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SMART TRAFFIC CONTROL SYSTEM BASED ON DENSITY USING EDGE DETECTION ALGORITHM

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Abstract

In this paper author is describing concept to control or automate green traffic signal allotment time based on congestion available at road side using Canny Edge Detection Algorithm. To implement this technique we are uploading current traffic image to the application and application will extract edges from images and if there is more traffic then there will be more number of edges with white color and if uploaded image contains less traffic then it will have less number of white color edges. Empty edges will have black color with value 0. By counting number of non-zeroes white pixels we will have complete idea of available traffic and based on that we will allocate time to green signal. If less traffic is there then green signal time will be less otherwise green signal allocation time will be more.

I INTRODUCTION

Traffic congestion is one of the major modern-day crisis in every big city in the world. Recent study of World Bank has shown that average vehicle speed has been reduced from 21 km to 7 km per hour in the last 10 years in Dhaka . Inter metropolitan area studies suggest that traffic congestion reduces regional competitiveness and redistributes economic activity by slowing growth in county gross output or slowing metropolitan area employment growth .As more and more vehicles are commissioning in an already congested traffic system, there is an urgent need for a whole new traffic control system using advanced technologies to utilize the already existent infrastructures to its full extent. Since building new roads, flyovers, elevated expressway etc. needs extensive planning, huge capital and lots of time; focus should be directed

upon availing existing infrastructures more efficiently and diligently. Glean traffic data. Some of them count total number of pixels; some of the work calculate number of vehicles. These methods have shown promising results in collecting traffic data. However, calculating the number of vehicles may give false results if the intra vehicular spacing is very small (two vehicles close to each other may be counted as one) and it may not count rickshaw or auto-rickshaw as vehicles which are the quotidian means of traffic especially in South-Asian countries. And counting number of pixels has disadvantage of counting insubstantial materials as vehicles such as footpath or pedestrians. Some of the work have proposed to allocate time based solely on the density of traffic. But this may be disadvantageous for those who are in lanes that have less frequency of traffic. How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day.

Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic. This research is to design such a system which works on the traffic density and manages the signal lights according to the sensed density of the traffic through the infra-red Sensors [1]. The timing of the signal lights will vary with respect to the varying density of the traffic, Hence Improving the light system and reducing the traffic congestion and other related problems How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic. This research is to design such a system which works on the traffic density and manages the signal lights according to the sensed density of the traffic through the infra-red Sensors [1]. The timing of the signal lights will vary with respect to the varying density of the traffic, Hence Improving the light system and reducing the traffic congestion and other related problems How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic.

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II LITERATURE SURVEY

Density, speed, and flow are the three critical parameters for road traffic analysis. High-performance road traffic management and control require real-time estimation of space mean speed and density as input for large spatial and temporal coverage of the roadway network. In Adaptive Traffic Control System which receives information from vehicle such as position and speed and then it utilize to optimize the traffic signal. The system specifies the use of onboard sensors in vehicle and standard wireless communication protocol Specified for vehicular applications. They implement various traffic Signal control Algorithms .Intelligent traffic system for VANET suggest that creation for smart city framework for VANET consisting of

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Intelligent Traffic Lights which transmit warning messages and traffic statistic. In That System Various Routing Protocol Has Been Discus And Compare. They suggest that AODB is best suited for Intelligent Traffic Light Author suggests in reference the data forecasting model for transmitting data from one to other. This article studied about the dynamic traffic control system and based on radio propagation model for predicting path loss &link. The author suggests in reference Intelligence road Traffic signaling System. In that system OBUs used. OBUs used destination information for calculating load traffic on road for reducing the conjunction on road. The general belief is that it is more difficult to estimate and predict traffic density than traffic flow .In Intelligent Traffic Light and Density Control using IR Sensors and Microcontroller the author propose that the delay of Signal not depend on traffic density. The Author optimize the traffic using microcontroller this system reduce traffic jams problem cause by traffic light to extent. The system contains IR Transmitter and IR Receiver. IR count the vehicles on the road Microcontroller generates the result. Priority Based Traffic Lights Controller Using Wireless Sensor Network the author implements Adaptive Traffic control System based on (WSN) wireless sensor Network. In that System Time manipulation Used for controlling Traffic Light. This System Control Traffic over Multiple intersections.

III EXISTING SYSTEM

Under present scenario, traffic control is achieved by the use of a system of hand signs by traffic police personnel, traffic signals, and markings. A comparable and matching education program is needed, through driver-licensing authorities, to assure that those who operate motor vehicles understand the rules of the road and the actions that they are required or advised to take when a particular control device is present. Each traffic control device is governed by standards of design and usage; for example, stop signs always have a red background and are octagonal in shape. Design standards allow the motorist to quickly and consistently perceive the sign in the visual field along the road. Standard use of colors and shape aids in this identification and in deciding on the appropriate course of action. Under current circumstances, traffic lights are set on in the different directions with fixed time delay, following a particular cycle while switching from one signal to other creating unwanted and wasteful congestion on one lane while the other lanes remain vacant. The system we propose identify the density of traffic on individual lanes and thereby regulate the timing of the signals' timing. IR trans receivers count the obstructions and provide an idea about the traffic density on a particular lane and feed this response to a controller unit which will make the necessary decisions as and when required

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IV PROBLEM STATEMENT

The challenge of the ITSCP is to find an optimal traffic signal configuration schedule that maximizes the traffic flow in a network. In other words, the goal of solving the signal timing control problem is to determine optimal phase sequences and durations for each phase. To solve this problem, the geometric information describing the intersections in the target network, the traffic information including traffic demand and turning movements of vehicles, and the limits regarding traffic signal components are considered. This information is processed in accordance with the model formulation. For example, Lin and Wang [13] expressed traffic demand as the number of variables in each cell using a cell transmission model. The ITSCP can be solved by optimizing various performance criteria, such as minimizing the average vehicle delay or maximizing the throughput of the network. More details of such objective criteria The ITSCP can be solved by optimizing various performance criteria, such as minimizing the average vehicle delay or maximizing the throughput of the network. In most studies, the constraints considered in the ITSCP are related rules regarding traffic flow and traffic signal laws such as total cycle length, green signal length, and phase sequence

MOTIVATION

In present, vehicular traffic is increasing throughout the world, especially in large urban areas. As the number of road user's increase constantly and current resources & infrastructures being limited; a smart traffic control will become a very important issue in the future. These needs have led to an ever increasing demand for an " intelligent " traffic control system. Therefore, optimization of traffic control to better accommodate this increasing demand is needed. Our project will demonstrate the optimization of traffic lights in a city using wireless sensors. Traffic light optimization is a tough problem. With multiple junctions, the complexity increases as the state of one light node influences the flow of traffic towards many other nodes. We proposed a traffic light controller that allows us to control and study different situations of traffic density

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V PROPOSED SYSTEM

a) In this paper, a system in which density of traffic is measured by comparing captured image with real time traffic information against the image of the empty road as reference image is proposed. Here, in figure 1, the block diagram for proposed traffic control technique is illustrated.

b) Each lane will have a minimum amount of green signal duration allocated. According to the percentage of matching allocated traffic light duration can be controlled. The matching is achieved by comparing the number of white points between two images. The entire image processing before edge detection i.e. image acquisition, image resizing, RGB to gray conversion and noise reduction is explained in section II. At section III, canny edge detection operation and white point count are depicted. Canny edge detector operator is selected because of its greater overall performance.

Advantages:-

- it is advantageous to convert RGB images into grayscale for further processing. When converting an RGB image to grayscale, it is pertinent to consider the RGB values for each pixel and make as output a single value reflecting the brightness of that pixel. One of the approaches isto take the average of the contribution from each channel:(R+B+C)/3.
- Easy to Access.
- Time-Saving.
- Fast Service.

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VI IMPLEMENTATION

Upload Image

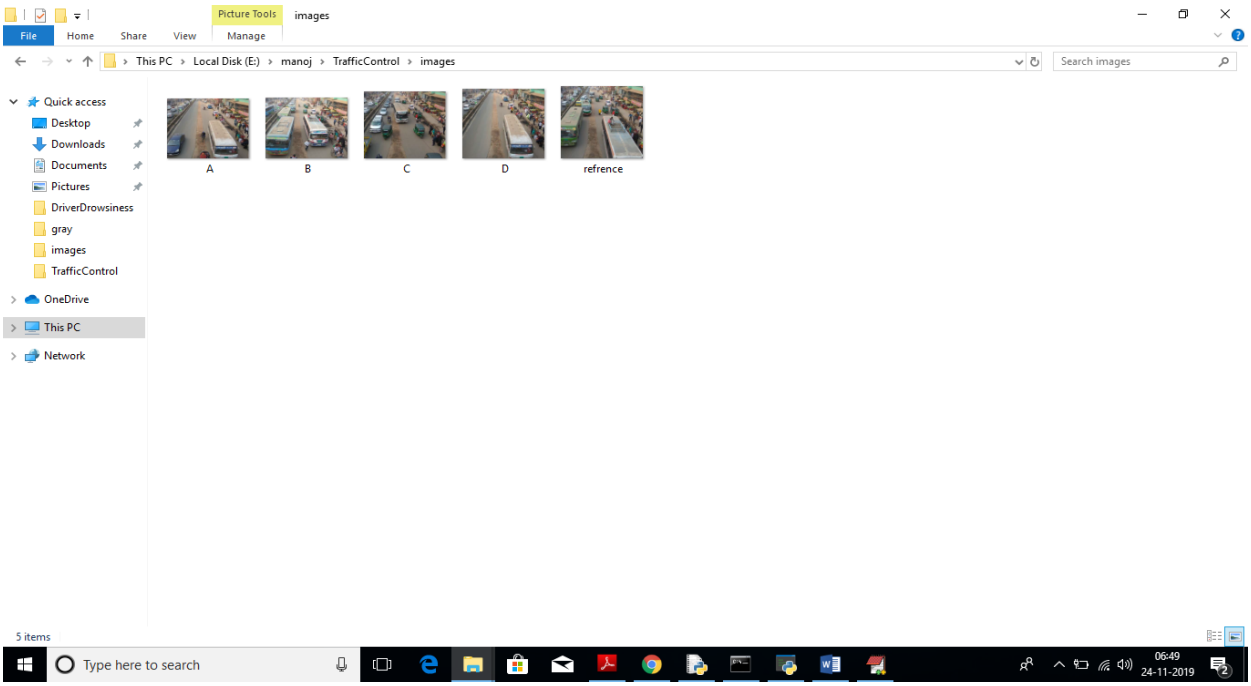
In this module current traffic image will be uploaded to application and then convert colour image into Gray Scale image format to have pixels values as black and white colour.

Pre-process In this module Gaussian Filter will be applied on uploaded image to convert image into smooth format. After applying filter Canny Edge Detection will be applied on image to get edges from the image. Each vehicle will have white colour pixels and non-vehicle will have black colour pixels.

White Pixel Count

Using this module we will count white pixels from canny image to get complete traffic count

VII RESULTS



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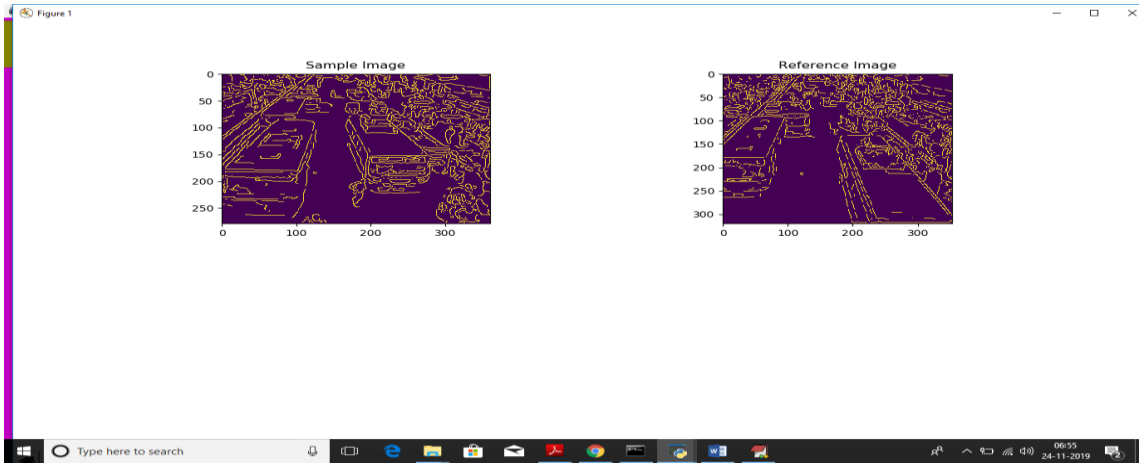

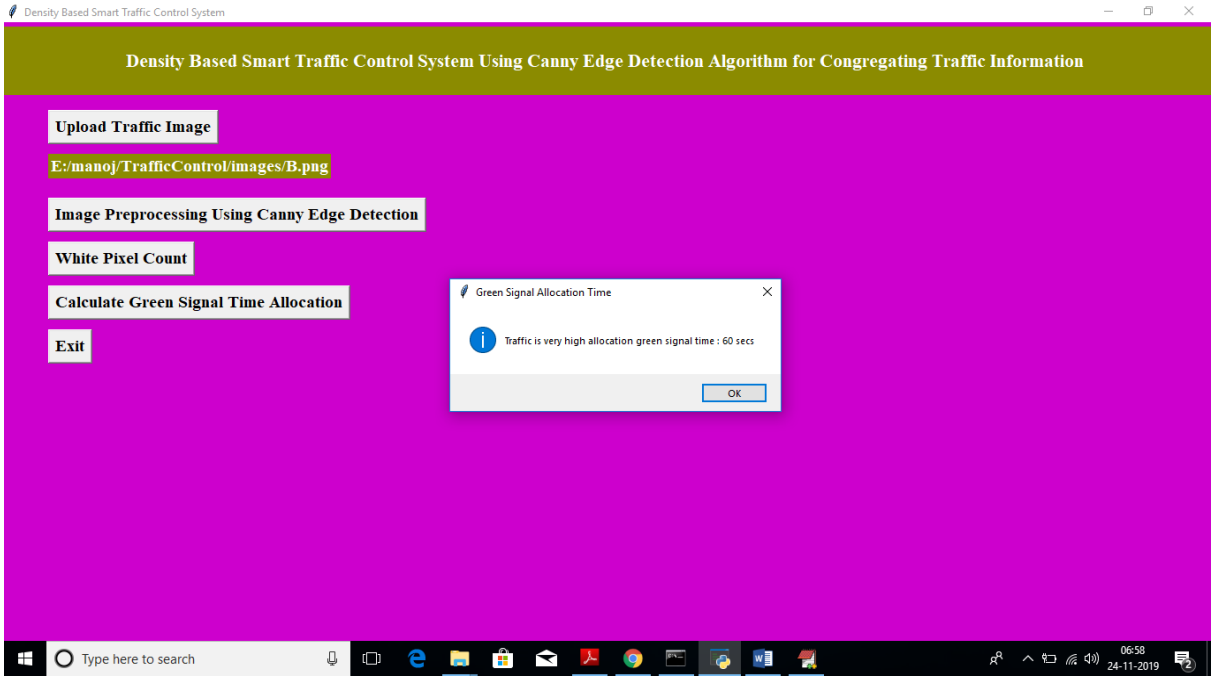

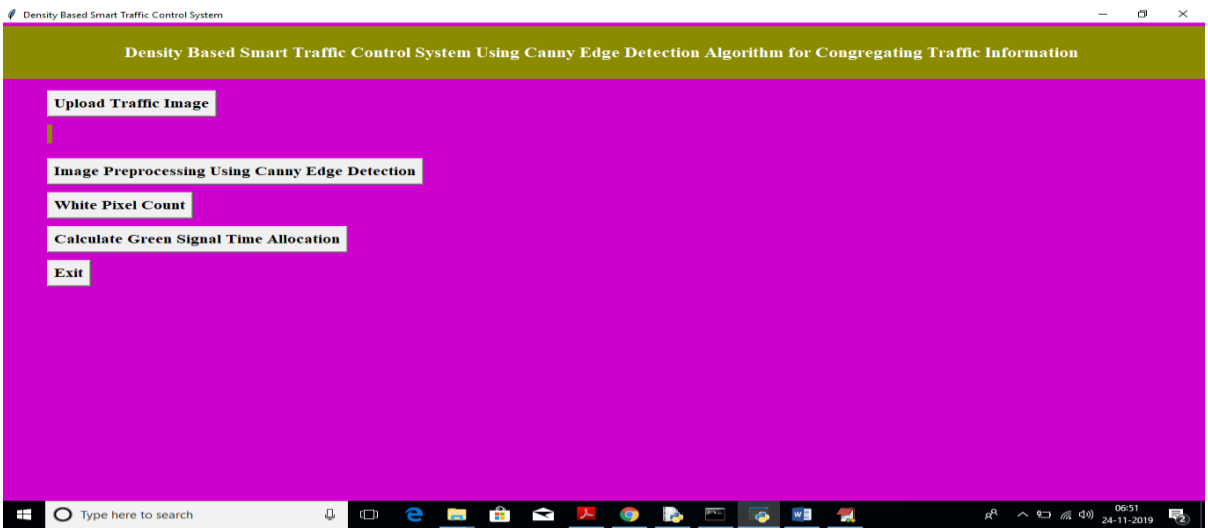

VIII. CONCLUSION

In this paper, a smart traffic control system availing image processing as an instrument for measuring the density has been proposed. Besides explaining the limitations of current near obsolete traffic control system, the advantages of proposed traffic control system have been demonstrated. For this purpose, four sample images of different traffic scenario have been attained. Upon completion of edge detection, the similarity between sample images with the reference image has been calculated. Using this similarity, time allocation has been carried out for each individual image in accordance with the time allocation algorithm. In addition, similarity in percentage and time allocation has been illustrated for each of the four sample images using Python programming language. Besides presenting the schematics for the proposed smart traffic control system, all the necessary results have been verified by hardware implementation.

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