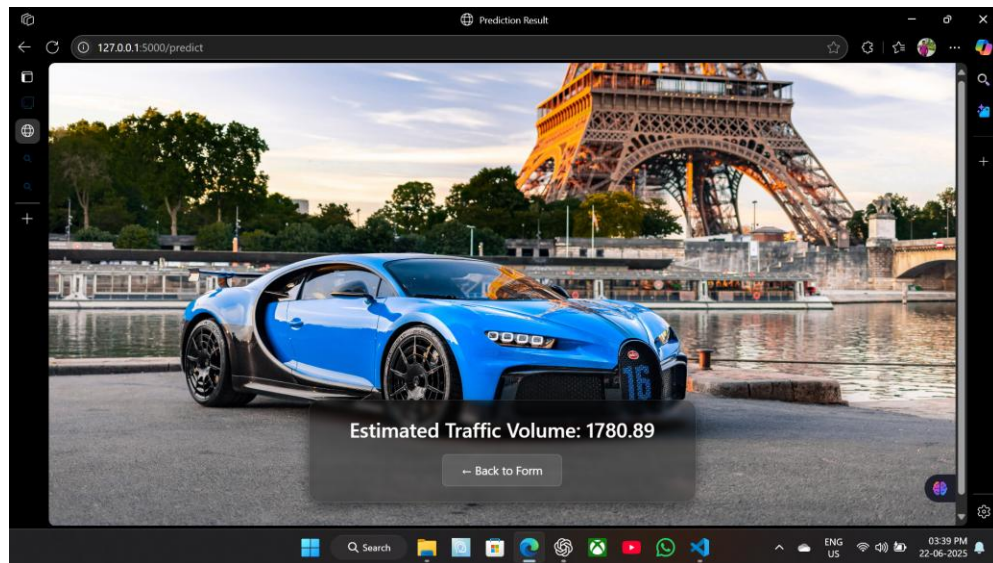
9. User Interface

Console for Input and output display predictions.

10. Testing

Unit tests and model evaluation using R^2 score, MAE, RMSE.

11. Screenshots or Demo



12. Known Issues

- Limited to historical data
- Accuracy drops in unseen conditions
- Minimal interactivity/UI

13. Future Enhancements

- Real-time data integration
- Web-based dashboard (Streamlit)
- Live traffic maps and alerts
- Cloud deployment