ADAPTIVE TRAFFIC SIGNAL AND TRAFFIC SURVEILLANCE SYSTEM USING WIRELESS CAMERA NETWORK

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Abstract—**Road dealings and traffic over-crowding is major problem worldwide. This system uses video surveillance as it comes as the most economical technique for Monitoring road traffic. Researchers have worked on different methodology for video processing. The problems in existing methods are occlusions and variable lightening status. Also, recent research on Red Indian roads proved that flow icon processing systems shows 55% median error on fomite count. Proposed system looks into both day clock time as well as night time conditions to monitor traffic. Camera-based surveillance is an important technology to monitor traffic, 1 sense of asset and places, for the applications of increasing physical security. Access to entropy services whilst on the move is becoming increasingly prevalent within transport systems. This composition examines pike vehicles equipped with wireless communication nodes to obtain images from the cameras distributed along a motorway. In this paper, I am trying to use the carrying out of a motorway surveillance system based on Ad Hoc networks (WAHCN). The paper nidus on providing the dynamic time for the traffic signal based on the lading or over-crowding of the motorway.**

1. INTRODUCTION

Traffic monitoring is one of the keystone component in intelligent traffic systems. traffic monitoring gives method to majority of the problems faced by way of the humans. It additionally makes policing and controlling of visitors less complicated. Video surveillance is one of the technologies which can be used for traffic monitoring. Video surveillance also is the maximum good value choose which doesn't involve major prices or infrastructural adjustments.

Traffic states (inclusive of congestion, gradual, easy, twist of fate) are macroscopic description of street's traffic go with the flow. The statistics of traffic states is crucial to transportation groups and travelers in visitor's management and command, site visitor's records show and guidance, in addition to visitor direction planning. With the creation of image processing and pc vision techniques into site visitor's statistics series and the rapid development of pc performance, video-based processes for visitor's state detection are more and more popular due to its low fee and visual nature.

Digital camera-based totally surveillance is an crucial technology to screen humans, assets and locations, for the programs of growing physical protection. access to information services at the same time as on the move is becoming increasingly more standard inside transport systems. This paper examines motorway automobiles prepared with wireless verbal exchange nodes to gain photographs from the cameras allotted alongside a motorway. on this paper, i'm seeking to use the overall performance of a motorway surveillance systems based on advert Hoc networks (WAHCN). The paper focus on presenting the dynamic time for the visitor's signals based totally at the load or congestion of the dual carriageway.

This device identifies the burden or congestion of the toll road by accumulating records from the wi-fi digicam placed alongside the dual

carriageway. This record consists of:

1.To finding the range of automobiles by means of shooting registration code quantity of the car.

2.And to discover the wide variety of motors by means of using photo processing techniques.

The statistics attain from these two methods are mixed to get an anticipated price of the vehicles. these values can be used to decide the burden or congestion which can be categorized in 3 classes:

a) less

b) slight

c) high

consistent with these classifications the time for green sign is decided and activated. The less congestion way minimal time, moderate congestion method slight time and high congestion manner maximum time. these variable times for green signal to set off will boom the efficiency of the system.

1.1. Background

Road traffic is one of the major problems in India and worldwide. Traffic congestion is seen all the time in countries across globe. Researchers around the globe are doing research in order to solve this problem. Various alternatives and methods are looked at to solve or at least reduce this problem. Traffic surveillance is also seen as the option to solve the problem. Intelligent Traffic Systems solves the problem like incident detection, traffic monitoring, traffic rules violations, live traffic updates, auto mated traffic signaling. Intelligent traffic system management and better access to real time along with historic information helps commuters to plan their route. It can also help to reduce congestion. Loop detectors, video cameras, mobile sensors like GPS can be used for traffic monitoring. Installing loop detectors involve high installation cost, high maintenance cost also changes in road infrastructure. Mobile sensors like GPS etc. involve high cost factor from commuter point of view. In contrast of all these, installing video cameras and monitoring traffic using it is better option as it doesn't require high installation, maintenance cost also no personal cost for the commuters...

1.2. Motivation

In step with previous studies, existing procedures for motion detection in visitor's surveillance systems may be divided widely into the three classes: temporal distinction, optical go with the flow, and background subtraction [1]. despite the fact that temporal distinction techniques may be adaptive to environmental adjustments, their use often effects in incomplete detection of the shapes of transferring objects. this is specifically authentic when items that are motionless or feature limited mobility are present. Optical drift processes are employed to come across transferring items by the usage of the projected motion within the photograph aircraft with proper approximation. sadly, these techniques unavoidably bring about the technology of noise and excess computational burden. apart from the abovementioned categories, background subtraction processes are broadly used for the detection of transferring objects due to their capacity to perform correct detection of shifting objects whilst showing only slight computational complexity. that is completed by way of comparing the differences between pixel functions of the cutting-edge image and those of the reference history model of the preceding picture. Now let's into trouble faced whilst implementing history subtraction techniques for Indian roads. in this method, the foreground pixels in frame N are calculated with the aid of subtracting a heritage body from it. The density of frame N is calculated with the aid of the ratio of foreground pixels to general pixels inside the body. The heritage frame become manually decided on as a frame containing no motors to serve as the template, in which any pixel variations suggest a automobile.

1.3. Main Objective

The principle goal of the task is to make a system in order to work in all types of conditions and offers very accurate outcomes. Proposed device must be able to detect and classify A database is maintained storing all the facts which is acquired from surveillance which can be helpful for in addition evaluation. This paper examines motorway automobiles prepared with

wireless verbal exchange nodes to gain photographs from the cameras allotted alongside a motorway. on this paper, I'm seeking to use the overall performance of a motorway surveillance systems based on advert Hoc networks (WAHCN). The paper focus on presenting the dynamic time for the visitor's signals based totally at the load or congestion of the dual carriageway.

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The statistics attain from these two methods are mixed to get an anticipated number of the vehicles. these values can be used to decide the burden or congestion which can be categorized in 3 classes:

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1.4. Scope

The proposed gadget will come across, depend, classify and perceive automobiles the usage of various techniques in day in addition to night time conditions. accordingly, data that's acquired from it is able to be placed to exact use. site visitor's density and rely can be used site visitors sign manipulate and also may be useful to commuters in direction alternatives. registration code detection can be used for tracking crook sports and can also help police to discover location of crook. Incident detection can be useful for pin pointing places of injuries or vehicle breakdown to handle emergency conditions. historic traffic information with a view to include classification and depend can be beneficial in making plans of new infrastructure.

2. Proposed Algorithm

Proposed system works in following way:

Step 1: Get the data i.e. Image from the surveillance camera: - In this step we used the image capture by the video surveillance camera (mage format "*.jpg, *.bmp, *.png, *.tif"). This

Step 2: Apply License plate recognition algorithm by applying Threshold and bias subtraction filter.

Step 3: Extract the license plate number and store it in database

Step 4: Store data into the database.

Step 5: Apply load/congestion identification by using Kalman filter.

Step 6: Use this to provide the dynamic timing for traffic signal by applying Adaptive traffic signal algorithm.

2.1 Algorithm for License Plate Detection:

Step 1: Get the data i.e. Image from the surveillance camera: - In this step we used the image capture by the video surveillance camera (mage format "*.jpg, *.bmp, *.png, *.tif"). This image is than converted into Grayscale because it converts the image into shade of only black and white color ranging from 0 to 255 (where 0 indicates white and 255 indicates black all other value is shade of white and black).

Step 2: Applying threshold and bias subtraction image filter technique. By applying threshold to the image, we remove all the value either above or lower to that (In

this I remove less than threshold value) and store it in the variable say pic. The value of threshold can be either randomly chosen or can be calculated by calculated by using library function 'graythresh'.

Step 3: Removing noise: This part is tricky because we remove noise by pixel density of the object in the image, so I used the value as 3500(through my research and by seeing the variation on the result while changing this value) things which have less than 3500 pixels are removed i.e. excluding number plate and store it in other variable pic1.

- Frame difference:

$$| frame_i – frames_{i-1}| > Th$$

Step 4: Applying subtraction to get the only number plate: when we subtract variable 'pic' from variable 'pic1' we get only number plate and store it in another variable 'pic2'. We remove all the connected component which has less than 200 pixels leaving only the text in the number plate.

Step 5: Identifying the letters: for this we have to convert variable 'pic2' into matrix (l, ne) where 'l' gives the matrix which has information of number plate and 'ne' gives number of digits or characters. Than this data is compared in the database where each letter is identified and display.

Step 6: Store the letters in a text file with date and display the message with the extracted database.

Flow Chart

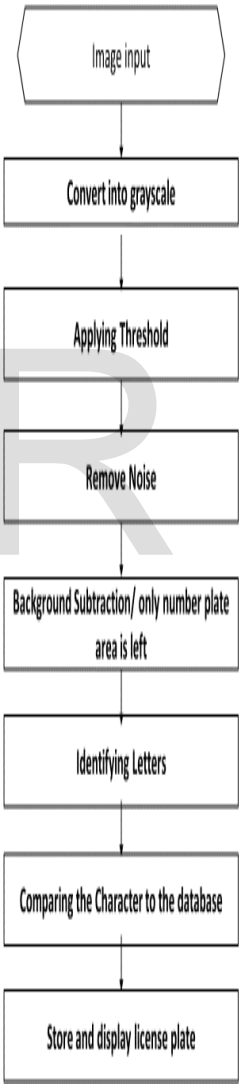


FIGURE 1

2.2 Algorithm for Traffic State Detection:

Step1: Obtain the video feed as input from the camera from the road. For this we can use the library function 'VideoReader'. And calculate the number of frame by using length(video) function.

Step2: Creating the database to store the data of each frame: This can be done by using read (video, i) for all the frames. Than we calculate the background image by averaging the first 5 frames/image.

Step3: Applying Kalman filter:

- The Kalman filter addresses the general problem of trying to estimate the state $x \in \Re^n$ of a discrete-time controlled process that is governed by the linear difference equation

  $$x_k = Ax_{k-1} + Bu_{k-1} + w_{k-1}$$

- with a measurement z that is

  $$z_k = Hx_k + v_k$$

- The random variables w_k and v_k represent the process noise and measurement noise respectively. The nxn matrix A in the previous difference equation relates the state at the previous time step k-1 to the state at the current step k , in the absence of either a driving function or process noise.

- The nxl matrix *B* relates the optional control input

- *u* to the state x.

- The mxn matrix H in the measurement equation relates the state to the measurement z_k.

Step4: Identifying load/congestion: this can be find by calculating the marking area which track the moving object and a counter is also used to count the target.

Step5: Deciding the congestion: the value of the Count is used to decide the congestion of the load. Store the data in the database for further use.

Flow Chart:

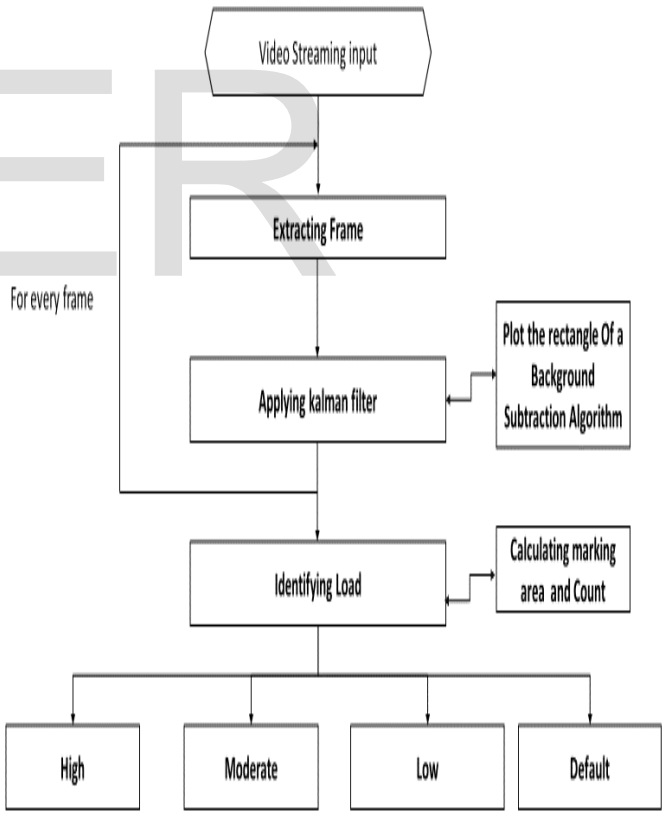


FIGURE 2: FLOW CHART OF TRAFFIC STATE DETECTION SYSTEM

2.3 Algorithm for Dynamic Traffic Signal:

Proposed system works in the following way

Step 1: Use the result from Algo2.1 which has the count on vehicle at the specific interval of time.

Step 2: Use the result from Algo2.2 to get the classification of the state of the traffic on the road.

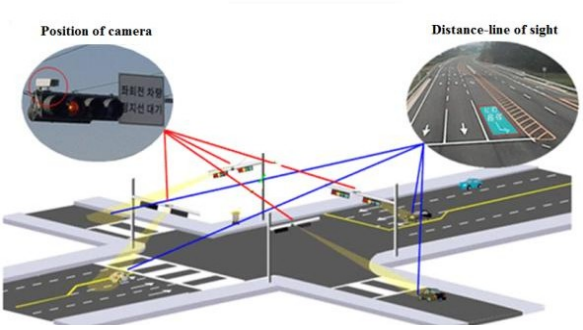
Step 3: According to the classification of the road traffic and license plate register at that interval of time provide dynamic duration for each class such as:

a) For High congestion duration will be 90 sec.
b) For Moderate congestion duration will be 45 sec.
c) For Low congestion duration will be 30 sec.
d) For no traffic congestion it will skip this round.

3. Architecture for this system

In this architecture camera is placed at the top of the signals to obtain clear view of the traffic on the selected side of the signal so that it will capture the image and analyze the traffic on the particular side and get the count of the vehicle. With this count the density of that particular side will be determined and corresponding signal will be provided.

This system is also maintaining the record of the license plate number of the vehicle on that side and the video from that camera can also be stored for future use.



4. Conclusions

I finish the brink and Bias Subtraction together with the Kalman filter out by means of the usage of OpenCV device as software program for image processing by means of simply displaying the numerous conversion of photograph within the screen and finally surrounding the container on the vehicle inside the given photo, the number of car is calculated.

We are able to calculate the density of the automobile by way of the usage of mat lab tool by way of evaluating the 4 aspect of the image that is given as a enter. we can simulate the end result of the four-given input image however this cannot be utilized in actual time applications as it's miles very slow and the software program is not freed from fee like OpenCV to overcome this downside of mat lab, OpenCV software program is used which may be very easy to put in and is open source software and may be used in actual time software in a short way. in this paper we've proven the Congestion of the road can be used inside the signal via using OpenCV within the device.

The OpenCV can integrate the result of the first two set of rules and used it to provide the Dynamic timing for the site visitors signaling.

5. Future Work

In future it could upload greater function like car identification, on line challan, route diversion, and so on. This will offer more security and comfort to the human beings and the authority. by way of using the AI on this device, the efficiency of the device may be accelerated. it can without difficulty assist the use of machine getting to know and artificial Intelligence.

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