ISSN 2395-1621

Real Time Traffic Analyzer

[#1]Tejas Jori, [#2]Vaidehi Kulkarni, [#3]Kalyani Panchakshari, [#4]Amey Tipre, [#5]S.P. Patil

[1]tejasjori26@gmail.com
[2]vaidehikulkarni339@gmail.com
[3]panchakshari.kalyani@gmail.com
[4]ameytipre95@gmail.com
[5]Shivprasadpatil@sinhgad@edu

[#1234]Department of Information Technology,NBN Sinhgad School Of Engineering,Pune,India-411041
[5]Professor,Department of Information Technology,NBN Sinhgad School Of Engineering, Pune,India 411041

ABSTRACT

Adaptive and dependable traffic management system is an urgent need to improve traffic control and management. Traffic flow analyzation appears to be an important part in surveillance system. The traffic flow shows the traffic condition in a given time interval and assists to manage and control especially when there is a traffic jam. In this paper, we propose a traffic surveillance system for vehicle counting. The proposed system is composed of two algorithms: BLOB analysis (Binary Large Object) and ORB (Oriented FAST and Rotated BRIEF). The experimental result shows that the proposed system can provide real time and useful information for traffic surveillance.

Keywords: BLOB analysis, vehicle counting, SURF, SIFT, background subtraction, BLOB tracking, ORB

ARTICLE INFO

Article History

Received :15th April 2016

Received in revised form :

17th April 2016

Accepted : 19th April 2016

Published online :

23rd April 2016

I. INTRODUCTION

In recent years, the traffic management system is put forward to be discussed and studied because it can provide useful information such as traffic flow density, length of queue, average traffic speed and the total vehicle in fixed time interval. Ideally, the traffic analyzing system requires more sensors. We require video input captured through CCTV camera. We take this input using CCTV camera because of its low cost and its potential ability to collect large amount of information about number of vehicles. The CCTV cameras are connected to a computer that performs image/ video processing, object identification and object tracking. Numerous research projects aiming to detect and track vehicle from stationary cameras have been carried out in terms of measuring traffic performance during the past decades. It is widely recognized that vision based system are flexible are dynamic in traffic monitoring application if they can be made sufficiently reliable and robust. As the main goal for a traffic surveillance system, the evaluation of traffic conditions can be represented by traffic flow rate and traffic density. Many of the proposed methods used to acquire traffic condition information are based on vehicle detection and tracking techniques. In these systems, adaptive and dependable vehicle detection and tracking is a critical step. In this paper, we describe the computer based system to count vehicles moving on roads. The system involves analyzing a sequence of road images which represent flow of traffic for the given time period and place.

II. RELATED WORK

The traffic management system which was already in use, that system was unable to give us information about traffic situation in real time.The author G. Salvi [2] presented about BLOB analysis algorithm. This algorithm was developed in 1979, but at that time CPU speed was very slow, so BLOB analysis was not getting used. In earlier days, the computer was very bulky and it performed fewer calculations at a time but nowadays, computer is capable of faster calculations. So we can use BLOB analysis algorithm for real time applications as the CPU's are faster.

The author Zhu Diaxian [3] presented about SIFT algorithm. SIFT is known as "Scale Invariant Feature Transform". This algorithm was published in 1999, but got presented in 2004. It also has drawbacks like SURF. It has very low speed and does not give exact vehicle count. It has low accuracy. It does not work with blur images and lighting changes. It is not good choice for real time processing as it is highly expensive and due to this

drawbacks we are not using SURF and SIFT for image processing.

The author Dong Hui and Han Dian Yuan [6] presented about SURF algorithm. SURF is known as "Speeded Up Robust Features". This algorithm was first presented in 2006. But it has some drawbacks. This algorithm does not give exact vehicle count and also it is not time efficient. It has low precision. It is not good for real time processing, as it has low speed and high computational cost.

III.SYSTEM WORKING

In this system we use the video input recorded by means of a CCTV camera placed at traffic signals. Then we extract images from the recorded video by using ORB algorithm. We apply background subtraction to the extracted images and we obtain contour of vehicles present in the image. We identify whether the objects in the image are actual vehicles or other non essential objects. We perform tracking of the blobs to determine whether the vehicle is moving or stationary. We use clustering to classify the blobs with similar specifications in clustering. After classifying we count the number of vehicles in each blob separately. Then finally we send the vehicle count of the desired location to the user and thus complete users' request.Fig.1 represents workflow of the system.

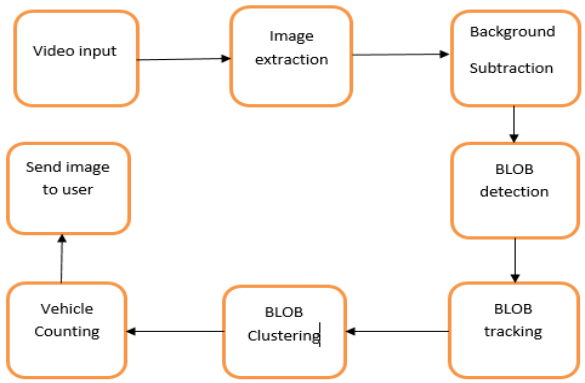

Fig.1: System workflow

IV.PROPOSED METHODOLOGY

We use two algorithms in this system which are BLOB algorithm and ORB algorithm.
BLOB (Binary Large Object) algorithm:
There are five steps in this algorithm. These are as follows:

i) Background Subtraction

In background subtraction, we either subtract foreground of the image from the background or background from the foreground. The background of image is generally defined as object which are constant (buildings and roads) or moving in small amounts (like trees). The algorithm then implies a Bayes decision rule for classification of background and foreground.

ii) Blob Detection

The background subtraction model provides the pixels identified as foreground. In the blob detection model, these pixels are clustered together in current frame by contour detection. All the vehicles will be identified as separate blobs.

iii) Blob Analysis

The blob analysis module is the most important stage in the algorithm. This module receives the CB with their position, as inputs, and gives the new blob in the current video frame. The blob analysis module identifies which CB in the current frame belongs to the same vehicle. For instance, there can be many CB corresponding to a same vehicle, due to mistakes in foreground detection. This correspondence is computed using the position. The positions of the CB, in present frame, are compared using the k-Means clustering. Optimal k for k-Means is decided by the following step: we execute the k-Means on the provided dataset multiple times for different k, and the best of these is selected. The best value of k is defined as follows:

Algorithm 1 Compute k

```
k ← n
for i = 1 to n − 1 do
        Ci ← kmeans(cb, i, labelsi);
        if Ci ≤ δ then
                k ← i
                return;
        end if
end for
```

where n and cb are respectively the number and the vector of centroids of the CB in the current frame, finally δ is a threshold that determines whether a set of CB belongs to the same vehicle. The function kmeans implements a k-means algorithm that finds the centers of i clusters and groups the input samples CB around the clusters. On output, contains a 0-based cluster index for the example stored in the row of the samples matrix. The output of this module are the blobs that detect the vehicles in each frame.

iv) Blob Tracking

In order to achieve the traffic-flow counting, the given method will track each blob within successive image frames. Minimum distance and same size of blobs needs to be searched in the past frames. Two objects that are closest in the adjacent frames are connected. Euclidean distance is used to calculate the distance between their centroids. Besides, the area of a vehicle is also considered for enhancing the vehicle tracking.

v) Vehicle Counting.

The main object of this part is to count and register the vehicle flow for each lane to achieve automatic counting for the vehicle passing. The moving vehicle is counted when it crosses the base line. When the vehicle goes through the specified area, the frame will be recorded.

vi) ORB (Oriented FAST and Rotated BRIEF)

ORB algorithm is the combination of FAST algorithm and BRIEF algorithm. FAST is known as Feature from Accelerated Segment Test and BRIEF is known as Binary Robust Independent Elementary Features. ORB

describes feature points by using binary string. Since the feature points of ORB are detected by improved FAST feature detection and improved BRIEF feature descriptor.

In the foreground frame, extracted ORB features to match with feature set of objects present in our database and select good key points. These key points are used to find the position and update feature set.

V. RESULTS / DISCUSSION

Experimental Results

This system is implemented in C#. The system can operate on 30 frames per second on a quad core processor at 2.4 GHz.

The working of the system starts by taking a video input. The input taken will be by positioning the camera in the centre of a cross road junction. Thus we will obtain images for all the four views around the signal. The image below (fig 2) describes this working.

According to the image, we obtain vehicle count of the vehicles moving in each view. Also the priority vehicles – (Ambulance and fire brigade trucks) will be mentioned separately. These vehicles being prioritized will receive special attention from the system and their count will be mentioned.

In fig.3, we see that after entering the mobile number the user will get notification about traffic condition.

Fig .2: Results of the System

VI. CONCLUSION

In this paper, the system designed is very useful, reliable and user friendly.Here we present the system to detect and count moving vehicles in traffic scene using BLOB analysis Algorithm. This paper has made acquire professional outlook towards problem statement to solving it to its best and optimum

REFERENCES

1] Feng Wang , "A Robust Blob Recognition and Tracking Method in Vision-based Multi-touch Technique", IEEE International Symposium on Parallel and Distributed bProcessing with Applications, ISPA 2008, 10-12 Dec 2008.

2] G.Salvi et.al "An Automated vehicle counting system system based on Blob Analysis for Traffic Surveillance" 11-12 Dec. 2009 ACM International conference on multimedia.

3] Zhu Daixian et.al "SIFT algorithm analysis and optimization" 9-11 April 2010 Image Analysis and Signal Processing (IASP), 2010 International conference.

4] Ethan Rublee , Vincent Rabaud , Kurt Konolige, "ORB: An efficient alternative to SIFT or SURF ", 2011 IEEE International Conference on Computer Vision, ICCV 2011,6 Nov 2011.

5] Nabeel Younus Khan, Brendan McCane, Geoff Wyvill, "SIFT and SURF Performance EvaluationAgainst Various Image Deformations on Benchmark Dataset", 2011 International Conference on Digital Image Computing: Techniques and Applications, 6 Dec 2011.

6] Dong Hui , Han Dian Yuan et.al "Research of image matching algorithm based on SURF features**"** 24-26 Aug. 2012 computer science and information processing 2012 International conference.

7] A.V.Kulkarni , J.S.Jagtap , V.K.Harpale , "Object recognition with ORB and its Implementation on FPGA" ,International Journal of Advanced Computer Research, (ISSN (print):-7970) Vol-3 ,11 September 2013.

8]M. Piccardi, "Background subtraction techniques: a review", IEEE International Conference on Systems, Man and Cybernetics 2014,pp. 337-344. H. Veeraraghavan, O. Masoud, and N.P. Papanikolopoulos, "Computer visionalgorithms for intersection monitoring," IEEE Trans. Intell. Transport. Syst., vol. 4, no. 2, pp. 78-89, June 2015.

9] M. Bertozzi, A. Broggi, M. Cellario, A. Fascioli, P. Lombardi, and M. Porta, "Artifical Vision in Road Vehicles",Proc. IEEE, vol. 90, no. 7, pp. 1258-1271, 2002.

10] R. Bishop, "Intelligent Vehicle Applications Worldwide", IEEE Intelligent Systems, 2000.

11] R. Cucchiara, M. Piccardi, and P. Mello, "Image analysis and rule based reasoning for a traffic monitoring system,"IEEE Trans. Intell. Transport. Syst., vol. 1, no. 2, pp. 119-130, June 2002.

12] H. Veeraraghavan, O. Masoud, and N.P. Papanikolopoulos, "Computer vision algorithms for intersection
monioring," IEEE Trans. Intell. Transport. Syst., vol. 4, no. 2, pp. 78-89, June 2003.

13] L. Li, W. Huang, I. Y. Gu, and Q. Tian, "Foreground object detection from videos containing complex background",Proc. of the Eleventh ACM

international Conference on Multimedia, Berkeley, CA, USA, November 02 08, 2003.

14] S. Suzuki, K. Abe., "Topological Structural Analysis of Digital Binary Images by Border Following.", CVGIP, v.30, n.1. 1985, pp. 32-46.

15] C.Stauffer and W.E.L. Grimson, "Adaptive background mixture models for real-time tracking", Proc. IEEE CVPR 1999, pp. 246-252, June1999.

