

1. INTRODUCTION

1.1 Project Overview

TrafficTellgence is an intelligent traffic volume estimation system powered by machine learning. It analyzes various factors such as weather, date, and holiday status to predict traffic volume. This aids in urban planning, congestion management, and traffic forecasting.

1.2 Purpose

The purpose of this project is to build a machine learning-based solution to predict traffic volume accurately. It is designed to help city planners, traffic authorities, and smart city projects optimize traffic flow and reduce congestion.

2. IDEATION PHASE

2.1 Problem Statement

Unpredictable traffic volumes lead to congestion, increased pollution, and delays. There is a lack of real-time tools that incorporate external factors like weather and holidays for accurate prediction.

2.2 Empathy Map Canvas

- **Says:** "I need to plan routes better."
- **Thinks:** "Will I get stuck in traffic again?"
- **Feels:** Frustrated with daily delays.
- **Does:** Tries different times/routes, uses traffic apps.

2.3 Brainstorming

- Use historical data
 - Feature engineering (weather, holidays)
 - ML models: Decision Tree, XGBoost, SVR
 - Visualization and UI with Flask
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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

User opens the app > Inputs conditions > Gets traffic prediction > Plans travel accordingly

3.2 Solution Requirements

Functional and non-functional requirements as outlined in the Requirement Analysis section above.

3.3 Data Flow Diagram

Input Data > Preprocessing > ML Model > Prediction Output > User Interface

3.4 Technology Stack

- Python
- Pandas, Sklearn, XGBoost

- Flask
 - HTML/CSS (for UI)
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4. PROJECT DESIGN

4.1 Problem-Solution Fit

Clear match between the urban planning problem and our data-driven prediction solution.

4.2 Proposed Solution

Train and deploy a model that predicts traffic volume based on input features such as weather, holiday, and date.

4.3 Solution Architecture

CSV Upload/Input > Preprocessing > ML Model (Pickled) > Flask API > Frontend

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Sprint-based planning with defined epics, user stories, story points, and a velocity of 16 story points per sprint.

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

Tested response time of Flask app. Model returns results in < 2 seconds. Accuracy measured using MSE, and R2.

7. RESULTS

7.1 Output Screenshots

- Preprocessing Output
 - Model Evaluation Metrics
 - Flask Prediction Interface
 - Charts and Graphs
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8. ADVANTAGES & DISADVANTAGES

Advantages:

- Accurate predictions
- Useful for traffic management
- Easy to deploy and use

Disadvantages:

- Depends on data quality
 - May require frequent retraining
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9. CONCLUSION

TrafficTelligence provides a practical ML-based approach to traffic prediction, helping authorities make better planning decisions.

10. FUTURE SCOPE

- Integration with real-time traffic APIs
 - Deployment on cloud
 - Incorporate live sensor data
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11. APPENDIX

- **Dataset Link:** [UCI Traffic Volume Dataset / Kaggle]
- **GitHub & Demo Link:** "C:\Users\ASUS\Videos\Captures\TRAFFIC VOLUME ESTIMATION and 2 more pages - Personal - Microsoft Edge 2025-06-30 17-36-42.mp4"