SYNOPSIS

PROBLEMSTATEMENT

Traffic Management System

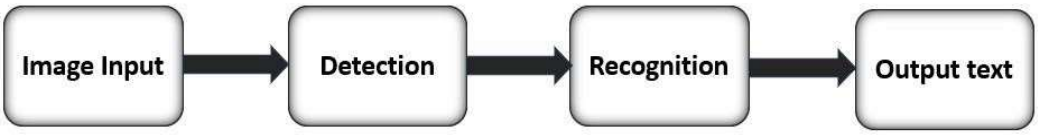
Our system consists of Traffic Sign Recognition (TSR) which involves detecting and locating traffic signs in real-time and utilize image processing techniques to preprocess input images and extract relevant features for detection, and Emergency Vehicle Detection focuses on detecting ambulance in the traffic which will be used to make the traffic clear for emergency vehicle preemption.

APPROACH

The proposed methodologies for traffic management sound promising and can contribute significantly to improving traffic flow, safety, and emergency response times. Here's how each methodology can be utilized:

1. Traffic Sign Detection:

The TSR module preprocesses input images, extracts relevant features, and applies a trained CNN model to classify and interpret various traffic signs.



We have constructed a model utilizing Convolutional Neural Networks (CNN) in Python, employing the Adam optimizer. The development process involves several key steps: importing requisite classes, importing image data, data splitting, preprocessing, and data augmentation.

To mitigate overfitting, we have implemented dropout layers strategically throughout the model. The sequence of operations includes initializing a Sequential model, incorporating convolutional layers, flattening the data, and introducing dense layers for comprehensive learning. Additionally, we have included an accuracy curve to monitor the model's performance.

Upon completion of the model construction, it is crucial to save the model for future use. This ensures that the trained model can be deployed or further evaluated as needed. This comprehensive approach to model development adheres to best practices in machine learning and neural network design, promoting robustness and effectiveness.

2.Vehicle Detection:

We implemented a real-time object detection and tracking system using the YOLO (You Only Look Once) model, OpenCV, PyTesseract. The program reads frames from a video stream, applies YOLO object detection to identify vehicles, and utilizes SORT to track these vehicles across frames. The system dynamically updates the labels of detected vehicles based on PyTesseract text. Specifically, if the process identifies the text "AMBULANCE" associated with a vehicle, the label for that vehicle is set to "ambulance." The implementation showcases a robust approach for real-time vehicle detection, tracking, and label updating in a video stream

BENEFITS

Our project Traffic Management System has various benefits.

Improved Driver Awareness: Prompt detection of traffic signs can enhance driver awareness, reducing the likelihood of violations.

Automated Systems: Integration with traffic control systems can automate responses to detected signs, such as adjusting traffic light timings.

Traffic Signal Control: Adjust traffic signal timings based on the detected signs (e.g., stop signs, yield signs).

Speed Limit Enforcement: Notify drivers when they exceed speed limits through detection of speed limit signs.

Emergency Vehicle Priority: Give priority to emergency vehicles by adjusting traffic signals and creating clear paths for them.

Reduced Congestion: Efficiently manage traffic flow by adapting to the presence of vehicles and responding to emergencies.

Emergency Response Optimization: Quickly identify and respond to emergency situations by dynamically adjusting traffic conditions.

Traffic Flow Management: Optimize traffic flow by adapting signal timings based on real-time vehicle detection.

Emergency Route Planning: Optimize routes for emergency vehicles based on real-time traffic conditions and detected signs.

CONCLUSION

The Smart Traffic Management System using Machine Learning aims to revolutionize urban traffic control by leveraging advanced algorithms and realtime data analysis. The system integrates predictive modelling, anomaly detection, and optimized traffic light control to enhance overall traffic flow and responsiveness. The project also incorporates dynamic route planning, utilizing real-time traffic information to suggest optimal routes for drivers. Supported by

computer vision algorithms, enhances the system's ability to monitor and respond to traffic events, such as accidents or congestion.

It enhances road safety by automatically detecting and interpreting traffic signs, alerting drivers to adhere to speed limits, stop signs, and other regulatory signs. It supports traffic management systems by collecting data on traffic signs, contributing to traffic flow optimization and monitoring. It plays a role in reducing accidents caused by human error or oversight, as the system can provide timely warnings and reminders to drivers.

Links:

Code and Dataset –

https://drive.google.com/file/d/1w0AHtOspA8-HFbE3ZnDH2G3ydDDDIhtn/view?usp=drive_link

Documentation –

https://drive.google.com/file/d/1111jMVeWM01LVeF38cGNdCVKnwxOh-Zn/view?usp=drive_link

PPT-

https://docs.google.com/presentation/d/1w7Md2fTSg4U0oudAMB3XAr6yDOx3W4kL/edit?usp=drive_link