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Review: Smart Traffic signal Management system using Image Processing

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Abstract - *Robust and reliable traffic surveillance system is an urgent need to improve traffic control and management. Vehicle flow detection appears to be an important part in surveillance system. The traffic flow shows the traffic state in fixed time interval and helps to manage and control especially when there's a traffic jam. In this project, we propose a traffic surveillance system for vehicle counting. The proposed algorithm is composed of five steps: background subtraction, blob detection, blob analysis, blob tracking and vehicle counting. A vehicle is modeled as a rectangular patch and classified via blob analysis. By analyzing the blob of vehicles, the meaningful features are extracted. The experimental results show that the proposed system can provide real-time and useful information for traffic surveillance.*

***Key Words*: Blob Detection, Background Subtraction, Template Matching, Smart Traffic management.**

1.INTRODUCTION

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the
input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems.

1.1 Software Requirements

1. Operating System: Windows

   Windows or win is an operating environment created by Microsoft that provides an interface, known as a Graphical User Interface (GUI), for computers.

2. Platform: .Net

   .Net allows you to access number of libraries that are specially intended with windows. The Common Language Runtime (CLR) is the component of the .NET Framework that allows you to compile and execute applications written in either C# or Visual Basic .NET.

3. OpenCV2.4.0

   OpenCV(Open Source Computer Vision) is the library of computer functions that aimed to real time computer vision. It is developed by Intel now maintained by Itseez. This OpenCV library is cross platform and open for use under the open source license.

4. Visual Studio 2012

   Microsoft Visual Studio is an IDE from Microsoft which is used to develop computer programs for Microsoft Windows, as well as web sites, web apps, web services and mobile apps. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It can produce both native code and managed code

1.2 Hardware Requirement

1. Operating System: Windows.
2. Expected Hard Disk : 250 GBMin
3. Expected RAM: 4GBMin
4. Arduino Board: 2
5. LED display : 4
6. WSN network
7. Standard Input/Output Devices

For developing this system we require a system which is having Windows Operating system to start the application. To synchronize the data between application and Arduino board we require a WSN network. To start the application we require a system of Minimum hard disk of 250GB and RAM of 4GB is required. To display the result, we require 2-Ardino board and 4-LED displays.

1.3 ALGORITHM TO BE USED

1. Blob Detection

A blob is a region of an image in which some properties are constant or approximately constant All the points in the blob can be considered in some sense to be similar to each other.

In computer vision, blob detection methods are aimed at detecting regions in digital image that differs in properties (Brightness, colour etc.).

Here we are using the property consistent motion.

Image 1.3.1: Blob Detection

2. Background Subtraction

Background subtraction is used to generating foreground mask. In some weather conditions like Cloudy or Rainy the algorithm is not able take appropriate input due to weather condition.

To avoid this we are using Background subtraction algorithm.

Fig: 1.3.2(a)

The above image 1.3.2(a) shows the actual condition of the traffic.

Image 1.3.2(b): Background subtraction

The above image 1.3.2(b) shows the background subtracted image.

3. Template Matching

Template matching is a technique in digital image processing for finding small parts of an image which match a template image.

Template matching algorithm is used to detect priority vehicles.

2. System Architecture

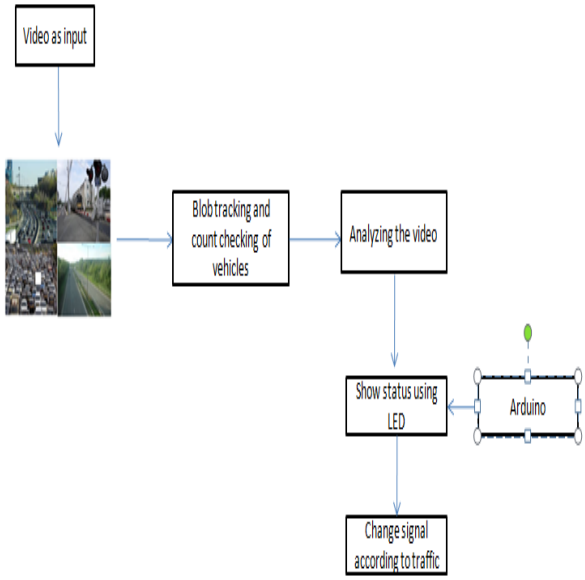

Image 2. System Architecture

The Above diagram shows the architecture of design of smart traffic signal management. Firstly user has to select four videos as input for the analysis of the traffic data. The

condition of the traffic is identified by using Blob Detection and Blob tracking algorithm.

If the traffic condition is high then the threshold condition will be get activated and the signal time is set for the particular threshold.

If the traffic condition is normal means vehicle count is less then according to the traffic condition the signal time will be get changed by the result given by the Blob detection and blob tracking algorithm.

The result of the algorithm is passed to the Arduino board as input to make changes into the signal timing.

3.Waterfall Model.

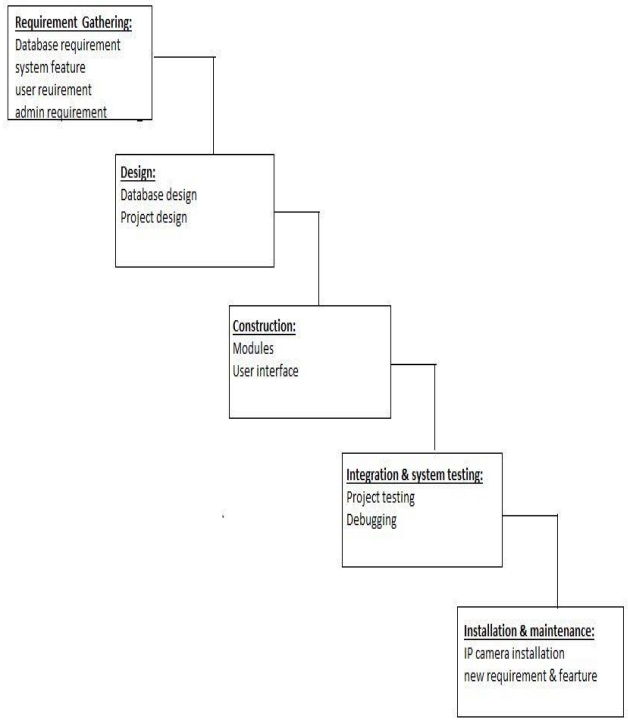

Image 3. Waterfall Model

The Waterfall Model was first Process Model to be introduced. It is also referred to as a linear-sequential life cycle model. It is very simple to understand and use.

In a waterfall model, each phase must be completed fully before the next phase can begin. This type of model is basically used for the for the project which is small and there are no uncertain requirements. At the end of each phase, a review takes place to determine if the project is on the right path and whether or not to continue or discard the project. In this model the testing starts only after the development is complete. In waterfall model phases do not overlap.

4. CONCLUSIONS

We are developing a proposed system which will detect the traffic from video input and Analyze the traffic condition. Also it counts the no of vehicle and based on that the status of traffic and analyzed data the traffic signal will be changed.

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