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Engineering Rank Band (151-200)
Pharmacy Rank - 77
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Artificial Intelligence (AI101B)

Even Semester Session
2024-25

Traffic Light Control System

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Introduction

- Traffic congestion is a major urban challenge.
- Traditional traffic lights follow fixed time intervals, causing inefficiency.
- Machine Learning can dynamically adjust signal timing based on real-time traffic data.
- This project uses **Linear Regression** to optimize **green light duration**.

Objective

- Reduce waiting time and improve traffic flow efficiency.
- Minimize fuel wastage and emissions by decreasing idle time.
- Adapt signal timings based on vehicle count at intersections.
- Implement a **data-driven approach** for **smart traffic control**.

Methodology

1. Data Collection

- Dataset includes **Vehicle Count** and **Traffic Light Duration**.
- Stored in **CSV file (test.csv)**.

2. Data Preprocessing

- Data loaded using **Pandas**.
- Cleaning: Handling **missing values, outliers, normalization**.
- Split: **80% training, 20% testing**.

Model Development

- **Algorithm Used:** Linear Regression
- **Feature:** Vehicle Count
- **Target:** Traffic Light
- **DurationTraining Process:** Model learns the relationship between vehicle count and required light duration.
- **Prediction:** Generates optimal signal timing for real-time traffic conditions.

Model Evaluation

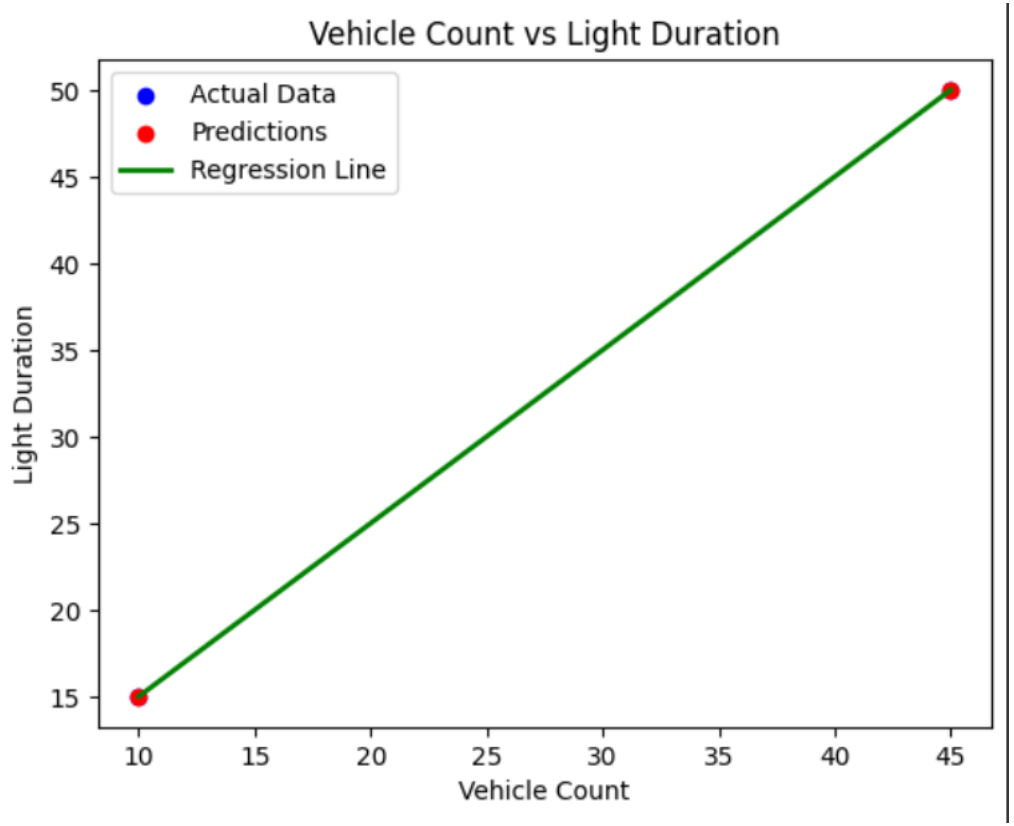
After training the Linear Regression model, its performance is evaluated using various metrics to measure accuracy and reliability.

- Performance Metrics
- Visual Evaluation
- Findings & Optimization

Code Implementation

Technologies Used:

- **Pandas** – Data handling
- **NumPy** – Numerical operations
- **Matplotlib** – Visualization
- **Scikit-learn** – Machine Learning



Future Enhancements

- Advanced Machine Learning Models
- Historical Data Analysis
- Multi-Lane Traffic Control
- Simulation & Visualization Improvements
- Cloud-Based Data Processing

Outcomes & Findings

- Traffic flow optimization achieved through machine learning-based signal control.
- Strong correlation found between vehicle count and signal duration.
- Predictive modeling helps estimate optimal green light duration in real time.
- Data-driven insights assist in reducing congestion and improving efficiency.
- Model evaluation metrics guide further improvements for better accuracy.

Conclusion

- Efficient traffic light management using machine learning.
- Reduces congestion, fuel consumption, and travel time.
- Scalable for smart cities and real-time traffic optimization.
- Future advancements can further enhance system accuracy and performance.

THANK YOU