Density Based Traffic Control System withConvolutional Neural Network

Mrunali R. Saple, Tejaswini M. Jadhav, Saurabh Y. Kode and Gargi

Phadke Department of Instrumentation Engineering, Ramrao Adik

Institute of Technology, Nerul, Navi Mumbai.

Abstract: - We present a real-time traffic flow controller structure that can keep traffic under control using image processing techniques. In this way, a camera is used in every section of the robot to take pictures of the traffic where traffic jams will appear. The number of vehicles in these images is designed using image processing tools. In the proposed image, green and red signals are represented using LEDs and the diminished green signal supervisor is signified by a specific presentation.

Keywords: - Real time, Traffic Light Control, Vehicle Count

I. INTRODUCTION

Traffic congestion has been a huge problem all around the world. Obstruction senses the delays in worker productivity, trading opportunities, and delays in delivery. Transportation which is current technologies use a hands-on operating system during distribution and require high adjustment during operation. Time ceasing and vehicular traffic increased due to this. The system proposed makes the traffic low and permit the transport built on the density of the lane. This project aims for lowering the traffic flow in the zone wherever the high density of vehicles by using R-pi operating system and Image Processing. Traffic congestion is a very common and increasing problem in upgrading areas, in fact it is constantly evolving gradually environment creates it challenging to catch wherever circulation congestion is in real time, in order to plan restored transportation indication mechanism and efficient traffic flow routes. The source of this could be various conditions such as traffic congestion such as inadequate lane width, road surroundings because of weather, unrestricted claim, and significant red signal delays etc. Although inadequate volume and unrestricted response are related anyplace, light delays have a strong code and are independent on traffic. Indeed, physical control should, therefore, to decrease human potential, the necessity to emulate and advance road traffic control in order to meet the growing demand. Surveillance and safety in image processing is the latest in a series, which is commonly used in vehicle and transportation control with navigation data. The traffic flow congestion resolution is been determined using Image Processing.

II. EXISTING SYSTEM

In existing system, traffic density Monitoring using Raspberry Pi and Open CV. The robots used in India basically have a pre-existing period when the time for each route to have a green signal is adjusted. In four lanes the traffic signal one lane is given a green signal at a time. Thus, the robot allows cars of all directions to pass in a straight line. Therefore, traffic can be either continuous or vertical or rotated by 90 degrees. So even though the traffic congestion on a particular route is very low, it should wait unnecessarily and if it gets an unnecessary green signal, it makes some routes wait even longer with some of the strategies we use. We suggest a method that can be used to control traffic flow using image processing. In line with traffic congestion on all roads, our ideal will intelligently allot green light interval on each road. We selected image processing to calculate traffic congestion as cameras are inexpensive than other procedures like sensors. The planned idea is designed as monitors: We have a Raspberry Pi linked to 4 groups of LEDs representing robots. It is a method of observing traffic congestion on every side and changing the signal rendering to the traffic congestion so it is very beneficial to control traffic.

III. LITERATURE SURVEY

This system proposed is to make some improvement in traffic system that depends on high traffic load. We hear, detecting traffic obstruction using Raspberry-pi, using the python.in libraries. Based on their density the trails priority is maintained. The obstruction calculation algorithm depends on real-time live video frame with citation image and by having cars in the preferred location. In order to

control the traffic signal intelligently the traffic congestion can be compared to the other lane. Recently Monitoring and Video surveillance are used for traffic management. To test traffic congestion using image processing a lot of redesigning is done. Various factors like rain; fog and so on is required by these methods for good image with good quality. Various car icons such as radar, ultrasonic, and microwave detector increase the authenticity. Partly, sensors can be expensive, low power, high maintenance, confusing to use and costly to repair. Metal barriers along the road side can affect the radar sensors. During monitoring the field and controlling traffic sensors like Passive acoustic detector array, high temperature, Photosensitive, inductive loop detector, magnetic detector, are used. These sensors have less accuracy. The traffic obstruction that occurs in city areas that cannot be effectively maintained using the endured system of stable signals. When traffic blockage grows beyond the limit on a particular road, it requires the duration of the green signal to lower the traffic. A complication with the lights system is that the timing variable is adjusted in software and as a result valuable time is wasted even if the opposite path is empty.

The goal of resolving signal time control is to determine the sequence of the phase and the length of every part. To explain this problem, formal information labeling the connections of an objective net, traffic information including circulation appeal and rotating vehicle activities, and limitations related to transportation indication constituents are measured. This information is managed according to the ideal design.

IV. PROPOSED SYSTEM

The proposed system main objective is to make the traffic signal more systematic and attainable. So, the traffic is reduced and time gets utilized. The proposed system will be density based so that it will give priority to the lane which has fairly a larger number of vehicles. For evaluating the density Image Processing is used. For Processing Raspberry Pi will be used. Images will be obtained by using the data set. Images obtained will go through steps of image Processing. Then, the differences will be compared and consideration will be assigned.

A. Image Acquisition from Data-Set: An image is taken from the data set of images of road having various amount of vehicle density. Images from the data-set demonstrate the real-time images of traffic.

B. Image Pre-Processing: Pre-processing is basically used for removing unwanted noise and objects from image. The following are the steps that are to be taken in this phase:

Step 1: The first step in which the RGB image is converted into greyscale image for improving performance is Greyscale Conversion. The grey color image consists of pixel intensities between 0-255 where 0 signifies black pixel and 255 signifies white pixel.

Step 2: The greyscale image into the binary image by Threshold. If pixel value is higher than a threshold value it is given one value (white), else it is given the other one (black).

C. Image Processing: This phase aims to serve the processing part on the pre-processed image. Steps taken are as follows: Discontinuities in image are detected by edge detection. Canny Edge Detection algorithm detects all the edges in the image. It provides:

a. Noise Reduction b. Finding Intensity Gradient

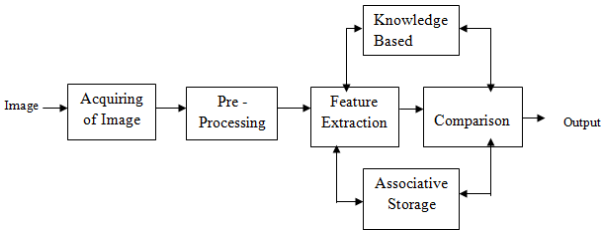

Fig.1 Block Diagram for Image Processing.

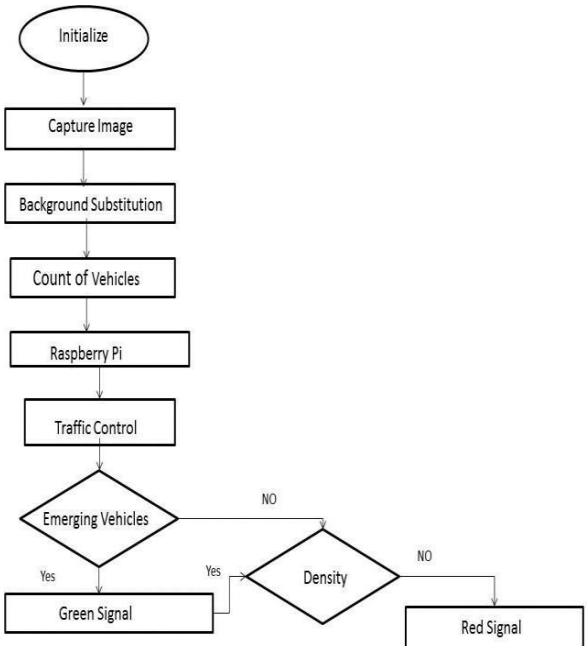

Fig. 2 Density based Control system Block Diagram.

V. IMPLEMENTATION

A. Design Procedure

Raspberry pi, Image Processing using Python and object detection algorithm are used to design this system. To convert raw images to accessible form Image Processing is used. The Raspberry Pi is a main constituent used to switch everything; it acts as a controller. Traffic flow is captured by using the pi camera and this information is received by computer. The computer is connected to the Raspberry pi to perform a hardware launch where it controls the traffic signal using a traffic control system. Crossing the road in the middle of a red light, it will hurt the nails that are attached to the motor. Traffic light-based traffic control system produces and decreases traffic congestion in city areas, time consuming because of traffic congestion.

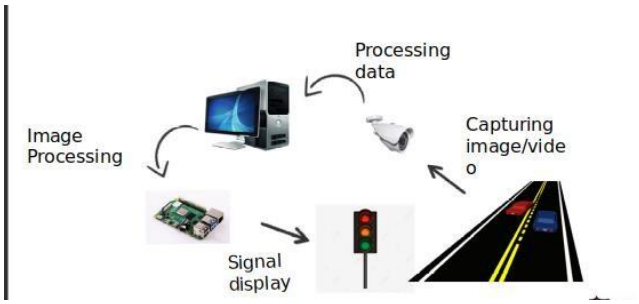

Fig.3 Block Diagram for Density Based Traffic Control Using CNN.

B. Image Segmentation: Image Segmentation helps to gain the region of interest (ROI) from the spitting image. The process of separating an image into different areas is called Image Segmentation. Image Objects are parts in which images are divided. Image segmentation is based on the properties like similarity, discontinuity, etc. Image Segmentation goals to simplify the image for better analysis. It is also the procedure of allocating labels to each pixel in an image. In Machine Learning Image Segmentation is used widely.

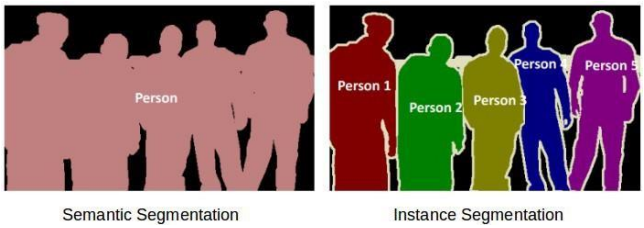

Fig.4 Image Segmentation

C. Image Classification: The process of classifying and classification groups of pixels or vectors inside an image built on certain instructions is image classification. The Separation Act can be designed using one or more spectral elements of text. The two most common methods of classification are 'supervised' and 'unsupervised'.

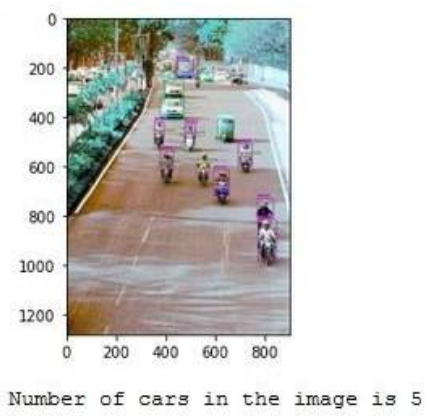

Fig. 5 Image Classification

A. RESULTS AND DISCUSSION

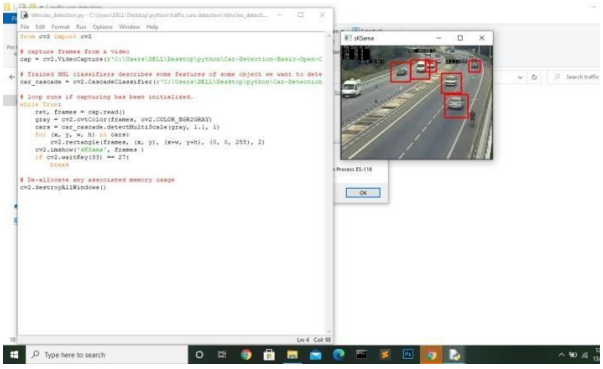

Fig. 6 Output form the image detection

Fig. 6 represent is a new vehicle acquisition and removal system for traffic rentals. Locating moving objects present in complex lanes are involved in this system.

The system implements an advanced background subtraction methodology. The algorithm proposed recreates a background event as needed under any traffic conditions.

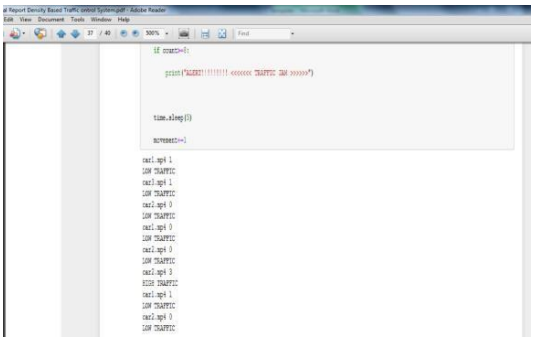

Fig. 7 Video Output

Fig. 7 shows the representation of the output taken from the audiovisual. This indicates the amount of cars existing in the space. It gives the respected signal according to the count of the vehicle.

Output Accuracy:

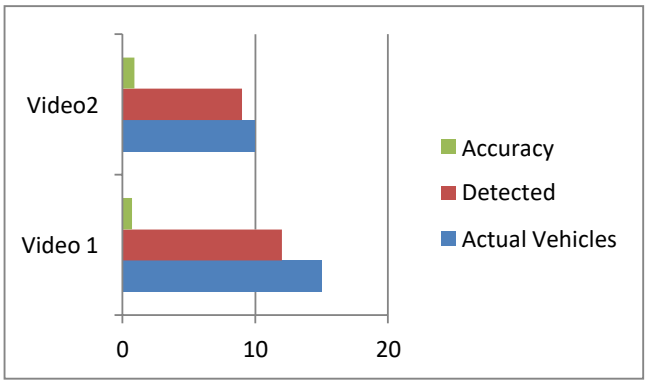

Fig. 8 Accuracy Chart

B. LIMITATIONS

1. Open CV is less flexible compared to MATLAB.
2. Raspberry Pi uses limited amount of memory.
3. In the present system, normal traffic light time is allocated to all the predetermined, defined and modified road routes.

C. FUTURE SCOPE

1. Future work may include a future where we can monitor signals and status can be updated on the server.
2. This will help in the future indicator of producing traffic congestion patterns according specific dates, holidays, time,
Etc.
3. It can also be used prioritize emergency vehicles separated by noise at the top.
4. This may provide a very important feature for ambulances, firefighters, etc.

D. CONCLUSION

We have designed a traffic density measurement control system using Raspberry pi, camera module, and image processing according to traffic congestion in urban areas. The camera module is mounted at the high end of the track. The number of vehicles on the street is given; traffic should be controlled by permitting cars where congestion is higher with the help of that calculation. This system gives good elasticity to keep traffic flow. Indication about the emergency vehicle is also known for transmitting the signal and will be shown a green signal on the route. The traffic light-based traffic control system is highly

effective and decreases traffic congestion in urban areas, wasting time because of traffic congestion.

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