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PROJECT:TRAFFIC FLOW OPTIMIZATION

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***PROJECT TITLE: TRAFFIC FLOW OPTIMIZATION***

Objective:

To design an intelligent traffic signal control system that dynamically adapts to real-time traffic conditions using AI, aiming to reduce congestion and improve vehicular flow at intersections.

Problem Statement:

Conventional traffic light systems operate on fixed time schedules, which are inefficient during variable traffic conditions. This leads to long wait times, increased fuel consumption, and traffic congestion. There is a pressing need for a system that adapts to real-time traffic conditions.

Proposed Solution:

Develop an AI-driven adaptive traffic light system using reinforcement learning that optimizes signal timing based on live traffic data collected from sensors or cameras.

Key Features:

1.Real-Time Data Collection:

- Use simulated traffic data or data from sensors (vehicle count, queue length).

2. AI Model:

- Implement a \*Reinforcement Learning\* model such as Deep Q-Network (DQN) to learn optimal signal timing policies.

- The model receives traffic states as input and outputs optimal light control actions.

3. Simulation Environment:- Simulate various traffic scenarios using SUMO (Simulation of Urban Mobility)or a custom Python simulation.

4. Performance Evaluation:

- Compare results with traditional fixed-time signal control.

- Metrics: average wait time, vehicle throughput, and stop frequency.

Tools & Technologies:

- Programming: Python

- AI Libraries: TensorFlow, Keras, or PyTorch

- Simulation: SUMO, TraCI interface

- Visualization: Matplotlib, Seaborn, or Dash for dashboard creation

Expected Outcomes:

- A trained AI model capable of managing traffic light signals adaptively.

- Demonstrated improvements in traffic efficiency through simulation.

- A scalable approach suitable for real-world smart traffic systems.