

# **TrafficTelligence: Advanced Traffic Volume Estimation with Machine Learning**

**Team ID : LTVIP2025TMID37528**

**Name : C.Tejaswini**

## **Introduction**

- Traffic congestion is a major urban issue.
  - Estimating traffic volume helps in planning, navigation, and urban development.
  - This project uses machine learning to predict traffic volume based on real data.
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## **Pre-Requisites**

- Python Programming
  - Libraries: Pandas, NumPy, Matplotlib, Scikit-learn
  - Machine Learning Basics
  - Data Analysis and Visualization
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## **Slide 4: Prior Knowledge**

- Regression Techniques
  - Feature Engineering
  - Data Cleaning
  - Model Evaluation Metrics
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## **Project Objectives**

- Estimate vehicle traffic volume using ML models.
- Automate prediction based on time, weather, and historical data.
- Visualize trends and predictions.
- Deploy a user-friendly application.

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## **Project Flow**

1. Data Collection
2. Data Preprocessing
3. Model Building
4. Evaluation
5. Application Deployment

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## **Project Structure**

- Data Source: UCI Traffic Volume Dataset / DOT APIs
- Language: Python
- IDE: Jupyter Notebook
- ML Models: Linear Regression, Random Forest, XGBoost
- App: Streamlit or Flask

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## **Data Collection**

- Used real-world data: [e.g., UCI Traffic Volume Dataset]
- Collected data points: date/time, weather conditions, traffic count
- Tools: CSV files, Pandas

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## **Data Preprocessing**

- Missing value treatment
  - Date/time conversion
  - Feature extraction (hour, day, season)
  - Normalization & Encoding
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## Model Building

- **Models tested:**
    - Linear Regression
    - Random Forest Regressor
    - XGBoost Regressor
  - Evaluation metrics: MAE, RMSE,  $R^2$  Score
  - Best Model: Random Forest ( $R^2 = 0.91$ )
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## Application Building

- Used Streamlit for UI
  - Real-time predictions with user input
  - Graphs and tables for traffic trends
  - Simple and interactive interface
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## Results

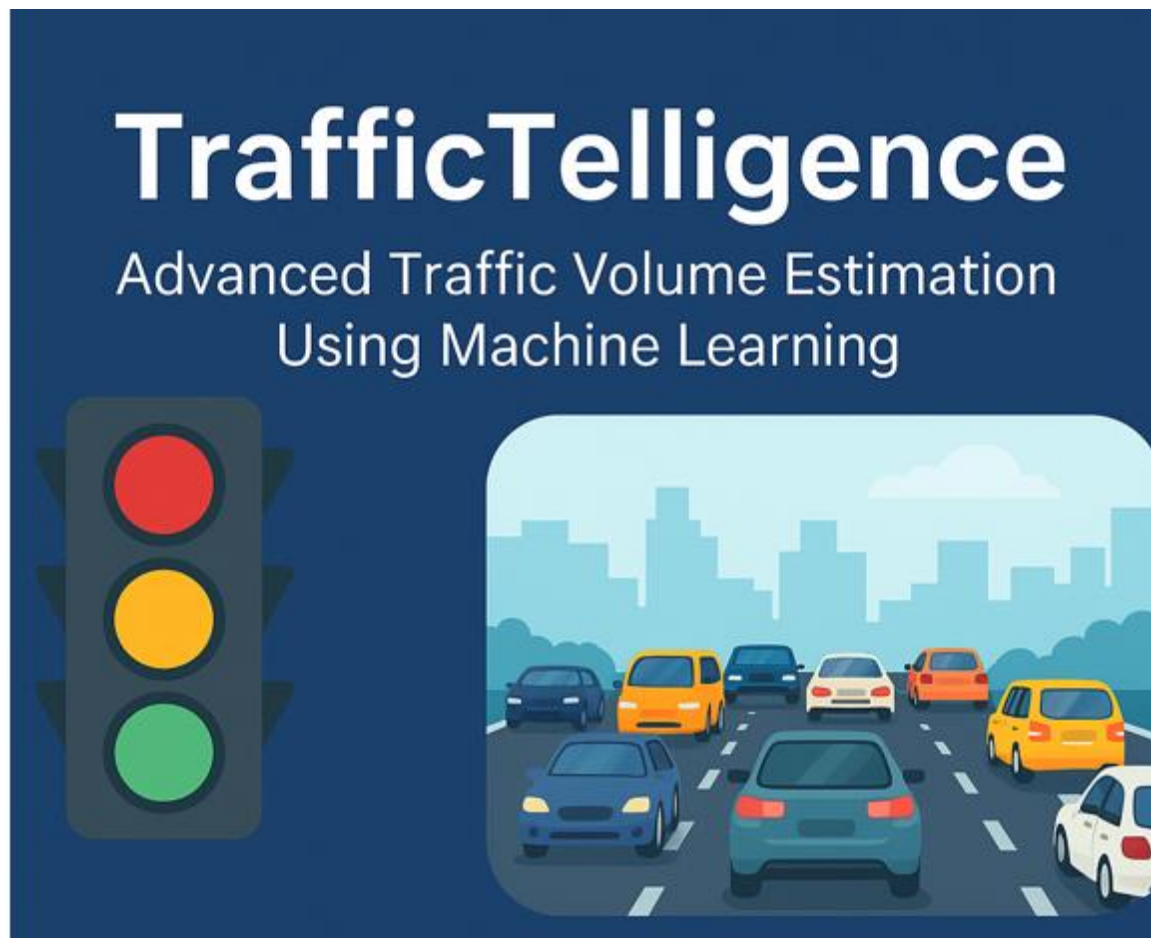
- Accurate traffic volume predictions
  - High performance under various conditions
  - Scalable and customizable solution
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## Future Scope

- Include live camera feeds (Computer Vision)
  - Integrate GPS data
  - Use Deep Learning for more accuracy
  - Mobile app version
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## Conclusion

- ML can improve urban traffic management
  - Accurate forecasting aids in decision making
  - This project demonstrates an end-to-end traffic volume predictor
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**Presented By :** C. Tejaswini

**Date :** 30-Jun-2025