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

Team Name:  
  
Traffic Titans

Team Members:  
  
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Thumati Manasa  
Thoran Sai  
Thota Naga Lokesh

# Phase 1: Brainstorming & Ideation

The idea of TrafficTelligence emerged from the increasing need for intelligent traffic management solutions. The core concept was to use Machine Learning (ML) to estimate traffic volume based on various factors such as historical traffic data, weather, and events. The team brainstormed on:  
- Challenges in current traffic systems  
- Application of AI in urban development  
- Real-world datasets and available technologies

# Phase 2: Requirement Analysis

Functional Requirements:  
- Predict traffic volume from input data.  
- Provide visual output for easier interpretation.  
- Offer a simple UI for end-users.  
  
Non-Functional Requirements:  
- High accuracy and reliability  
- Scalability for Smart City integration  
- Quick response and low latency  
  
Technical Requirements:  
- Python, HTML/CSS  
- Libraries: Pandas, NumPy, Scikit-learn, Matplotlib, Flask  
- Platforms: Jupyter Notebook, GitHub

# Phase 3: Project Design

System Architecture Overview:  
1. User Interface – For uploading CSV data and viewing results.  
2. Data Handler – For cleaning and transforming data.  
3. ML Model Pipeline – Trains on historical data using Linear Regression, Random Forest, and XGBoost.  
4. Prediction Module – Outputs estimated traffic volume.  
5. Visualization – Graphical representation of results.  
  
The architecture was designed for modularity and future upgrades.

# Phase 4: Project Planning

Roles and Responsibilities:  
- Thumati Manasa – ML Model Development  
- Ummaleti Sasank – Data Collection & Preprocessing  
- Thoran Sai – Model Testing & Evaluation  
- Thota Naga Lokesh – Documentation & Presentation  
  
Timeline:  
- Week 1–2: Ideation and Dataset Collection  
- Week 3: Preprocessing & Model Selection  
- Week 4: Model Training and Evaluation  
- Week 5: UI Integration and Testing  
- Week 6: Documentation and Presentation Prep

# Phase 5: Project Development

Steps Involved:  
- Collected real-world traffic datasets (CSV format)  
- Preprocessed data using Pandas and NumPy  
- Trained models using Linear Regression, Random Forest, and XGBoost  
- Integrated Flask-based UI for predictions  
- Implemented graphical output with Matplotlib

# Phase 6: Functional and Performance Testing

Evaluation Metrics Used:  
- Accuracy  
- Precision  
- Recall  
- F1-Score  
  
Testing Strategy:  
- Split dataset into training and testing sets  
- Cross-validated models for generalizability  
- Tested UI for input-output flow and user-friendliness  
  
Sample Output:  
- Estimated Traffic Volume: [4495.41]

# Conclusion

TrafficTelligence successfully demonstrates the use of ML in solving urban traffic issues. With real-time predictions and easy integration, it supports commuters, traffic authorities, and urban planners alike.