Traffic Control System Using Image Processing

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ABSTRACT— Traffic management is becoming one of the most important issues in rapidly growing cities like Pune. Due to bad traffic management lot of man-hours are being wasted. Regarding this problem, I have thought to develop a self adaptive system which can help in better traffic management.

I came up with two different strategies for different situations depending on rate of change of traffic density.

In the first part I have implemented the basic traffic control system called the fixed time system which is implemented almost everywhere in India. Also in this part I have synchronized the signals serially. Synchronization of signals helps in saving time.

In the second part I am using the technique of image processing for traffic control. I am using image processing operations to calculate traffic density as cameras are cheaper and affordable devices compared to any other devices such as sensors. I have provided options for loading traffic image files and for calculating traffic density.

Keywords— Image Processing, Traffic Control System, Traffic Management.

1. INTRODUCTION

Problem: To develop the 'TRAFFIC MANAGEMENT SYSTEM'. Traffic management is becoming one of the most important issues in rapidly growing cities like Pune. Due to bad traffic management lot of man-hours are being wasted. Regarding this problem, I have thought to develop a self adaptive system which can help in better traffic management. The system will help in reducing the problems related to the City traffic.

Solution: Traffic means the movement of vehicles along a route. Congestion may result due to heavy traffic at a junction. In developing cities like Pune, traffic management is becoming important issue day by day due to rapid increase in number of vehicles. Lot of man-hours is being wasted in traveling due to bad traffic management. To avoid congestion there are so many traffic management techniques available. Even though many companies are working on traffic management over years, no technique is perfect by itself as the real time situations are generally continuously changing and the system has to adapt itself to change in the continuously changing circumstances.

I have made an attempt to provide some traffic management strategies which are self adaptive in nature, so as to fit in to continuously changing real time traffic scenarios. For the Junction at which rate of change of average traffic density is less I have provide strategy called Gradual Adaptation and for the Junctions at which average traffic density

varies drastically with respect to time I have provide a strategy which I have named On-Situation scheduling. In exceptional situations I have provide option for manual traffic control.

2. LITERATURE SURVEY

A survey defines the process of gathering information from relatively useful sources, in order to compile and efficiently use that data, to make meaningful systems. To maintain the "TRAFFIC CONTROL SYSTEM USING IMAGE PROCESSING", I have maintained the TRAFFIC.

1. Most of the situations the deadlock will be occur.

2. Produce each & every information of the traffic.

3. Provide runtime application.

4. Communication with

    - RTO Officer.

    - Traffic Controller (POLICE).

    -PMC (Pune Municipal Corporation).

    -Customers.

3. SYSTEM ANALYSIS

3.1 Purpose :

    Traffic management is becoming one of the most important issues in rapidly growing cities like Pune. Due to bad traffic management lot of man-hours are being wasted. Regarding this problem, I have thought to develop a self adaptive system which can help in better traffic management. This system is Real Time based and it will help in reducing the problems related to the City traffic*.*

3.2 Overview:

The functionalities provided are:

1. Manual operating in case of emergency

    Here, the traffic operator is the user of the system. In case of the emergency (i.e. if any V.I.P. is coming in the city or if the Ambulance is coming to that intersection then the operator can interrupt the normal working of the Traffic Management System and then can allot the Green signal to the respective road of the intersection.

2. Default operating i.e. by simple anticlockwise round robin technique of 60secs.

    In this case Traffic Control System works in normal traditional fashion. Default 60secs are assigned to each road for the Green signal and the roads of the intersection are processed in Round Robin fashion in either clockwise / anticlockwise fashion. No preemption is there in this processing.

3. Self Adaptive system using Image processing.

    Here the Traffic Control System works in Round Robin fashion only like default one in either clockwise / anticlockwise but the Green signal duration for each road is

assigned according to the traffic density on that road at that particular moment. If there is no vehicle at all on that road at the moment when the photograph is taken then the next road side is taken into an account and thus time is not wasted at all.

3.3 Product Perspective:

- Maintains communications between the two traffic junctions.
- Manage different Traffic situations.
- Securely handles traffic control system at the junction.
  Authenticated service provider

3.4 Product Functions:

The flow of this Traffic Management System
1) A Camera device which capture the image of traffic at   particular lane and send it to specific control system.
2) The captured image will be automatically sent to image processing function.
3) The image processing function gives the output as number of vehicles present in the image.
4) That count will be assign to green signal of particular lane as consider a time duration of that signal.

4. SYSTEM DESIGN

4.1 Multi Threaded Programming:

A multi Threaded program contains 2 or more parts that can run concurrently. Each part of such a program is called a thread, and each thread defines a separate path of execution. Thus multithreading is a specialized form of multitasking. I use Runnable interface for continuous animation to take place. The runnable abstracts are unit of executable code; you can construct a thread on any object that implements runnable.

Java's threading is built into the language, which makes a complicated subject much simpler. The threading is supported on an object level, so one thread of execution is represented by one object. Java also provides limited resource locking. It can lock the memory of any object (which is, after all, one kind of shared resource) so that only one thread can use it at a time. This is accomplished with the synchronized keyword. The programmer must lock other types of resources explicitly, typically by creating an object to represent the lock that all threads must check before accessing that resource.

4.2 Swings:

Swing components are not implemented by platform specific code. Instead, they are written entirely in Java and are platform independent. The term lightweight is used to describe such elements. Some of the swing component classes used are :

- JFrame
- JMenu

- JMenuItem
- JScrollBar
- JSlider
- JButtons

4.3 System Architecture:

The system architecture consists of three main components that is client, device and the service provider. The client is using this appropriate system; the device used is Camera Device which is capturing the Image of current traffic at respective Lane. The service provider provides the service to the client according to the situation occur at that junction through the wireless network. The service provider handles the situation of traffic using the three main modules which are as follow in figure 1.
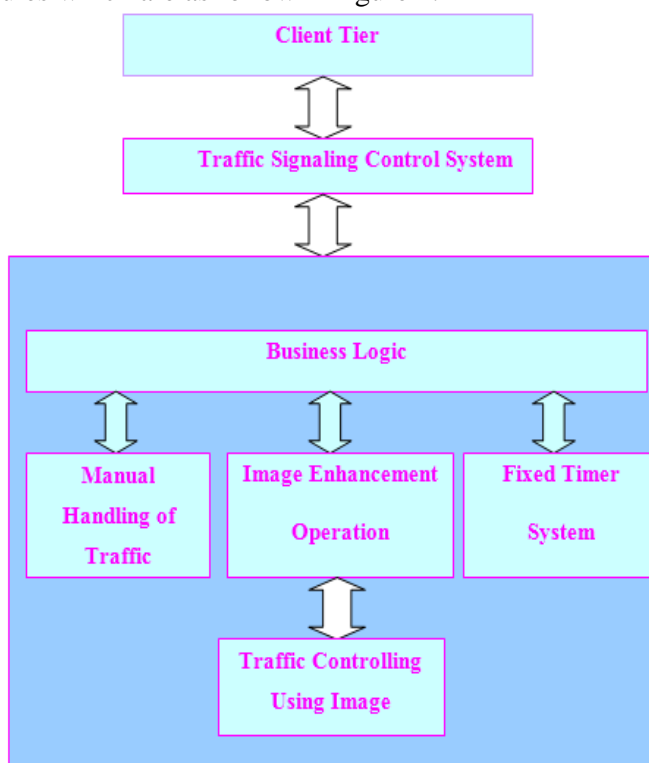

Figure 1: System Architecture

5. IMPLEMENTATION DETAILS

5.1 Modular Details:

This system is being develop comprising of several frames. The names of the frames under the scope of this system are revealed as under:

1) Login Screen
2) Main Form
3) Manual Traffic Management System Form.
4) Fixed Timer System Form.
5) Traffic Control System Using Image Processing Form.
6) Exit Form.

5.2 Database Details:

Actually in this system I am not useing any specialize database system but I require some memory space on Hard Disc Drive for storing captured image.

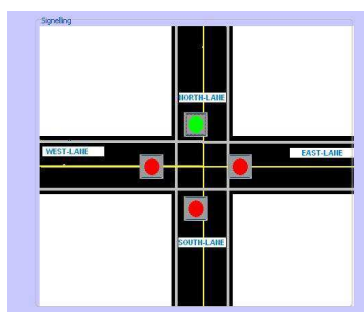**5.3 Interface Details:**

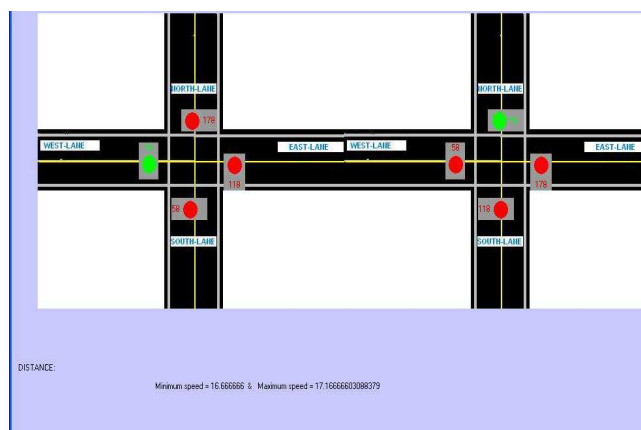Figure 2: Manual Traffic Management System
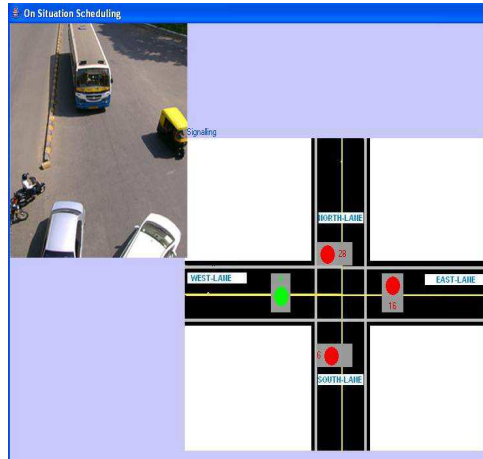

Figure 3: Fixed Timer System

Figure 4: Traffic Control System Using Image Processing

6. APPLIATIONS OF SYSTEM

The main application of this system is that it is a very helpful tool for the RTO Department.

This tool helps in the management of traffic. This tool will be of great help to the traffic police. His hectic job of standing in the sun and controlling the traffic will lessen. Also with the help of this tool the traffic police can catch hold of the people who break the traffic signals and traffic rules. They will no longer have to run after such people because the camera will capture images of such people and alert at the next junction. Thus this will also help in reducing crime. All people will have to follow the rules.

Also this tool will be very useful to the commuters who go to and fro from one place to another everyday for work. After long working they have to wait at the junctions for a long time. This tool will be of great use to these people because they will no longer have to wait for long for their signal to go green. This tool will help in reducing the rate of accidents which are taking place almost every day on busy streets. And also will help in reducing the rates of traffic jams.

If made some further changes this tool can also be used by the Railway Department. The movement of trains can be done with the help of this tool. This tool will also prevent the unwanted accidents which take place almost every day because of wrong signals given to the trains.

7. CONCULSION AND FUTUREWORK

Traffic management is becoming one of the most important issues in rapidly growing cities In India like Pune city. Due to bad traffic management lot of man-hours are being wasted. Regarding this problem, I have thought to develop a self adaptive system which can help in better traffic management.

The Primary objectives of this system was to develop an application that helps to manage traffic effectively by providing different strategies for different situations, to provide options to perform certain image enhancements operations on traffic images, to provide a good user interface for user to work with.

I came up with two different strategies for different situations depending on rate of change of traffic density.

In the first part I have implemented the basic traffic control system called the fixed time system which is implemented almost everywhere in India. Also in this part I have synchronized the signals serially. Synchronization of signals helps in saving time. In the second part I am using the technique of image processing for traffic control.

I am able to develop a self adaptive traffic management system, were I can be taken as foundation to develop better traffic management systems, and finally, it was a wonderful learning experience to work on the system.

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