Automated Traffic Surveillance of Vehicles Using Image Processing

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ABSTRACT: The objective of this paper is to obtain multiple vehicles details violating the traffic signals (eg: signal jumping) simultaneously from a surveillance camera, as it is an essential and significant approach for an automated traffic surveillance system. This system will help to get the details of the vehicles violating the traffic rules and it will be stored in server. The development of this application will help the traffic management to retrieve the details and automatically generate the fines for the respective rule violations. The deployment of this system will reduce the violations of rules since the fines will be allotted to the respective owner every time when it has violated the rules. This paper describes the approach to detect the multiple areas and process it to obtain the registered details of the vehicle. This is further stored in order to proceed with traffic regulations. The real time video is used to determine whether each vehicle at that instance does violate the rule or not on the basis of area of interest appeared on the screen and performs selection processing for obtaining suitable region.

Keywords: Image Processing, Traffic Surveillance

INTRODUCTION:

A traffic light, is a signaling device that is placed at a road in order to indicate when it is safe to drive or walk by seeing the color of light. The traffic lights contain three main lights, a red that means stop, a green that mean go and yellow means ready to stop. It helps to reduce the number of accidents, smooth flow of traffic and save people from any major accidents.

Nowadays we can see increase in the traffic problems and the rate at which traffic violations are increasing is incredible. As Internet of Things (IOT) is one of the trending technology it play an important role in module of controlling the traffic in this system. This system helps to identifies a solution to control traffic and also helps the traffic officers to identify the vehicle violating the norms

and guidelines monitored via Internet. This proposed method can be used for general purpose and it can also be used anywhere without the loss of generality.

This proposed paper aims at developing the traffic surveillance module which can effectively detect the traffic signal violations at a particular instance and also to keep record for analysis and further proceedings within the server side. The module detects all automobiles at the instance when the device detects a violation in traffic signal. With surveillance camera and multiple instance motion capture, the registration plate of vehicle is determined. The huge data from the module at the instance is to be recorded into the server.

This module will contribute in imposing the traffic rules effectively to the society by providing legal action to all those who violate the rule.

Problem Description

Since, nowadays traffic violation is huge and increasing day by day this paper shall help in detecting multiple number plates, analyze it and generate penalty automatically such that it can store the data into the database.

Here the multiple areas of interest are taken from the image i.e. a suitable frame .The data is recorded in less time and the analysis is done for the same .The surveillance module detects and analyzes the image frame which will then be segmented to get the required data of interest and details of the vehicles through Image Processing. The data frame, on segmentation is analyzed. Multiple data from the module is sent to the server, following the IoT principle.

Challenges Faced

- Detection of registration plate in video sequence is important for many applications but is very challenging due to invisibility of Number plate ,overlapping and dirty images .
- In this project identifying the multiple images simultaneously in less amount of time will be a main challenge.
- Poor quality of images send by the surveillance device to the main server.
- Multiple data obtained at an instance from the module needs to be send to the server side without any data lose or redundancy.

LITERATURE SURVEY

In this era, traffic has a major effect on one's life. People violates the traffic signal rules which leads to signal break or jump. ALPR techniques are used to categorize the vehicles extracted based on some of the features. The features were compared and categorized based on the various parameters .This focuseson particularly single region of interest rather than multiple area of interest. The method

mentioned here is used for recognition of number plates which are of various shapes and sizes [1].The next phase deals with the detection of objects in the given image frame. Here, it takes an initiative to describe its importance in detecting objects that may be in the form of video or image. The objects are tracked through the use of several given algorithm. This tracking of objects is completely dependent on the features of the object in the particular image frame with the acknowledgment of good aspects. These techniques are not successful in detecting a target in a congested area .As in, an image frame may have more than one target to be detected, and the image frame is difficult to track down due to the disturbance of other objects [1] [2].The edge detection is used for license plate and recognition of characters. Here, the vehicle number plate is extracted or captured from real time video surveillance without any help of human involvement. This method includes shrinking of image frame which is then continued by breaking down of characters one by one. Once the object is detected, the exact location of the object is returned to the respective system.Edge detection result is comparatively better than the other conventional methods [2] [3]. For extraction of image from the frames in most convenient way CNN algorithm in image processing is to be used. This improves the precision in detecting the region of interest. Hence, deep learning techniques are used in this system to determine the license plate from the vehicle [4][5].

SYSTEM ARCHITECTURE:

As shown below, the system has a server side and an End node. The End node consists of a camera and a microcontroller. The camera takes care of the surveillance. It is assumed that the traffic lights, sensors that are used to detect the vehicular movement through it are all connected to the microcontroller. Further, when the traffic light turns red, the sensor checks if there is any vehicle that jumps the traffic signal breaking the traffic rules. If the sensor detects an anomaly, it immediately sends a feed to the microcontroller which triggers the surveillance camera to capture the image.

This image is sent to the server side as the testing data. The server side model is then fed with the test data. Initially, it undergoes the vehicular detection and segmentation. Consequently the license plate is detected from the segments which then undergoes Optical Character Recognition to obtain the characters of the license plate.

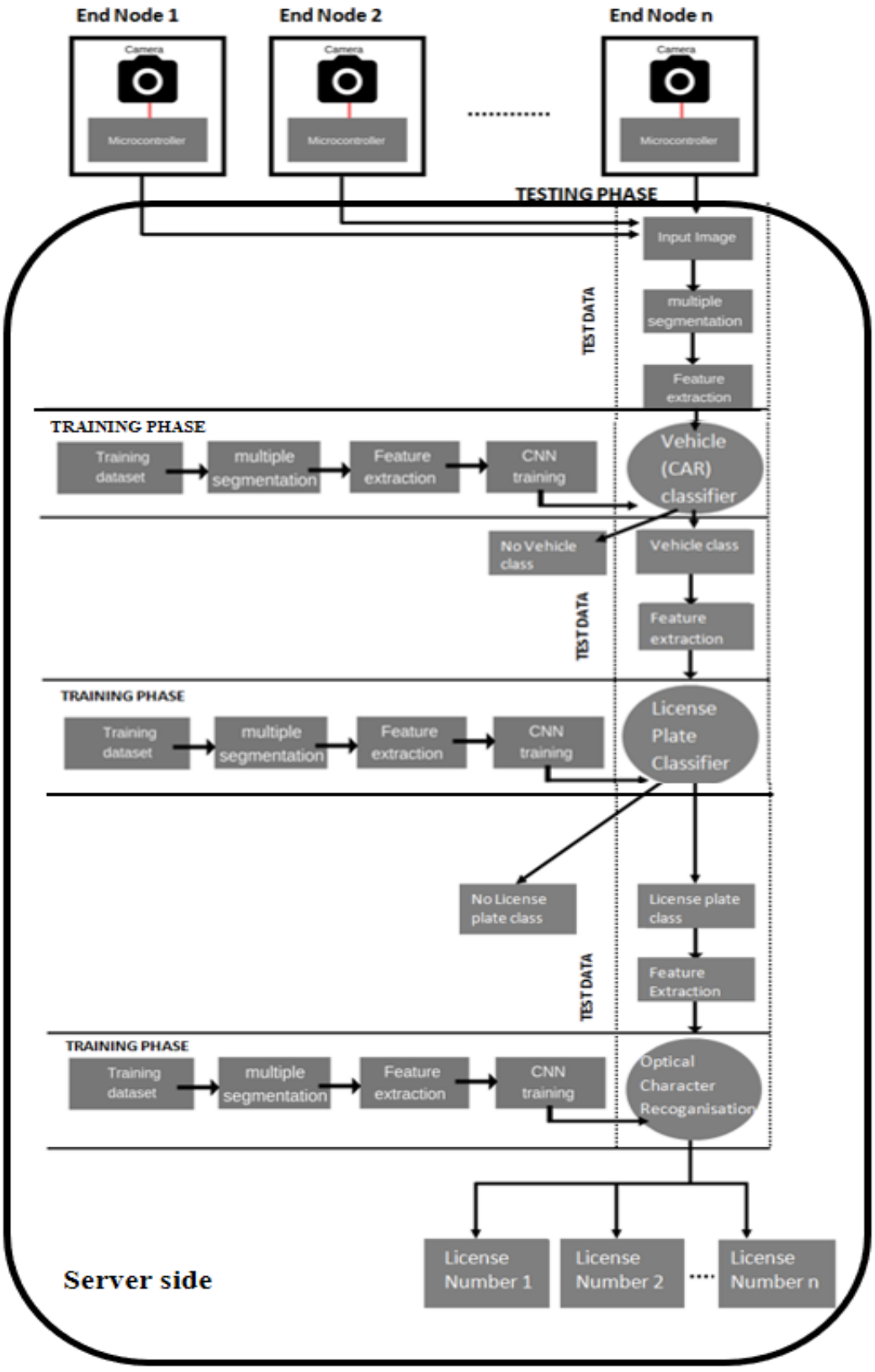

Fig 1: Block diagram of system architecture

METHODOLOGY: In this system, number plate detection algorithm is used to detect number plates of multiple vehicles simultaneously. This system mainly concentrates in detectingthem within the given time to get the fast and correct output. This system uses multiple areas of interest in simple way, to avoid the overlapping, blur or invisible images.

With multiple area of interest, the region where number plates are detected need to be processed. The depth of the frame should be good enough to have a precise output. The surveillance camera should be placed in such a way that the frame of the region is clearly captured and processed.

The video from the camera of a particular instance, that is the images of vehicles (objects) that are present and those crossing the region mark are obtained for further process. This instance is sent to the module for further analysis of region of interest. If the module detects single region of interest, it proceeds to image processing of the region and obtains the output else, If the module detects multiple regions of interest, it then separates the video instance according to the object of interest into various images of each object. Each image obtained will have a single region of interest and is then processed in order to obtain the multiple outputs. The outputs obtained are sent to the Server module.

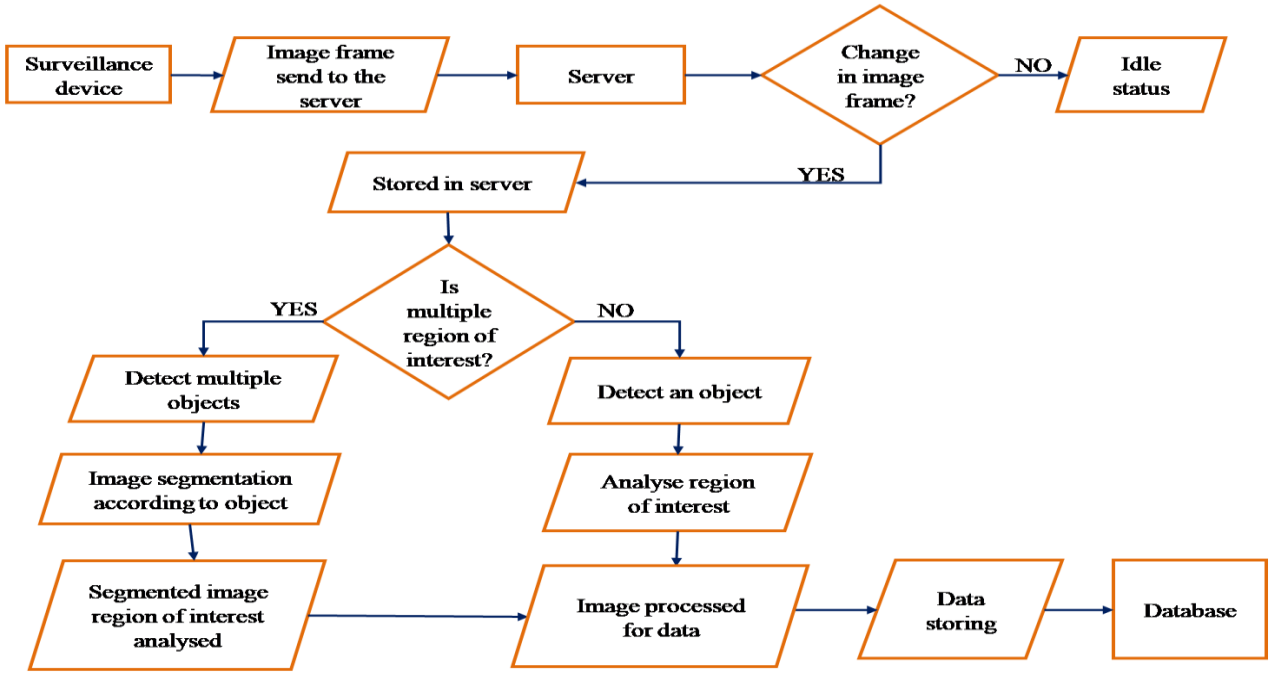

Fig 2: Flowchart of system

Experimental Results:

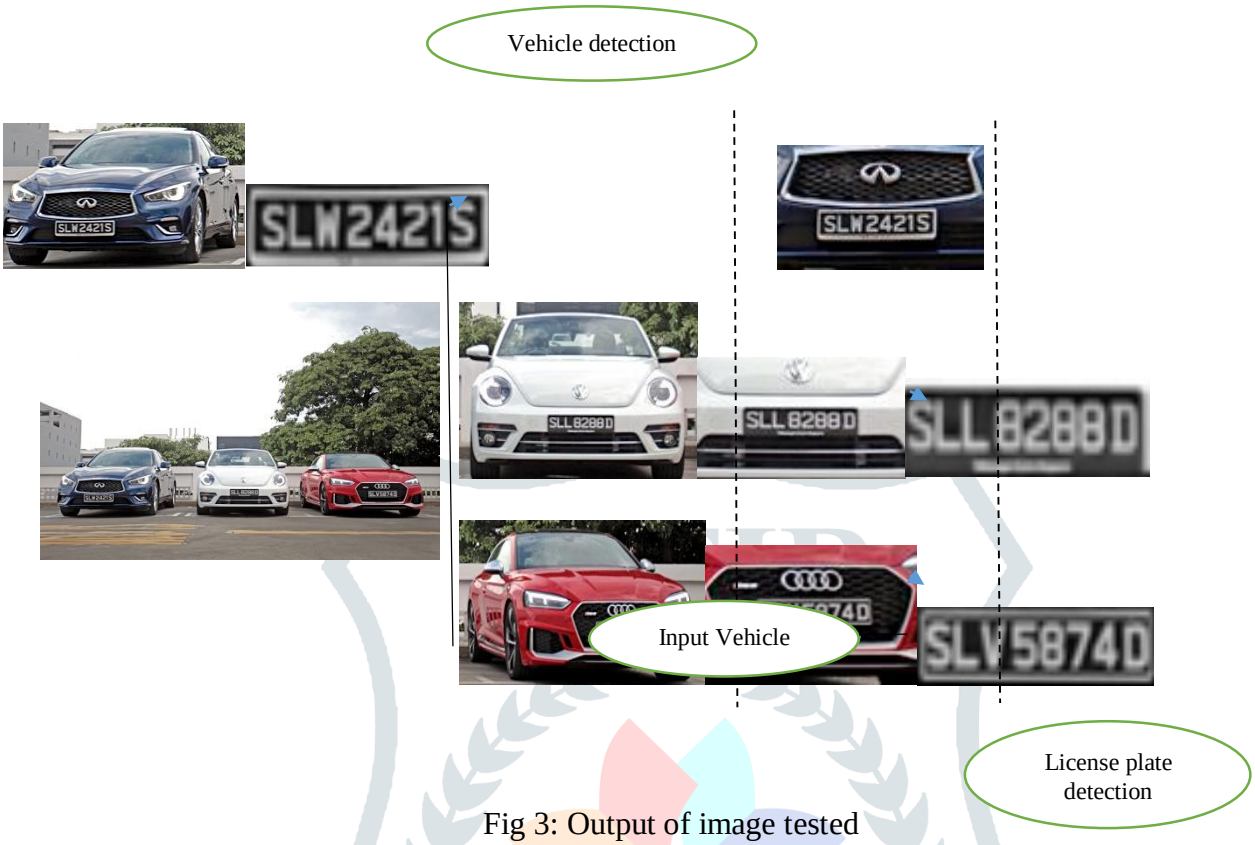

Fig 3: Output of image tested

The image captured from the surveillance camera is send from the end node to the server side. It is then fed as test data into the model with YOLO network. This will detects all vehicles from the test image and are then segmented. The vehicle segments are fed to the next model having WPOD network. Further, this detects the license plate from the vehicle segments and used for processing into the OCR (Optical Character Recognition) network. The OCR subsequently takes up the required rectification and obtains the characters visible in License Plate.

TEST 1:

Fig 4:Result of License plate using KNN algorithm

Fig 5 : Result of License plate using CNN algorithm

TEST 2:

Fig 6 : Result of License plate using KNN algorithm

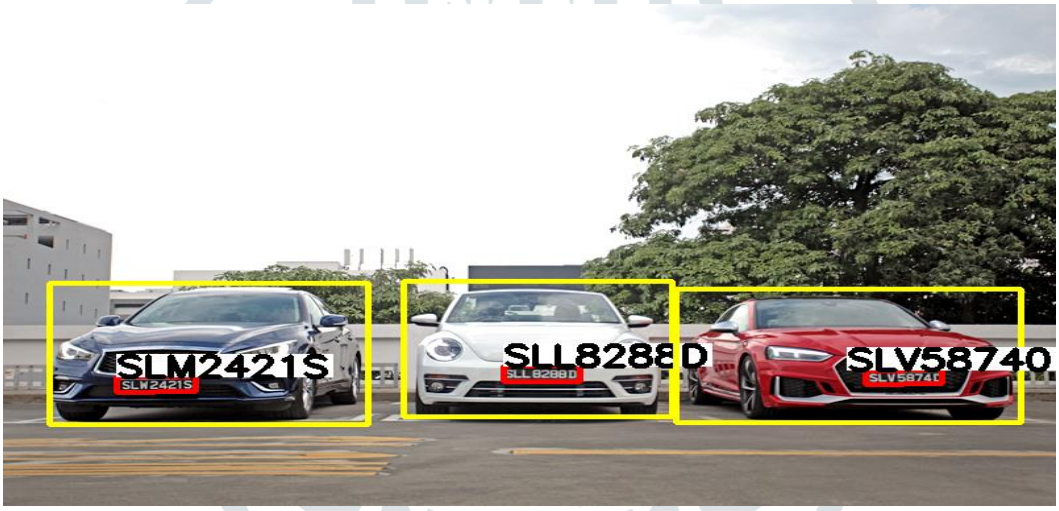

Fig 7 : Result of License plate using CNN algorithm

Comparison between KNN vs CNN:

TEST DATA	KNN ALGORITHM	CNN ALGORITHM
TEST 1	66%	85%
TEST 2	58%	88%
TEST 3	36%	91%

Table 1: Precision comparison

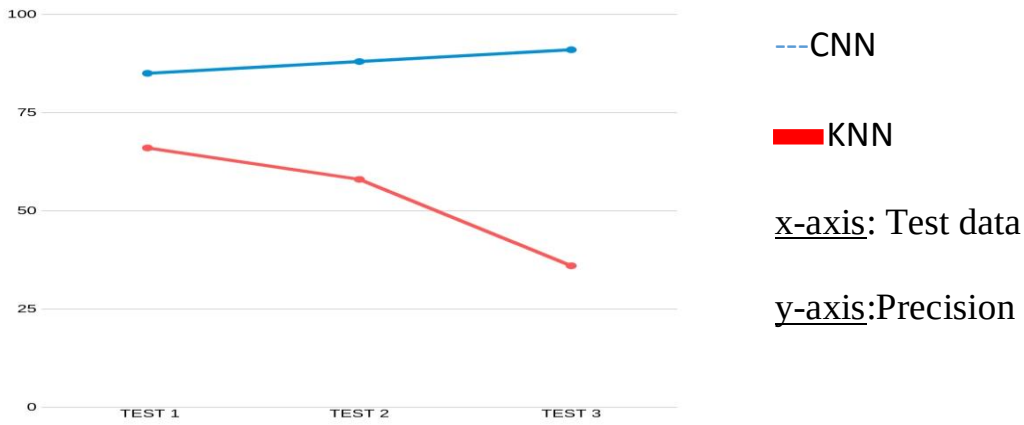

Fig 8: Comparison graph between CNN &KNN

CONCLUSION:

This paper discussed an approach to detect multiple number plates with precision more than 75%.The experimental results show that CNN algorithm is better as compared to KNN.Hence,CNN best suits for the proposed system.Based on this analysis the proposed system will be easy to detect the number plates of vehicles which violates the law.

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