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Vehicle Detection and Traffic Assessment Using Videos

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***Abstract*: Using Image features automatic vehicle detection and classification can be done. Here captured a two wheeler and four wheeler real videos using digital camera and mobile cameras. The Video is splitting into number of frames. Then region of interest (vehicle) is obtained to count. To obtain vehicle contour/edges, edge descriptors (canny) are applied. Feature extraction is applied to the extracted vehicle region which is cropped. The model of vehicle type is represented by the pair wise geometrical histogram (PGH) and edge features. Specially for polygonal shape purpose the PGH is a powerful shape descriptor. We can apply this for an irregular shape. The features are trained with (NN) neural network. The test image is also processed in same steps. Then the vehicle is classified as two or four wheeler based on input and trained features. The percentage of accuracy is given. The traffic is assessed based on the region count and some predefined knowledge about traffic surveillance. So the work deals with automatic vehicle detection, classification and traffic surveillance in restricted vehicle count. The work can be improved by including sound and video surveillance and better feature extraction techniques.**

***Keywords*: PGH, NN**

1. Introduction

Now a days, everywhere digital cameras and computers have become wide-spread due to the number of applications using vision techniques has increased significantly

Traffic surveillance is one of the applications that has received significant attention from the computer vision community.

A new traffic surveillance system which works without prior, explicit camera calibration. It has the ability to perform surveillance tasks in real time.

The ground planes were derived using geometric primitives common to any traffic scène is based on Camera intrinsic parameters and its position. Before, they use optical flow and knowledge of camera parameters to detect the pose of a vehicle in the 2D/3D world. This information is used in a model-based vehicle detection and classification technique employed by our traffic surveillance application.

The people are facing heavy traffic problem due to busy schedule of work style. Traffic problems are arised due to narrow road, improper traffic controllment by the controller & also avoiding rules & road signals. So a survey is must for proper traffic management. The planning, monitoring and control or influencing of traffic is the Traffic management. To maximize the effectiveness of the use of present infrastructure, ensure reliable and safe operation of transport, address environmental goals & ensure fair allocation of infrastructure space (road space, rail slots, etc.) among competing transporters is the main purpose. Hence an Intelligent Transportation System is become an essential part of life to survive & better benefit, safety of human life. It is one of the effective way to solve the traffic jam which is caused by rapid development of urbanization and automobile industry. The video image sequence is a combination of digital video images and artificial pattern recognition technology. It analyzes the video images with characteristics of intuition, efficiency, wide detection range and high precision in traffic monitoring system.

There are many methods to detect moving targets such as Background subtraction and Frame difference method, as well as a number of ways to tracking vehicles such as region-based, dynamic contour, feature-based methods. The remainder of this paper is structured as follows. In Section 1, we discuss some of the important related works for efficient traffic management and safety purpose in the area of traffic surveillance system. In Section 2, we discussed about proposed System. Module and module description is given in Section 3. Experimental results defined in Section 4. Finally, we defined the Conclusion.

2. Block diagram

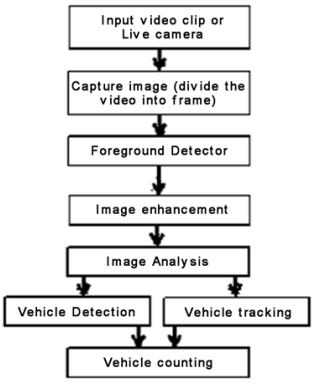

Fig. 1. Block diagram of traffic detection

A. Related work

For efficient traffic management and safety purpose in the

area of traffic surveillance system Vehicle detection and tracking plays an effective and significant role. So here we are detecting vehicle / traffic data from video frames. Vehicle data recognition and tracking is done using Gaussian mixture model and blob detection methods.

The foreground from background in frames is differentiated by learning the background. In traffic detection video frames, foreground detector detects the object and a binary computation is done to define rectangular regions around every detected object. A morphological operations have been applied to detect the moving object correctly and to remove the noise. By tracking the detected objects and their regions the final counting is done.

[1] G D Sullivan, K D Baker, A D Worrall, C I Attwood and P R Remagnino (1997) reported the current state of work to simplify our previous model-based methods for visual tracking of vehicles for use in a real-time system intended to provide continuous monitoring and classification of traffic from a fixed camera on a busy multi-lane motorway. The system developed uses three main stages: (i) pose and model hypothesis using1-D templates, (ii) hypothesis tracking, and (iii) hypothesis verification, using 2-Dtemplates. Stages (i) & (iii) have radically different computing performance and computational costs, and need to be carefully balanced for efficiency.

[2] A.N Rajagopalan and R. Challapa (2000) have presented a scheme for vehicle detection and tracking in video. The method effectively combines statistical knowledge about the class of vehicles with motion of vehicles. Statistical learning and parameter estimation, moving object segmentation, object discrimination and tracking are used. The system effectively detects and tracks vehicles, even against complex backgrounds. The method is also reasonably robust to orientation, changes in scale and lightning conditions.

[3] Surendra Gupte, Osama Masoud, Robert F. K. Martin (2002) presented algorithms for vision-based detection and classification of vehicles in monocular image sequences of traffic scenes recorded by a stationary camera. The system consists of segmentation, region Tracking, recovery of Vehicle Parameters, vehicle Identification, vehicle Tracking &vehicle Classification steps.

[4] Neeraj K. Kanhere Shrinivas J. Pundlik Stanley T. Birchfield (2005) presented a method to segment and track vehicles in low-angle situations. The technique is based upon tracking feature points throughout a block of frames from the image sequence, then grouping those features using several motion-related cues. They present a novel combination of background subtraction, extending plumb lines, and multi-level homography to determine the height of features using a constraint we call the relative height constraint.

B. Proposed system

Based on edge/shape features the work classifies the vehicles as two/four wheeler. The neuro classifier uses for classifying the images. The traffic surveillance is determined based on the object count and threshold value. Later work can be carried by combining video/still images with acoustic/sound signal.

The system consists of two phases such as training phase & testing phase.

We are also implementing the video and converting it to still images and when the emergency vehicles arrives it should clears the road.

Advantages of proposed system

- Intelligent Transportation System (ITS) is an effective way to solve the traffic jam.
- It analyzes the video images with characteristics of intuition, efficiency, wide detection range and high precision.
- It reduces the death rate & accident rate, an automatic traffic surveillance system.

C. Modules

- Input image
- Pre-processing
- Edge extraction
- Discrete wavelet transform (DWT)
- Traffic Detect

D. Experimental results

1) Input Video

Here in this module we take the Video and we pass it to the next module for further processing. Here we are converting video to frames.

Fig. 2. Input Video

2) Pre-processing

The processing helps in maximizing clarity, sharpness and details of features of interest towards information extraction and further analysis.

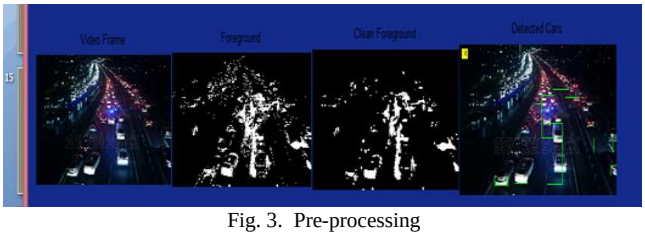

Fig. 3. Pre-processing

3) Edge extraction

Edges are those places in an image that correspond to object boundaries. Edges are pixels where image brightness changes abruptly. An edge is a property attached to an individual pixel and is calculated from the image function behavior in a

neighborhood of the pixel. It is a vector variable (magnitude of the gradient, direction of an edge).

4) Discrete wavelet transform (DWT)

DWT is the algorithm used to reduce dimensionality of image so it used for image compression, feature extraction process.

5) Traffic Detect

This module detects the traffic in terms of total vehicles, congestion, detected vehicles.

Fig. 4. Traffic Detect

3. Conclusion

A traffic surveillance system that identifies, classifies and tracks vehicles. The system is capable of detecting, tracking and classifying. Here used feature based object detection and classification techniques. It is a fast technique, compared to the different strategies suggested in the literature. Based on edge/shape features the work classifies object (vehicle) as two wheeler or four wheeler. The traffic surveillance is determined based on object count and probable estimated size of road. The work can be enhanced by including road parameters, additional features, and images of more vehicles & can be combined with video signals. Our Future work is in vehicle following utilizing picture handling in which the vehicle plate picture is gotten by the advanced cameras and the picture is prepared to get the number plate data. A back picture of a vehicle is caught and handled utilizing different calculations. Advance we are intending to learn about the attributes required with the programmed number plate framework for better execution.

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