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# Dynamic Traffic Control System using Enhanced Algorithm

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***Abstract***

*Traffic congestion is most widely creating problem everywhere in the present world. It is very important to control the traffic in the busy roads. Dynamic controlling system is to develop to control the traffic at the congestion places. In this paper, Ensemble Traffic Control System (ETCS) is developed with the integration of various algorithms such as canny edge detection. The objective of ATCS is if the vehicles are more than 5 then the signal is green and if the vehicles are below 5 then the signal is red. Results show the performance of the ACTS.*

*Keywords: traffic congestion, ACTS, dynamic controlling.*

## 1. Introduction

Nowadays world is facing the problem with traffic congestion and also pollution with the increase of many vehicles. Increasing of traffic day by day leads to air pollution all over the world and also in every city. Though the government is taking many steps to overcome the traffic issues but this becomes the more complicated. Pollution can be more occurred at traffic signals because of the heavy traffic. The most common problem that can seen with the increase of more number of vehicles and this is called as traffic congestion. Many researchers are proposed various solutions to overcome this issues. Timer model is most widely used by the many places to control the traffic. With timer model the traffic can be controlled with the great extent in each and every phase of the traffic.
And also in some cities and at the heavy traffic junctions the electronic sensors that finds number of vehicles and gives the signals according to the increase of vehicles.

In some places the cause of traffic is more based on some causes such as peak time, special days, season, bad weather, or unexpected events like accidents, special events or constructional activities. To overcome various issues in traffic congestion in this paper, the Ensemble Traffic Control System (ETCS) is developed to control the dynamic traffic congestion which can be occurred in various places. The aim of the ETCS is to count the number of vehicles in the roads and dynamically change the traffic signals based on the count of the vehicles. LISA dataset which consists of 2000 frames that belongs to one camera.


**Figure: 1 sparse vehicles crowded vehicles**

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A real-time traffic congestion estimation approach was proposed which is called as ETCS, which is based on image texture feature extraction and texture analysis.

## 2. Literature Survey

Detecting the counting of vehicles dynamically can be done from the unsupervised videos which is present in the highways is most challenging tasks to monitor the traffic congestions in the various places that will predict the which is used to assists in regulating traffic. The manual process is most complicated and very tedious to solve the various issues. In this section, various existing works are discussed on traffic congestion.

The author Guohui Zhang et.al., [1] proposed the new traffic congestion system which is called as Video-based Vehicle Detection and Classification (VVDC) system which collects the count of the vehicles and data classification is done. This classification can be done based on the uncalibrated video images. The purpose of using these types of images will collects the images and enhances the prototype of VVDC system.

The author H.S. Mohana [2] et.al., designed the new technique which is used to detect and count the vehicles in sunlight with the help of real time traffic flux by using various methods. The main aim of the traffic flux estimation can be done with the counting object pixel and background pixel in a frame can be done.

The author Laura Munoz et.al., [3] explained about the new system to predict the traffic density by using the cell transmission model. The model is most widely used the densities of cell as the variables of state instead of occupancies of cell. By using the densities of the cell in place of the cell occupancies permits that will consider the uneven cell lengths, that leads to higher flexibility in dividing the national highways.

Tomas Rodriguez et.al., [4] proposed a structure on realtime traffic watching; the system is self-adaptable and can work self-rulingly for broad stretches of time, for instance no covered parameters to be adjusted. It acts in all atmosphere condition and subsequently picks the fitting figuring for day, night and progress periods.

P.F Alcantarilla et.al., [5] proposed a modified road traffic control and checking system for day time progression using a high differentiation camera. Noteworthy road traffic information, for instance, mean speed, estimation and vehicles counting are gotten using PC vision systems. Directly off the bat, moving things are isolated from the scene by strategies for an edge difference figuring and surface information reliant on diminish scale power. In any case, shadows of moving things have a spot moreover with the front line. Shadows are ousted from the closer view objects using top changes and morphological managers. Finally, objects are followed in a Kalman filtering system, and parameters, for instance, position, estimations, detachment and speed of moving things are assessed.

Clear Y. Shih et.al., [6] proposed a system for modified seeded region creating computation for concealing picture division. In the first place, the data RGB concealing picture is changed into YCbCr concealing space. Second, the fundamental seeds are normally picked. Third, the concealing picture is separated into locale where each region identifies with a seed. Finally, region solidifying is used to consolidate similar or little regions.

M. Vargas et.al.,[7] proposed a structure for video based traffic thickness estimation. Successful video-based structures for urban traffic checking must be adaptable to different conditions. They should fuse estimations for disclosure of moving vehicles and shortterm halted vehicles (especially noteworthy in urban conditions).

Yi-Hsien Chiang et.al., [8] proposed a structure which devises a freeway controller that is fit for offsetting traffic stream when the traffic system is in the precarious (stopped up) organize, in which a daze wave is most likely going to occur inside seeing any in homogeneity and where the structure is almost a jam condition.

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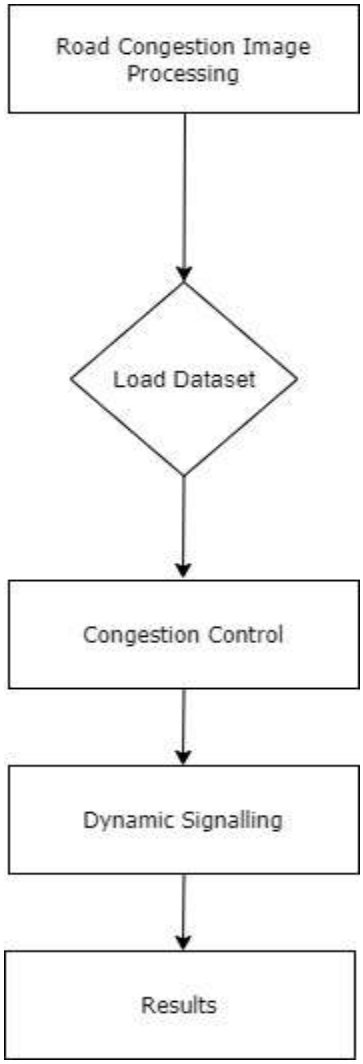


**Figure 2** represents Road Congestion using proposed system

The main steps of our proposed system are given below:
1. Image capturing
2. Background subtraction
3. Vehicle area detection
4. Feature extraction
5. Density estimation
6. Vehicles count.
7. Estimate time for controlling traffic lights

### 3. Dataset Description

When evaluating computer vision projects, training and test data are essential. The used data is a representation of a challenge a proposed system shall solve. It is desirable to have a large LISA dataset with large variation representing the challenge, this consists of 2000 front camera images e.g detecting and recognizing traffic lights (TLs) in an urban environment. From surveying existing work it is clear that currently evaluation is limited primarily to small local datasets gathered by the authors themselves and not a public available dataset.

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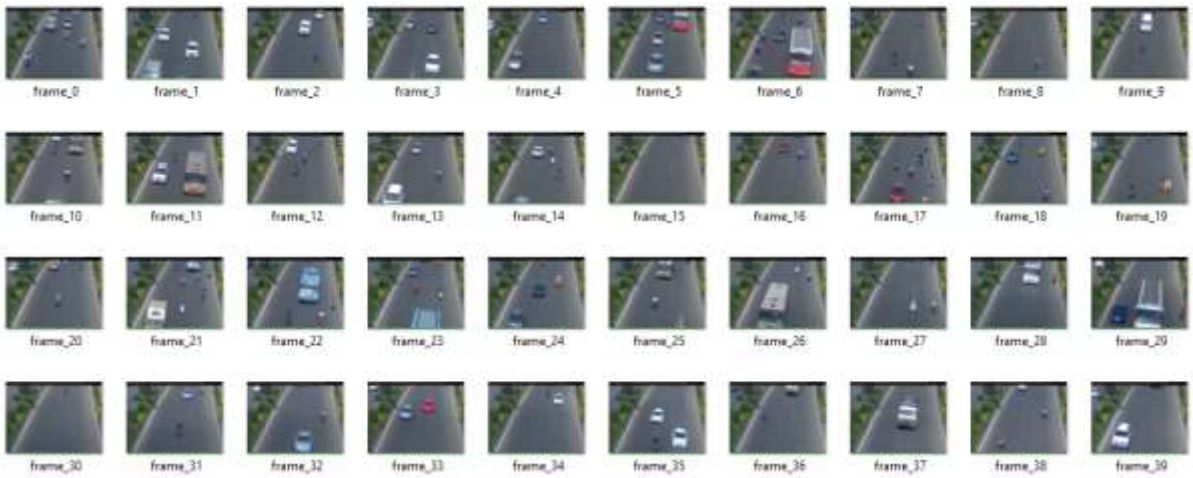


**Figure 3: Implementing ATCS using LISA dataset**

### 3.1 Proposed Edge Detection Algorithm

"Edge Detection Algorithm" is the optimal algorithm among the edge detection algorithms. The three main criteria‟s of the canny edge detection are as follows:

1. Low error rate: It is important that edge occurring in image should not be missed and there should be no response for non-edge.

2. Good Localization: The distance between the edge pixels as found by the detector and the actual edge is to be minimum.

3. Single Response: To have one response to a single edge. The algorithm mainly has five steps in it. They are:

Step 1: Computing the horizontal (Gx) and vertical (Gy) gradient of each pixel in an image.

Step 2: Using the above information the magnitude (G) and direction (of the each pixel in the image is calculated.

Step 3: In this step all non-maxima‟s are made as zero that is suppression the non- maxima‟s thus the step is called Non-Maximal Suppression.

Step 4: The high and low thresholds are measured using the histogram of the gradient magnitude of the image.

Step5: To get the proper edge map hysteresis thresholding is employed which will link between the weak and strong edges.

## 4. Implementation of Adaptive Traffic Control System (ATCS)

The implementation is done with java programming language and JDK 1.8 and NETBEANS 8.0.2.

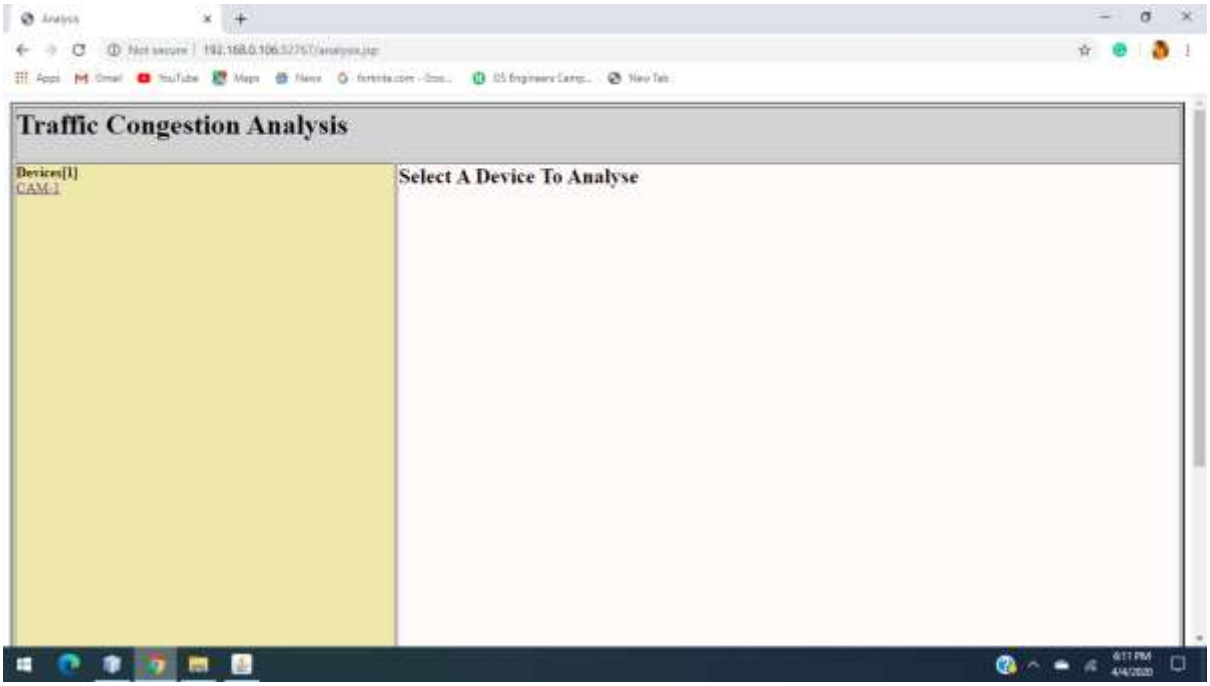


**Figure 4 traffic congestion analysis start.**

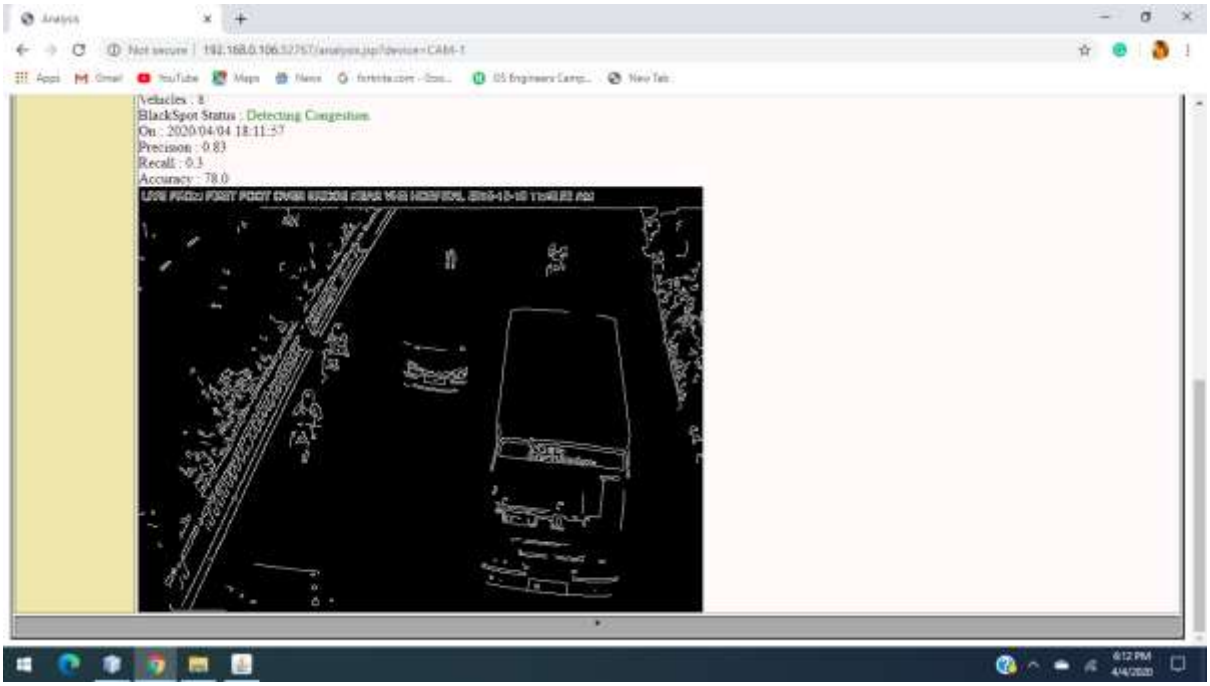


**Figure 5 Edge Detection**

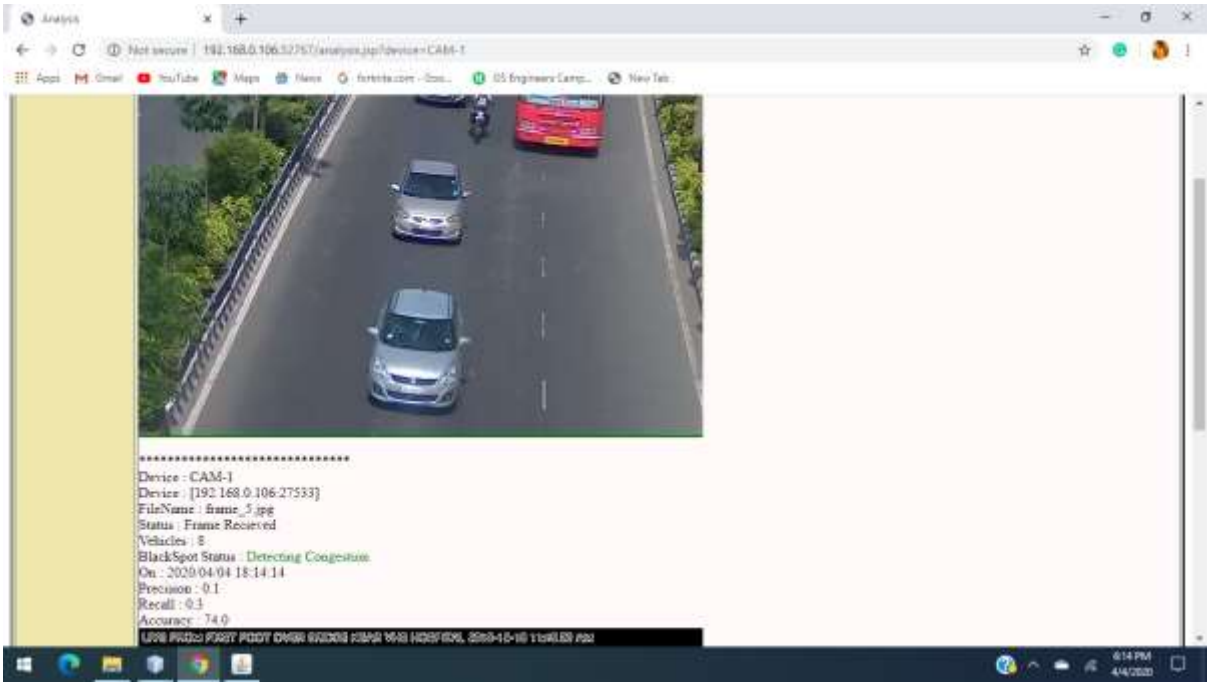


**Figure 6 ACTS Analysis**

## 5. Conclusion

In this paper, the adaptive traffic control system is developed to overcome the various issues in controlling the traffic and also the dynamic traffic signalling control is implemented with the proposed system. It is also a much better way of detecting the presence of vehicles on the road since it makes use of image data. So it surely operates much better than systems which rely on the metal content of the vehicles to detect their presence. Image processing techniques overcome the limitations of the all the traditional methods of traffic control. It eliminates the need for extra hardware and sensors. The use of multiple cameras will help to analyze and control traffic in a particular region. The proposed system outperforms the existing system in terms of accuracy and simplicity.

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