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SMART TRAFFIC MANAGEMENT SYSTEM USING DEEP LEARNING

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Abstract:
Despite of more cars on the road, traffic congestion has become a regular problem. In large cities, excessive traffic congestion has increased significantly. This commonly happened at the primary junctions in the early morning, prior to the commencement of business hours, and during the late hours of the night, following the conclusion of business hours. The primary result of this is that drivers waste time. The biggest problem with sustainable transportation is dealing with traffic jams in busy road networks. Sometimes, even in the absence of traffic, people have to wait at particular intersections. Road users should wait for the light to turn green because it is red for the predetermined amount of time. Therefore, a traffic management system that can address traffic issues is required. A project called "smart traffic management system" addresses each of these issues. By measuring traffic density using real-time video processing techniques and providing dynamic time according to traffic scenarios, this research aims to develop a smart traffic control system. However, advanced methods using deep learning technology have shown promise in predicting traffic flow and improving decision-making for managing congestion. Deep learning has been successfully used in various fields to identify and prioritize important factors, making life easier for people.
Keywords: Traffic, YOLO algorithm, Deep Learning.

Introduction:

Over the past ten years, deep learning has made significant strides in solving complex real-world problems across various fields like healthcare, autonomous vehicles, business, and image processing. Unlike traditional algorithms that follow strict programming instructions, deep learning algorithms learn through trial and error, making them highly adaptable. Deep learning plays a crucial role in simplifying human problems, leading to widespread interest from governments and industries in integrating AI into their systems. These models excel in handling real-time conditions and have been extensively studied for traffic regulation tasks such as image segmentation and object detection. This particular study focuses on improving live traffic management near traffic signals by reducing waiting times based on vehicle counts the object detection used to detect the vehicles and prompt responses. The system plays vital role to swiftly making decisions and managing traffic. The goal of this project is to develop more efficient program that can adjust traffic flow based on the vehicles count data, ultimately enhancing overall traffic management. This endeavor aims to create a web application designed to address issues related to "Traffic Congestion". The User Interface is developed by using Python-Flask as frontend technology, MySQL as backend technology. The software is easy to use and access the information and make it suitable for individuals with basic computer skills, thereby earning the designation of being user friendly.

Literature Survey:

This paper introduces a new way to guide vehicles called anticipatory vehicle routing, which aims to prevent traffic jams before they happen. Unlike traditional systems that can only react to congestion, this approach uses traffic forecast information to plan routes. It's based on a decentralized method using multiagent systems inspired by how ants work together. In this system, agents act like ants exploring the environment for congestion forecasts, allowing vehicles to change routes accordingly. The approach was tested against three other routing methods in a simulated real-world traffic scenario. The results showed significant improvement over the most advanced existing strategy, which relies on traffic message channels for routing.

Moreover, the application is designed to operate seamlessly on live CCTV footage, enabling real-time traffic monitoring and control. By continuously analyzing incoming video streams, the system can adaptively regulate traffic signal timings, responding to fluctuations in traffic density and vehicle types. Deep learning algorithms, coupled with object detection methods, facilitate accurate vehicle identification and counting in real-time.

Conclusion:

In conclusion, the implementation of a Smart Traffic Management System using Deep Learning marks a significant advancement in traffic control technology. By harnessing the power of deep learning algorithms, this system offers dynamic and adaptive solutions to traffic congestion challenges. In this study, vehicles are classified into distinct categories including cars, trucks, bikes, and buses using our proprietary dataset comprising labeled images. This classification and object detection model holds potential applications in traffic monitoring, vehicle recognition, and related fields. By accurately detecting the number of vehicles, we have integrated this information into a timing allocation scheme. The system is built in a user-friendly environment using Flask with Python programming. Additionally, the system may gather images from users to optimize traffic flow in lanes with the highest vehicle count. Ultimately, this application results in the development of a traffic congestion management system.

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