

# Traffic Control Using Image Processing

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Date of Submission: 01-03-2023

Date of Acceptance: 10-03-2023

**ABSTRACT** –Traffic congestion on the Indian road network has increased over the past few years. We have a lot of issues to deal with in modern life. One of these is how daily traffic congestion is getting worse. An effective management system is required since key crossroads frequently experience traffic congestion. The primary reason for traffic congestion is the increase in the number of vehicles. Traffic congestion is mostly brought on by the large number of cars on the road, which is a result of population growth and economic expansion. Traffic congestion has several negative effects: Wasting the time of motorists and passengers ("opportunity cost"). Congestion is a non-productive activity for the majority of people, which harms the regional economy. Traffic congestion affects travel costs, travel time, mobility, accessibility, productivity, and environmental impacts such as air pollution and global warming. The existing traffic control works on a fixed time base technique and the manpower needed for traffic control is increasing rapidly. Thus, for controlling traffic and reducing the time spent on signals we use image processing for traffic control. This will help in reducing traffic congestion.

## I. INTRODUCTION

The logistic system of any nation is maintained by its roadways. The main form of transportation is them. Humans can visit many locations thanks to roads. In India, many different kinds of roadways meet peoples' demands for transportation. For instance, the construction of roads enables quick and secure transportation between significant cities. Conversely, highways are constructed to link two or more cities. Farmlands and cities are connected by a variety of roadways in the country's rural sections. In general, different roads kinds are built inside a nation according to particular relevance and requirements. Roads play a significant role in India's economic development and progress in addition to transportation. They actively provide

significant social advantages to the nation, making them crucial for a country's growth and development.

Highways, which have become a key economic driver, are essential to a country's successful economy. The development of India depends on its road system. The industry contributes to Indian GDP more than 3.6% or two-thirds of transport-related GDP. Most Indian passenger face traffic and more than 65% are on the roads. With a total length of 5.5 million kilometers. India boasts one of the greatest road networks in the world. The nation's road network is used by 90% of all passengers traveling in India, and it also handles 64.5% of all goods and commodities that are shipped there. There are several methods of managing traffic. One such way is by using image processing.

The process of turning a captured image into a digital image, which can be saved anywhere and used to extract any information from it, is known as image processing. As a picture is processed, all of the items are seen as 2D objects. Any image may be improved using the image processing technique.

## II. LITERATURE SURVEY

This paper specifies the intelligent transport system (ITS), which is the method through which we can obtain smart and advanced solutions for avoiding traffic congestion. In this method, we come across the concept of the YOLO algorithm. In this algorithm, all the vehicle size data are determined and fed through the neural network for vehicle recognition. The vehicles are divided into big, medium, and small vehicles so then the timer is set for each vehicle and after determining the number of vehicles on the road the timer is set for each category of the vehicle. This way we can create a smart city with image processing. [3]

Traffic can be controlled using a density-based control method which uses MATLAB for image processing and various MATLAB algorithms.

In this method, the webcam will capture the image from all the lanes on the roads and send the image to the MATLAB software in the system for image processing. After the image is processed, a microcontroller is used to check the density of all the lanes and allocate timing to traffic signals based on the density of the lane. The same method can be used in our project to find the number of vehicles in the lane by using MATLAB for image processing and avoid wastage of time during green lights on empty roads.[5]

In this work, we use the webcam to capture the images on the road then after the images are captured, they are sent to MATLAB for image processing. In this paper, they have used MATLAB for the image processing, image enhancement, and edge detection of the object in the image. After the webcam captures the images, all this data is extracted and sent to the traffic light for changing the time light according to the density of vehicles on the captured images. The webcam can be installed on the traffic light and they have used the Arduino program to perform the operations on the dc motor for spin control, speed, and direction to control the traffic lights based on the number of vehicles.[2]

For better use of the roads, ongoing monitoring is required for automatic traffic. The use of additional vehicles on the roads as a result of population growth is the main cause of traffic. A sophisticated traffic control system that operates on real-time data and makes decisions accordingly is required to effectively manage traffic. For traffic control, a variety of techniques are available, including the use of sensors and loop detectors. Among these techniques, image processing is the best since it continuously processes data which is updated accordingly then it produces precise results that assist in restricting the traffic signal according to the number of vehicles. An image of the lane is taken using a web camera, and the image is then processed through five steps—RGB to grey conversion, photo scaling, photo enhancement, canny edge detection, and photo matching—before being saved. In this system, a camera takes a picture of an empty lane as a learning image and uses the matching image approach to assign time. Image processing methods are used to calculate the number of vehicles. The amount of green time is assigned based on the number of vehicles. Image recognition is one modern method for spotting ambulances. Based on color segmentation. The ambulance has red and blue lights on top to help to detect it from far away. When ambulance distance is less than the specific threshold value, it looks for red and blue lines in the same line. If both lights are in the same line, then it will identify it as an ambulance. Edge detection has many

methods, which include canny edge, Sobel, Robert, and LOG, among others. In compare to all edge detection methods, canny edge detection produces better output than other methods.[1]



Fig: Captured image



Fig: Canny edge detection

### III. PROPOSED SYSTEM

The proposed system is mainly used for reducing the time being wasted on empty lanes during a green light. This system is executed using MATLAB. The entire system is built around image-matching data. The Image Matching Information section compares reference pictures and gathered images and calculates the percentage of matching between them using Image Processing Techniques in MATLAB. The Traffic Light and Timer Allocation systems are used in the Time Allocation segment. In the image processing method, there are 5 main steps

1. Image acquisition
2. RGB to greyscale conversion
3. Image enhancement
4. Edge detection
5. Percentage matching

a) Image Acquisition:

To create a digital image, we must extract the image from a source that has been acquired.

b) RGB to Grayscale Conversion:

The RGB photos are transformed into grayscale for precise Edge Detection results.

c) Image Enhancement:

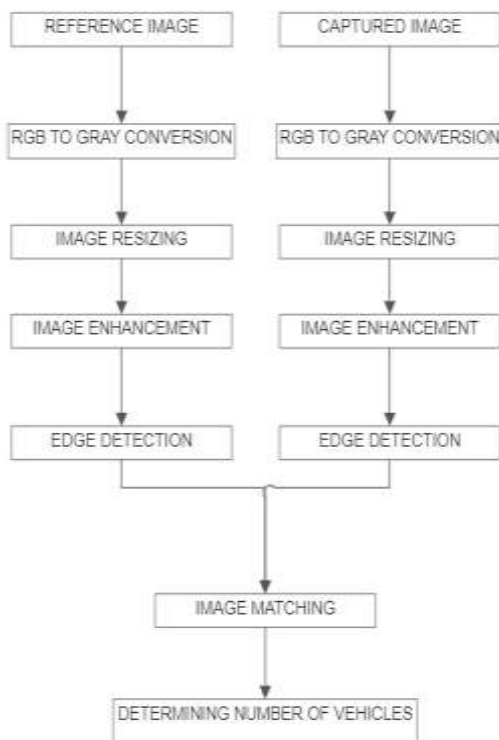
We must reduce image blurring if we want to increase image quality. Image enhancement is the procedure involved in this.

d) Edge Detection:

It is a method of processing photos that identify the edges of things. Here, we are utilizing a Canny Edge Detector to locate the boundaries of the automobiles.

e) Percentage Matching:

It is the procedure used to pair together two edge-detected pictures one is the reference and the other is the acquired image. The Canny operator was used for reference and captured pictures. After that, a pixel-by-pixel comparison of the two photos would provide matching information that would determine when the green light should turn on.



#### IV. CONCLUSION

Traffic control using image processing is a method used to control traffic on road junctions. Controlling traffic can be done in many ways such as using manual labor, time-based signals, image processing, and sensors. This System is proposed to deal with the increasing rate of traffic. In smart cities, traffic congestion, pollutants, and noise pollution have increased due to a constant rise in vehicle kinds, ineffective management of traffic, and technical issues with traffic signal control equipment.

Traffic leads to a lot of problems like wastage of time. To control, the flow of traffic, an up-to-date traffic management system with the real world is offered. The Canny Edge detection strategy, an image processing technique, is used to compute the matching using a processing tool for the digital image in MATLAB. The suggested approach can also prevent idling at green lights on deserted highways.

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