Traffic Density System with Mobile Alert

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Abstract –The project is designed to develop a density based dynamic traffic signal system. The signal timing changes automatically on sensing the traffic density at the junction. Traffic congestion is a severe problem in many major cities across the world and it has become a nightmare for the commuters in these cities. Conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density. Junction timings allotted are fixed. Sometimes higher traffic density at one side of the junction demands longer green time as compared to standard allotted time. The image captured in the traffic signal is processed and converted into grayscale image then its threshold is calculated based on which the contour has been drawn in order to calculate the number of vehicles present in the image. After calculating the number of vehicles, we will come to know in which side the density is high based on which signals will be allotted for a side

Keywords -Fuzzy Inference System(FIS); Speeded-Up-Robust Features(SURF); Maximally Stable Extremal Regions (MSER); Arduino Microcontroller; loop detectors.

1. INTRODUCTION

The traffic congestion in urban cities and prominent township is the main cause of concern for any road commutation. The commuting time between two places is dependent entirely on the intensity of traffic, time of travel. Traffic jam at junctions is a major reason for slack in flow of vehicles. Traffic congestion gives rise to various negative impacts, including loss of productive time and manpower, waste of fuel, late delivery of goods, pollution, to name a few. This traffic is regulated in most of the metropolitan cities. But in some semi urban areas the traffic is unregulated. The monitoring and control of the traffic is becoming the major problem in many countries.

The increasing number of vehicles, the increasing density of image processing and fuzzy logic techniques. The problem of traffic light regulation has some solutions before. Most conventional traffic systems use sensors, loop detectors, and road tubes. These systems are of high cost and the accuracy of traffic control system is dependent on environmental conditions. In most of the systems, fixed time interval is used for traffic light control. The problems associated with static signals are, irrespective of the density of traffic, the signals are either green or red for a fixed time, leading to accumulation of vehicles in either of the directions depending on the time of travel. For instance, during peak hour there might exist heavy traffic across junctions going towards work area in the morning hours and the reverse in the evening hours. vehicles during different parts of the day, the public attitude, and duration of traffic light control system are some of the factors adding to the problem. While the first three problems don't have a technical solution, a solution can be aimed for controlling the duration of traffic signal. The proposed work aims at dynamically controlling the traffic signal through.

To provide hassle free and convenient traffic management and to provide information about the traffic to the driver whenever being on road. This project centers on calibrating the traffic during both peak times and at usual time basis and intimate the driver through a notification service whenever they go out with their vehicle by calculating frames and background patterns monitored through surveillance cameras. This system majorly focuses on sophisticated traffic management through precise calculations done through monitoring frame changes and pattern conversions that takes place time to time and varies from vehicle to vehicle.

Arduino Microcontroller is an open-source electronics platform based on easy-to-use hardware and software. It's intended for anyone making interactive projects. And hence it is used to switch traffic lights on and off. Part II of the paper deals with the literature review for the dynamic traffic controller problem, part III gives the flow of the proposed approach, part IV deals with results and analysis.

The other method using image subtraction proposed to calculate the traffic density, takes the background image which is with no vehicle or lesser vehicle and subtracts it from the image of road with more number of vehicles. These images are obtained from real time traffic videos. The result of the method will be in count of zeros which will decide the density of traffic.

2 PROPOSED WORK

Fuzzy inference system is used in building smart traffic lights for dynamically controlling the duration of traffic signals. TDDWMAS takes the traffic density as input to the controller and based on the input linguistically determines the duration of green signal. This value is de-fuzzed and sent as a qualitative input to an Arduino microcontroller which controls the timing of the LED for displaying the duration of green signal. Block

diagram of TDDWMAS is shown in fig 1. The three blocks are Pre-processing block, Fuzzy Logic based

Intelligent Traffic controller block, Computation of duration of gree

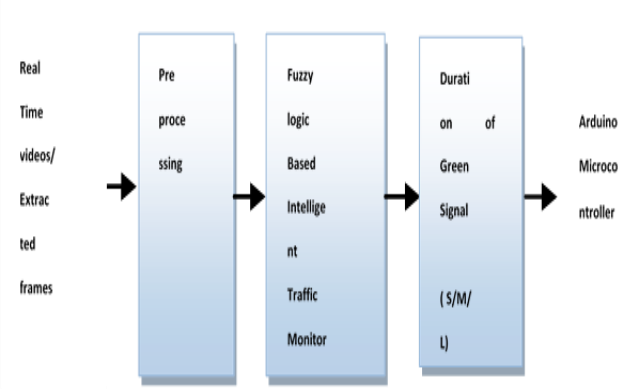


Fig.1. Block Diagram: TDDWMAS

2.1 Real Time videos

Real time videos were captured from Chennai suburbs specifically in three junctions. The traffic at these junctions was recorded for different timings. A video camera was used for the same. The density of traffic in terms of identified vehicles was done using feature detection method and image subtraction method.

2.2 Pre-processing

It is the process in which vehicle density is computed using two methods feature detection method and image subtraction method.

2.3 Feature Detection Method:

Feature detection method, detects pattern or distinct structure found in an image such as edge, corner, point or small image patch. Two feature detection methods SURF and MSER are used in extracting points of interest.

2.4 Image Subtraction Method:

Image subtraction or pixel subtraction is a process whereby the digital numeric value of one pixel or whole image is subtracted from another image. This is primarily done for one of two reasons – levelling uneven sections of an image such as half an image having a shadow on it or detecting changes between two images.

2.5 Fuzzy Inference System (FIS*)*

Fuzzy logic can deal with information arising from computational perception and cognition, that is, uncertain, imprecise, vague, partially true, or without sharp boundaries. Fuzzy logic comes in handy in such cases where there exists uncertainty and also gives a human like reasoning to any problem in hand. The component parts of FIS are fuzzifier, rule base which is formulated by the human experts, fuzzy inference engine and de-fuzzifier n signal block.

3. PROCEDURE

3.1 Image capturing*:*

Image Capturing is an application program from Apple that enables users to upload pictures from digital cameras or scanners which are either connected directly to the computer or the network. It provides no organizational tools like iPhoto but is useful for collating pictures from a variety of sources with no need for drivers. Image Capture is scriptable with AppleScript and may be manipulated with Mac OS X v10.4 (Tiger)'s "Automator" application. As of Mac OS X 10.4, Image Capture's AppleScript dictionary does not open in Script Editor. As of Mac OS X 10.6 only the Image Capture Web Server opens in Script Editor.

3.2 IMAGE CONVERTION**:**

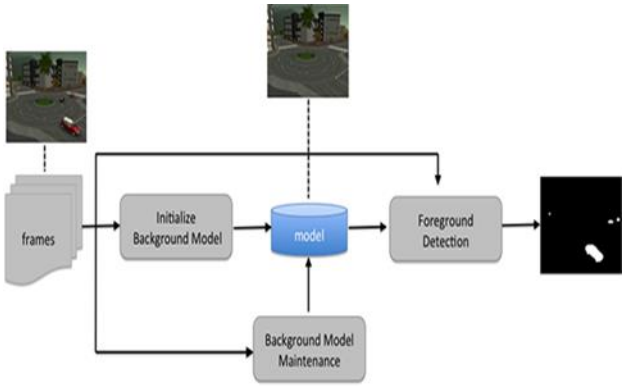
Figure 1 Video Surveillance

Many image file formats are available for storing graphical data, and, consequently, there are a number of issues associated with converting from one image format to another, most notably loss of image detail. Many image formats are native to one specific graphics application and are not offered as an export option in other software, due to proprietary considerations. An example of this is Adobe Photoshop's native PSD-format (Prevention of Significant Deterioration), which cannot be opened in less sophisticated programs for image viewing or editing, such as Microsoft Paint. Most image editing software can import and export in a variety of formats though, and several dedicated image converters exist.

3.3 GREY SCALE CONVERSION:

A Grayscale or Greyscale Image is one in which the value of each pixel is a single sample representing only an amount of light, that is, it carries only intensity information. Images of this sort, also known as black-and-white or monochrome, are composed exclusively of shades of grey, varying from black at

the weakest intensity to white at the strongest. Grayscale images are distinct from one-bit bi-tonal black-and-white images, which in the context of computer imaging are images withonlytwo colors, black and white (alsocalled *bilevel* or *bin ary images*). Grayscale images have many shades of grey in between



4. RESULTS AND CONCLUSIONS

The Arduino microcontroller is used in simulating the output of FIS and the duration of green signal is displayed using an LEDs. In the preprocessing phase although the feature detection algorithm could be used in computing the density of traffic the number of features detected is much more in a peak hour traffic. Feature detection algorithm detects feature points for each and every object on road and hence it will be considered as a part of density and further calculated as a vehicle density. In image subtraction method, background image is subtracted with the frames; it detects only the intensity of the vehicles on road. By comparing these two methods it was observed that image subtraction method gives the best result within less time than feature detection method. So image subtraction method proves computationally less intensive. Graph in fig.15 also justifies the fact image subtraction method is more suitable when compared to feature detection method.

The analysis and results represented in shows that density calculated by image subtraction gives more accurate results with less processing time than the one which uses feature detection method.

4.1 DRAWBACKS

As usual, a framework with incredible advantages do have a few downsides or disappointments. The framework is still in progress which requires more stability and testing. Other than this, there are two more drawbacks of this project that is low density adding with high density, whenever the two densities collide or subside there is an interference which could hamper the signal and could cause unnecessary trouble. The next drawback is the low accuracy as the project is in implementation stage, so the beta version is less accurate. However, work and efforts are constantly made to improve the system to nullify the drawbacks to make the project work properly and provide a stable traffic management system.

4.2. CONCLUSION

The improvement of urban traffic condition is largely dependent on the modern ways of traffic management and control. Advanced traffic signal controller and control system leads to improve traffic problems. Thus, the simulation of smart traffic controller using STCFIS has been proposed and implemented with two methods and hardware interface

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