Smart Traffic Management System

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Abstract

In many cities around India and other nations, traffic congestion is a serious issue. Traffic congestion is a result of signal failure, ineffective law enforcement, and inadequate traffic management. One of the main issues with Indian cities is that the existing infrastructure cannot be expanded further, leaving better traffic management as the sole solution. Constant traffic has a detrimental effect on the economy, the environment, and everyone's quality of life. Therefore, it is imperative that the traffic congestion issue be managed adequately. There are numerous techniques for managing traffic, including wireless sensor networks, inductive loop detection, infrared sensors, video data processing, and ultrasonic sensors.In order to gather, process, and store real-time traffic data for such a scenario, this research suggests an AI-based system paradigm. The goal is to increase mobility by using roadside messaging devices to deliver real-time traffic reports on traffic congestion and unexpected traffic events. To minimise excessive traffic flow by allowing a significant number of vehicles to cross the traffic light, an intelligent AI-based traffic signal monitoring system using smart algorithms becomes essential.

Keywords : Traffic congestion, AI-based system, Traffic management, real-time traffic ,traffic flow.

INTRODUCTION

Vehicle utilisation has skyrocketed globally over time. As a result, the flow of traffic on the roads has become confusing and chaotic. Currently, urban areas are facing a serious problem with traffic congestion that is causing quality of life to decline, economic losses, and environmental degradation. The ineffective working of traffic signals is one of the primary causes of traffic congestion. Traditional traffic signal systems frequently have fixed signal timings that do not change to accommodate shifting traffic patterns or react to real-time circumstances.

As a result, traffic signals frequently perform below optimum, causing delays, gridlock, and aggravation for motorists. It covers a significant problem that metropolitan areas face and offers information about the potential advantages of adopting cutting-edge technologies in traffic signal operations. By offering recommendations for enhancing traffic flow and easing congestion based on solid evidence, the results of this study can benefit the area of transportation engineering.

This Management system leads toward smooth management of traffic over a signals. The lane whose having the more vehicles are preffered first to go. Here we overcome the pre-defined timing of signal and give preference to the lane having more traffic than other lane. This project is aims to contribute to the field of transportation engineering by investigating the effectiveness of an intelligent traffic management system for traffic signals.

REQUIREMENTS

Software Requirements:

Visual studio code: -

It is used to develop computer programs including websites, web apps, web services and mobile apps. Visual Studio empowers you to complete the entire development cycle in one place. For example, you can edit, debug, test, version control, and deploy to the cloud. With the diversity of features and languages in Visual Studio, you can grow from writing your first piece of code to developing in multiple project types.

Hardware Requirements:

RAM:-

8GB RAM is recommended.

Processor:-

Minimum i5 Processor with 10th Generation is recommended.

Operating System:-

Windows 8 or more.

EXISTING SYSTEM

A predefined timing-based system is one type of traffic management that is currently in use. In this type of system, city planners or traffic engineers establish specified timings for the operation of traffic signals. Using this system, traffic lights at junctions alternate between red, yellow, and green at predetermined intervals, independent of the volume of traffic on the road at the moment.Traffic signal timings in this system are often determined using assessments of road capacity, traffic patterns, and historical traffic data. For instance, during peak hours, secondary roads with lighter traffic can receive shorter green signal periods whereas the main road might receive longer green signal times.This system's drawback is that it cannot adjust in real-time to changes in traffic patterns or unanticipated events like accidents or road closures. Inefficient traffic flow, congestion, and delays may result from this, particularly in uncertain circumstances. Another existing system for traffic management is the traditional approach of traffic police handling the traffic manually at intersections. At major crossroads, traffic police officers are posted to control traffic using hand signals or manually operating traffic signals. They base their choices on their judgement, knowledge, and observations of the actualtraffic conditions. Although this approach offers considerable flexibility in controlling traffic flow based on current circumstances, it can also have drawbacks. It mainly relies on the decision-making and judgement abilities of traffic police officers, which can vary based on their background and education. Deploying traffic police personnel at every intersection can also be time-consuming and expensive, especially in big cities with plenty of traffic.In conclusion, systems with predetermined timing and human control by traffic police are two types of traffic management systems now in use. Despite the fact that these systems are extensively employed, they have some limitations when it comes to adjusting to changes in traffic circumstances that occur in real time and may not always produce the best traffic flow. To get over these restrictions and boost traffic management effectiveness, newer technologies are being developed, such as intelligent traffic management systems that make use of real-time data, advanced analytics,
and automation.

PROPOSED SYSTEM

The proposed traffic management system utilizes cameras to count the number of vehicles on different lanes of a road or intersection. Through the use of cameras, the system collects real-time data that is fed into a central management system, which then analyses it to help control traffic flow effectively. The following stages describe how the system works: The number of vehicles travelling through each lane is recorded via cameras placed at key intersections or spots along the road. The central management system receives the data for analysis. To calculate how many vehicles are in each lane, the central management system examines the information from the cameras. It determines which lane has the most traffic and prioritises that lane as the preferred lane for managing traffic flow.

The traffic management system makes judgements to optimise traffic flow based on the analysis. It has the ability to dynamically alter traffic signal timings such that the lane with the most vehicles receives preference and greater green signal time than other lanes. By doing so, traffic congestion is lessened and overall traffic flow efficiency is increased. The system continuously monitors the traffic situation through the cameras in real-time and updates the traffic signa timings accordingly.

Additionally, it notifies traffic controllers of any anomalies or issues, allowing them to respond appropriately. The proposed traffic management system based on vehicle counting through cameras offers several benefits. By giving priority to lanes with more traffic, it improves traffic flow and cuts down on congestion and travel time. By detecting and controlling traffic issues in real-time, it also improves safety. To help traffic authorities plan for the future and enhance their traffic management techniques, the system delivers useful data for analysis.

I. FLOWCHART

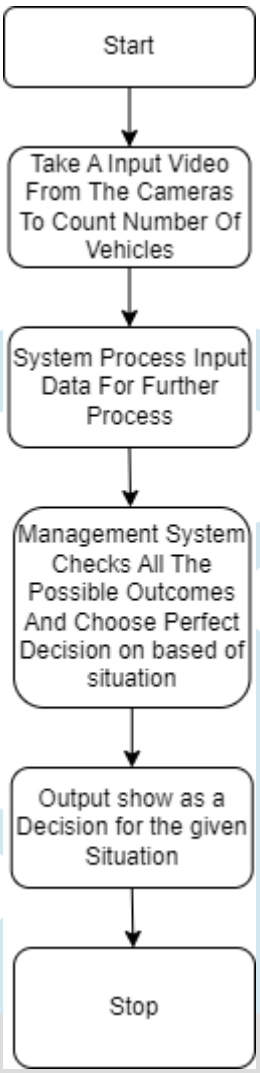


Fig.1. System Flowchart

II. ALGORITHM

OpenCV (Open Source Computer Vision) is an open-source computer vision and machine learning software library that provides tools and algorithms for analyzing, processing, and manipulating images and videos in real-time. It was first released in 2000 and has since become one of the most popular computer vision libraries in the world.

OpenCV It looks at the image and analyses it to look for automobiles as well as other characteristics like lanes, footpaths, road signs, and pedestrians. Model The SVM model is trained to identify vehicles, classify them, and determine whether or not there is traffic.

III. FUTURE SCOPE

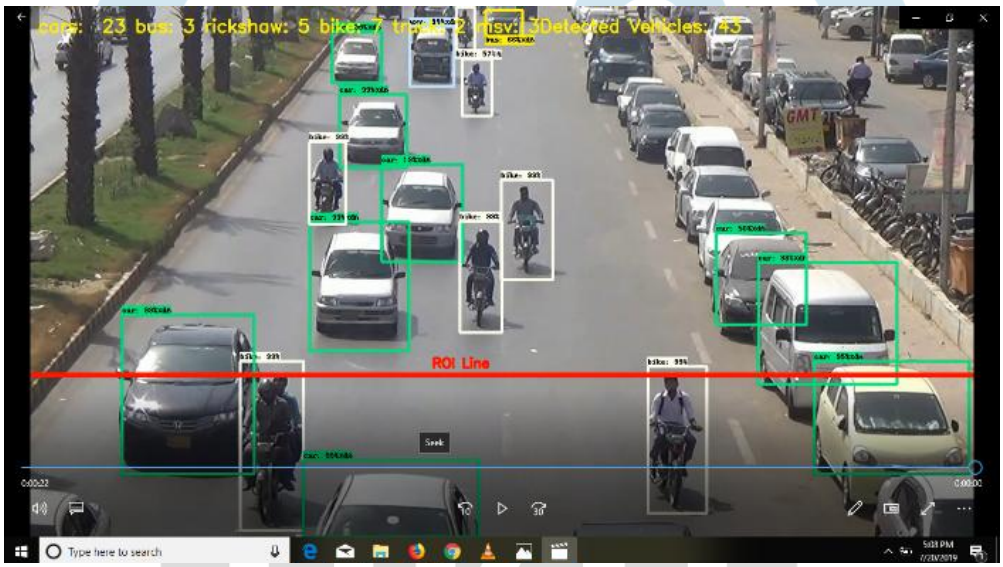
- time traffic monitoring and analysis: With the help of sensors, cameras, and other data collection devices, traffic management systems can provide real-time insights into traffic patterns, congestion, and accidents.
- Connected and autonomous vehicles: As connected and autonomous vehicles become more prevalent, traffic management systems will need to adapt to accommodate these new modes of transportation.
- Smart city initiatives: Traffic management systems can play a key role in smart city initiatives, which seek to improve the quality of life for urban residents through the use of technology.

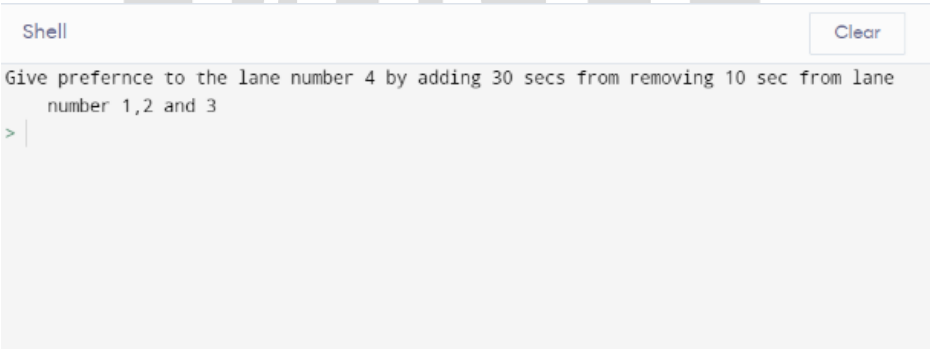
- By integrating with other smart city systems, such as energy management and waste management, traffic management systems can help cities become

IV. CONCLUSION

In order to address the growing problems of traffic congestion and enhance road safety, an effective traffic management system with intelligent signal control is essential. Traffic signals can be optimised to respond to changing traffic conditions by utilising cutting-edge technology like AI, computer vision, and real-time data processing, which will enhance traffic flow and decrease congestion.These traffic management programmes provide advantages for minimising greenhouse gas emissions, fuel consumption, and overall transportation efficiency. These systems can aid in creating a more sustainable transport ecology by easing traffic congestion and flow.In summary, an intelligent traffic management system with optimised signal control that makes use of cutting-edge technologies like AI and real-time data analysis has the potential to significantly improve traffic flow, relieve congestion, increase road safety, and contribute to a more sustainable and effective transportation system. Traffic management systems are anticipated to become even more advanced with ongoing technological developments, enabling improved traffic control and enhancing the overall experience of road users.

V. EXPERIMENTAL RESULTS





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Shell                                                    Clear
Give prefernce to the lane number 1 and 2 by 10 sec each by removing timming from lane
    number 3 and 4 by 10 sec
>
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REFERENCE

1. Rijurekha Sen, Bhaskaran Raman, Intelligent Transport Systems for Indian Cities.
2. Ashish Jain, Manisha Mittal, Harish Verma, and Amrita rai
3. Chandrasekhar.M, Saikrishna.C, Chakradhar.B, phaneendra kumar.p, sasanka.c,Traffic Control Using Digital Image Processing, International Journal of Advanced Electrical and Electronics Engineering ISSN 2278-8948, 2, May 2013.
4. "Intelligent Transportation Systems" by Washington State Department of Transportation
5. "Traffic Management System" by Siemens Mobility