Automatic Road Monitoring System

Project Title: Adaptive Traffic Signal Control Using YOLOv8

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Introduction

- Background:
  - Urban areas are experiencing increased traffic congestion due to rapid urbanization and a surge in vehicle numbers.
- Need for Optimization:
  - Traditional traffic signal systems often operate on fixed timers, leading to inefficiencies.
  - There's a pressing need for intelligent traffic management systems to enhance traffic flow and reduce delays.

Problem Statement/POC

- Challenges with Fixed-Time Signals
- Inability to adapt to real-time traffic conditions.
- Increased waiting times and fuel consumption.

Methodology

- YOLOv8 for Vehicle Detection:
- Utilized YOLOv8, a state-of-the-art object detection model, for real-time vehicle identification.
- Adaptive Signal Timing
- Implemented algorithms to adjust signal durations based on detected vehicle density.

System Architecture

Components:

- Cameras positioned at intersections to capture live traffic footage.
- YOLOv8 model processes images to detect and count vehicles.
- Adaptive signal controller adjusts traffic light timings based on vehicle count.

Objective

Enhance Traffic Flow Efficiency

- Implement a real-time vehicle detection system using YOLOv8 to dynamically adjust traffic signal timings, thereby reducing congestion and improving overall traffic flow.

Reduce Environmental Impact

- Minimize vehicle idle times at intersections to decrease fuel consumption and lower greenhouse gas emissions, contributing to environmental sustainability.

Improve Road Safety

- Utilize accurate vehicle detection to prevent traffic bottlenecks and reduce the likelihood of accidents at intersections.

Develop a Scalable Traffic Management Solution

- Create an adaptive traffic control system that can be efficiently implemented across various urban intersections, accommodating different traffic patterns and volumes.

Future Scope

- Real-time Traffic Management using Traffic Camera’s
- Accuracy Enhancement
- Emergency Vehicle Priority
- Alert System for Sudden Activties
- Auto Switch to Defalut Timings in Case of Software or Hardware Failure

Results

- Detection Accuracy:
  - We achieved good accuracy in vehicle count detection using YOLOv8.
- Adaptive Timing:
  - Signal timings adjusted dynamically, leading to improved traffic flow.

THANK YOU !