

Image & video processing, analysis of traffic signal areas using deep learning, AI Models

ABSTRACT:

In any part of our life, each of us has encountered high-priority vehicles like *ambulances*, *fire engines*, and police vehicles waiting during their time of emergency. We have also experienced waiting for *90 seconds* at traffic signal lanes even if the other lanes are empty. We can save significant time and *prioritize* vehicles at traffic signals by analysing and executing better algorithms with the help of video processing and AI models. The main motto of this project is to eliminate the excess time and prioritize the vehicles at the traffic signals. This can be achieved by training deep learning models. Firstly, the models will analyse the density of the vehicles at each lane of traffic areas. Additionally, the models will identify high priority vehicles such as ambulances and fire engines.

Based on the density of vehicles, the models will then assign time to each lane, ensuring the time assigned is within the range of 5 to 120 seconds. Furthermore, to facilitate the movement of high priority vehicles, the models will direct traffic junctions to display lane directions, making the lane free for these vehicles. The tools and equipment required for this project include data sets of traffic signal areas and high-priority vehicles, CCTV access, AI and deep learning models, video and image processing tools, and an IDE compatible with training and testing *AI models*. Edge computing devices can be used to process data locally and provide real-time responses. Finally, traffic signal control systems need to be integrated with the AI models to dynamically adjust signal timings based on real-time traffic conditions and the presence of highpriority vehicles. By implementing advanced AI and deep learning models for traffic signal management, we can significantly reduce the waiting time at traffic signals and ensure the swift movement of high priority vehicles. This approach not only optimizes the overall traffic flow but also enhances emergency response times, ultimately contributing to improved public *safety* and *efficiency*. The integration of video and image processing technologies allows for real-time analysis and decision making, making our traffic systems smarter and more responsive to varying conditions.

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