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Review of Smart Traffic Control System Using Image Processing & Iterative Enhancement Wavelet

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***Abstract*— In the field of processing signals information, image processing technology is a popular practical technology for getting important research values. The studying the design and algorithm of image processing is the aimed of this article. As the development of image processing algorithm, application programs and network technologies has fascinated the process of changing, reproducing, duplicating digital images at lower cost and approximately immediate delivery without any loss of quality, therefore these threats as well challenges must be faced, one of the effective way to face these threats is digital watermark technology can be applied, because DIP enables the users to share the digital contents in public domain without any issue. Another fact is that, now day by day the population of city and numbers of vehicles on the road are increasing. For the improvement of the traffic problem various detection technique are used.**

Hence my review research paper objective to understanding importance of digital image processing in the modern technological environment for detection and then improve the traffic problem.

***Index Terms*—Digital image watermarking, Enhancement Wavelet Technique, Frequency rate, False acceptance rate.**

I. INTRODUCTION

Digital image processing is adopted in various applications like agriculture, food technology, civil engineering (construction), medical science, and security including secure communication system or multidisciplinary research many more. Due to increase in population which leads to increase in the number of vehicle, thus traffic problem is serious and stature problem of mankind, Traffic problem result time-waste and cause the increase in pollution level. If this problem will continue than world atmosphere will be at major risk. This problem arise due to use of old technology for making roads infrastructure and used the traditional method for controlling the traffic.

Objective of proposed system is to improve efficiency of existing automatic traffic signalling system. At first, film of a lane is captured by a camera, the system will be image processing based adaptive signal controlling. Then these images are efficiently processed to know the traffic density. An image is represented by two dimensional functions like f(x, y), That image containing different finite number of elements as these elements are called pixel of range any from 0 to 255. System will have artificial vision with the help of digital camera mounted on motor for its rotation to face lanes which is controlled by PC through microcontroller to change its direction in steps of 90 degree to face each lane and capture image to sense the traffic on the road. Whereas in another method aim to developing a system which can have better result than the traditional one which we are using for our traffic control problem. For the improvement of the traffic problem different type of edge detection technique are used with the problem of removal of noise and robustness from the image during processing. Thus iterative enhancement wavelet transformation with the edge detection technique for keeping the false detection of image minimum.

A. LITERATURE REVIEW

Digital image watermarking is a method in which the watermark is merged with the object to be protected and then extracted from it. These methods ensure tamper-resistance with authentication as well its content verification, and integration of the image [1]. Image preprocessing means operations on picture at the lowest level, whose mean is an improvement of the image data that suppress undesired distortions or enhances some image features important for further processing. It does not increase image information content [2] Image encryption techniques try to convert original image to another image that is hard to understand; to keep the image confidential between users, in other word, it is essential that nobody could get to know the content without a key for decryption [3] it is considered more secure when compared to effectively existing strategies of sending the interactive media information safely. Watermarks are so named because of their corresponding with the impact of water droplets spread over the sheet of paper. Digital image watermarking is essentially a section of applied science that reviews the digital images and their changes so as to promote their quality or to extract data [4]. whereas"Object detecting using PCA image reconstruction and Optical flow" [5], in this author use two type of process PCA reconstruction for classification the area and Optical flow-based tracking of feature points. He use this for set the feature point during

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feature tracking and also restoration of missing points which occur in every noisy environment. He used image reconstruction wit PCA classification using reconstruction feature extraction by cluster optical flow based technique feature point and used motion- based object detection for this he used feature extraction, feature point prediction and combined after doing this he come to an conclusion that after using PCA reconstruction algorithm have better result in related to the area like intensity and edge image. According to Asha, K.Arun Kumar, D. David Neels Pon Kumar, "A Real Time Video Object Tracking Using SVM" [6], in this they studied present of the vehicle detection in aerial surveillance using Dynamic Bayesian Networks. A Dynamic Bayesian Network (DBN) is a Bayesian Network which mean relating the variables to each other within adjacent time period. This method used to calculate the variable that evolves in time. SVM classifier is used to train the image samples for the classification. For edge detection canny edge detector is used which help to the analysis of aerial videos taken from aerial vehicle has become an important issue. These technologies have a variety of applications, such as military, police, and traffic management. DBN is used for the node classification. For this he use the Background Color Removal in this the color from the image is removed because it help on only in removing the false detection but also increase the speed of detection. After he use the Feature Extraction in this he analysis Local Feature in the corner of the image is detected by the Harris corner detector because the corner of the image have more information than the whole image and apply moment-preserving thresholding method on the classical canny edge detector to select thresholds adaptively according to different scenes. After detecting he use Color Transform and Color Classification in this the color model to separate vehicle colors from nonvehicle colors effectively. After detecting the vehicle he used DBN in this the pixel wise classification of the vehicle is done, then comparing the result using BM and DBN. After applying the different process he conclude that by using DBNs for vehicle detection that the pixel- wise classification is way more better than the traditional method and it is very effective and have fast processing as compare with the traditional one [7]

II. Iterative Enhancement Wavelet

Image processing is the technique for getting the information from the image for this we can use different type of technique in the first technique IEWT is used and the system have the high frequency rate (FR) of accuracy and false acceptance rate (FAR) that is less false detection of the edge, so that we have the better result. IEWT for the improvement and with this it also use one-level wavelet and two level wavelet transformation and combine them to get the good results. The main problem is the noise which become the main problem of the image processing for getting the good result this system need to remove the noise form the image.

In this process the main objective is to overcome the problem which are faced in the previous like false edge detection and noise problem and the efficiency of the edge detection method canny is not good enough to get the proper detection because in canny the sometime the week edges which are not even the edges are also included so it don't get the proper result from this. For this in the first methodology the Iterative Enhancement wavelet technique (IEWT) for removing the noise from the and for getting the better result so that false detection can be remove and it can overcome the main problem of our research which solve traffic problem. To remove false detection problem and obtain the best result required steps are as following

- Input avi video
- Apply discrete wavelet transformation using Harr
- Use two-level discrete wavelet transformation
- Apply median filter for 2-D position
- Fetch the position of Vehicle
- Measure the threshold level for various position of vehicle
- Find Root-mean Square error

Figure:1 Steps with Enhancement Wavelet Technique

This approaches are as following:

a) Put Input in avi format video: Enter the avi format video as an input for processing.
b) harr with discrete wavelet transformation: The adaptive data hiding in the image pixel.
c) Useing two-level discrete wavelet transformation: In this two-level passes from the filter to get more better value of the pixel so that the true value of pixel to avoid the false result.
d) 2-D position with median filter: In this median filtering of the matrix in two dimensions by applying this it can he helpful to find the neighborhood which does not have the relation with both intensity and color.
e) Finding the position of Vehicle: In this it fetch the position of the moving vehicle.
f) Calculate the threshold level for various position of vehicle: In this used threshold level for prediction of the position of the moving vehicle.
g) Find Root-mean Square error: In this it use root-mean square value to check weather our prediction is correct or not.

working of each modules with the help of step-by –step description followed by the experimental result that are produced by the system. In order to achieve the started goal and objectives the system it follow an algorithm to get the final result. In this first take an avi video as the input and take each pixel and applied discrete wavelet transformation using harr for getting the adaptive data hiding in the image pixel. Then two level discreet level transformation and after passing it with the filter will get more accurate value of the image pixel. After that three-level wavelet transformation than each pixel of image after two-level passes from the filter to get more accurate value of the pixel so that the true value pixel to avoid the false result. After that optical flow is used

Horn-Schunck method in this to smoothen the image and find the inner missing information from the images. Now the median filtering of the matrix in two dimensions by applying this to find the neighborhood which does not have the relation with the intensity and color after that applying morphological operator to count the neighborhood points and with help of morphological operator then extracted the information from the image even in the small part. After that it use blob analysis for boundary which help to find the different property of an boundary of an object in the image after processing, after this it can fetch the position of the moving vehicle then after this threshold level for prediction of the position of the moving vehicle is used and at last using root mean square value to check weather our prediction is correct or not.

III. Traffic Control by System Architecture

The main aim in this architecture is to designing and developing of the Smart Traffic Signal Simulator is to reduce the waiting time of each lane of the cars and also to maximize the total number of cars that can cross an intersection given the mathematical function to calculate the waiting time. The traffic signal system consists of three important parts.

The approach utilized to analyze traffic is by using the following steps:

a) Use a controller which represents the brain of the traffic system. It consists of a computer that controls the selection and timing of traffic movements in accordance to the varying demands of traffic signal as registered to the controller unit by sensors.

b) Signal visualization head provided for controlling traffic in a single direction and consist of one or more signal sections. These usually comprise of solid red, yellow, and green lights.

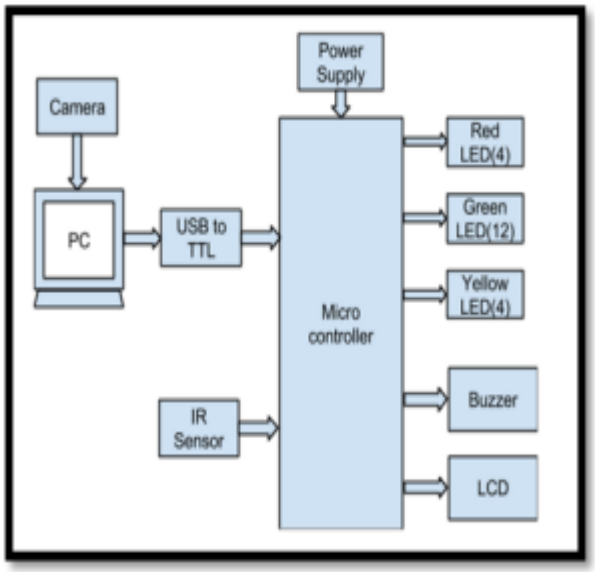
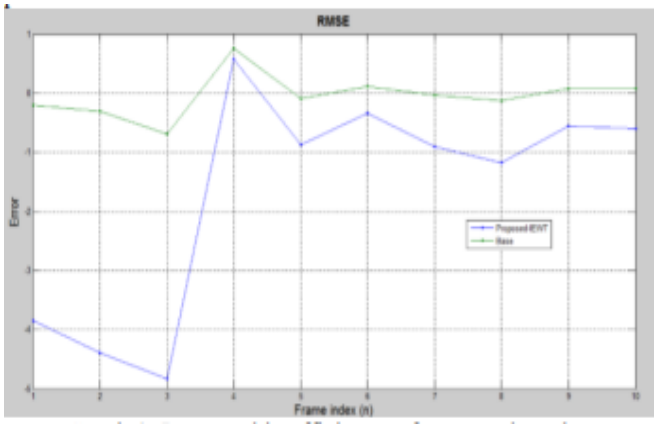


Figure: 2 Block diagram of system architecture

The system works by detecting the entering objects to the scene, and tracking them throughout the video. The input to the algorithm is the raw video data of a site. The algorithm then performs the following steps: First, a statistical background model of the scene is populated using the first few frames of the video. This background model collects the statistics of the background of the recorded scene such as road, trees, buildings, etc. This model is then used to distinguish the objects of interest (vehicles) from the surroundings. In the next step, the detected foreground parts of the scene are grouped together by a neighbourhood analysis, and a filtering process is applied to remove noise and misdetections. The objects of interest obtained at the end of this step are then tracked throughout the video until they leave the scene.

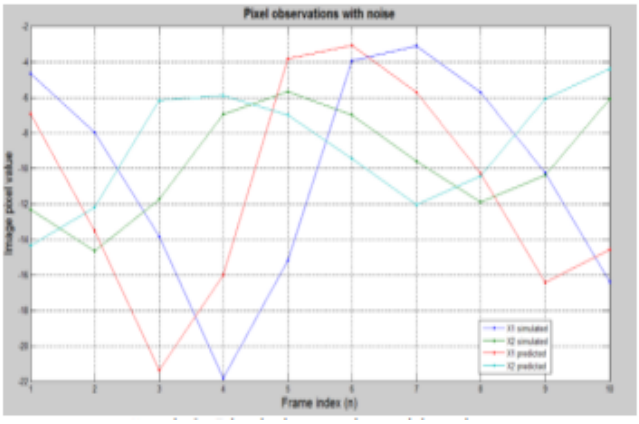
IV. Result Analysis

After applying the Enhancement wavelet technique algorithm it was concluded that for stronger noise higher levels are needed for efficient noise suppression. Also if there is no noise good edges can be extracted from lower levels (multiplication of the first and second) enabling better localization as shown in graphs below



Graph: 1 Increment in efficiency

It shows increased efficiency of the of tradition method by applying the Enhancement wavelet technique algorithm. In this figure green line shows the efficiency rate of base which is want to be increase but the blue line show in graph is the increased efficiency which was required before.



Graph: 2 Pixel-Noise observation

It shows the position vector get increased for the simulated pixel value from video then error rate getting minimum for IEWT technique for an object. In this for the X1 and X2

position the observation of the dynamic number of frames make number of observation symbol value for object should vary with the Simulated X1 and X2 positions.

In another method of system architecture the following features are implemented in system architecture

a) Priority based traffic clearance

Figure: 3 Preview window

b) Ambulance detection using Image processing

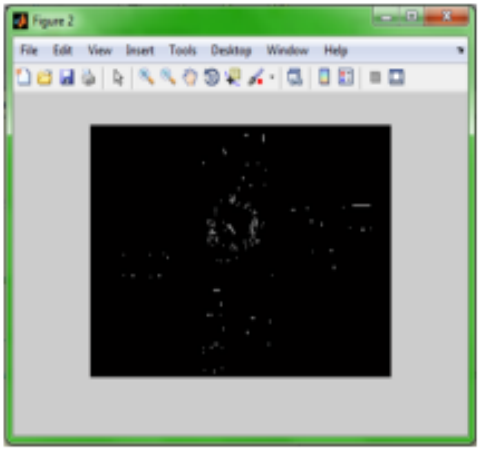


Figure: 4 Gray scale conversion

c) Safety message display on LCD

Figure: 5 Command window output

d) Red Signal break (Number plate detection)

Figure: 6 Signal break detection

e) If any obstacle in any particular lane then display ALERT message on LCD

Figure: 7 Obstacle detection

V. CONCLUSION

In this paper we have present analysis on an intelligent system to overcome the problem Traffic control system by using MATLAB software Image Processing tool and another based on system architecture.

The result is shown in the Graph 1 and Graph 2 above the method used for edge detection by Enhancement wavelet technique with less false detection. By using this technique it help to find the edges in mage more accurately and with less time and also with less computation cost. In future work it can overcome the processing problem is related to symbol extraction from number plate image and further symbol recognition. This will help in the progress of automatic number plate registration and recognition. Also the same concept can be used for Traffic Light Control wherein the timer of the signal for its corresponding road is automatically increased or decreased depending upon the traffic density on the particular road facing the camera. Speed of vehicles can be detected and eventually it can help the traffic management system and the police to get better control over the traffic flow of the particular location. Traffic Monitoring at night will become simpler as compared to the traditional patrol team scanning the roads.

Whereas by system architecture a method for estimating the traffic using Image Processing is presented. This is done by using the camera images captured from the highway and videos taken are converted to the image sequences. Each image is processed separately and the number of cars has been counted. If the number of cars exceeds a specific threshold, warning of heavy traffic will be shown automatically. The advantages of this new method include such benefits as use of image processing over sensors, low cost, easy setup and relatively good accuracy and speed. Because this method has been implemented using Image Processing and Mat lab software, production costs are low while achieving high speed and accuracy.

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