Vedio Based Vehicle Detection, Counting And Classification System

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ABSTRACT Traffic Analysis has been a problem that city planners have dealt with for years. Smarter ways are being developed to analyze traffic and streamline the process. Analysis of traffic may account for the number of vehicles in an area per some arbitrary time period and the class of vehicles. People have designed such mechanism for decades now but most of them involve use of sensors to detect the vehicles i.e. a couple of proximity sensors to calculate the direction of the moving vehicle and to keep the vehicle count. Even though over the time these systems have matured and are highly effective, they are not very budget friendly. The problem is such systems require maintenance and periodic calibration. Therefore, this study has purposed a vision based vehicle counting and classification system. The system involves capturing of frames from the video to perform background subtraction in order detect and count the vehicles using Gaussian Mixture Model (GMM) background subtraction then it classifies the vehicles by comparing the contour areas to the assumed values. The substantial contribution of the work is the comparison of two classification methods. Classification has been implemented using Contour Comparison (CC) as well as Bag of Features (BoF) and Support Vector Machine (SVM) method. keywords: Contour Comparison (CC) ,Bag of Features (BoF). Support Vector Machine (SVM)

I. INTRODUCTION

A good alternative to these techniques can be video based surveillance systems. Video surveillance systems have become cheaper and better because of the increase in the storage capabilities, computational power and video encryption algorithms. The videos stored by these surveillance systems are generally analyzed by humans, which is a time consuming Job. To overcome this constraint, the need of more robust, automatic video based surveillance systems has increased interest in field of computer vision.

The objectives of a traffic surveillance system is to detect, track and classify the vehicles but they can be used to do complex tasks such as driver activity recognition, lane recognition etc. The traffic surveillance systems can have applications in a range of fields such as, public security, detection of anomalous behavior, accident detection, vehicle theft detection, parking areas, and person identification. A Traffic surveillance system usually contains two parts, hardware and software. Hardware is a static camera installed on the roadside that captures the video feed and the software part of the system is concerned with processing and analyses. These systems could be portable with a microcontroller attached to the camera for the real-time processing and analyses or just the cameras that transmit the video feed to a centralized computer for further processing.

II. EXISTING SYSTEM

vehicle detection and counting is a challenging task due to many reasons such as: small size of the vehicles, different types and orientations, similarity in visual appearance of vehicles and some other objects (e.g., air conditioning units on the buildings, trash bins, and road marks), and detection time in very high resolution images is another challenge that researchers need to take in consideration.the number of the cars detected has been determined by the estimation of the detected regions. Hyper feature map that combines hierarchical feature maps have been used in an accurate vehicle proposal network (AVPN). Vehicle location and attributes have been extracted by the proposed coupled regional convolution network method which merges an AVPN and a vehicle attribute learning network. Fast and Faster R-CNN have been explored . In order to overcome the limitations in Fast and Faster R-CNN, a new architecture has been proposed. They have improved the detection accuracy of the small-sized objects by using the resolution of the output of the last convolution layer and adapting anchor boxes of RPN as feature map.

Disadvantages of Existing System:

- unable to detect in poor visual video streams
- there is no vehicle classification

III. PROPOSED SYSTEM

The system could be used for detection, recognition and tracking of the vehicles in the video frames and then classify the detected vehicles according to their size in three different classes. The proposed system is based on three modules which are background learning, foreground extraction and vehicle classification as shown in Background subtraction is a classical approach to obtain the foreground image or in other words to detect the moving objects.

Background Learning Module This is the first module in the system whose main purpose is to learn about the background in a sense that how it is different from the foreground. Furthermore as proposed system works on a video feed, this module extracts the frames from it and learns about the background. In a traffic scene captured with a static camera installed on the road side, the moving objects can be considered as the foreground and static objects as the background. Image processing algorithms are used to learn about the background using the above mentioned technique.

Foreground Extraction Module This module consists of three steps, background subtraction, image enhancement and foreground extraction. Background is subtracted so that foreground objects are visible. This is done usually by static pixels of static objects to binary 0. After background subtraction image enhancement techniques such as noise filtering, dilation and erosion are used to get proper contours of the foreground objects. The final result obtained from this module is the foreground.

Vehicle Classification Module The third and the last module in the proposed system is classification. After applying foreground extraction module, proper contours are acquired, Features of these contours such as centroid. Aspect ratio, area, size and solidity are extracted and are used for the classification of the vehicles.

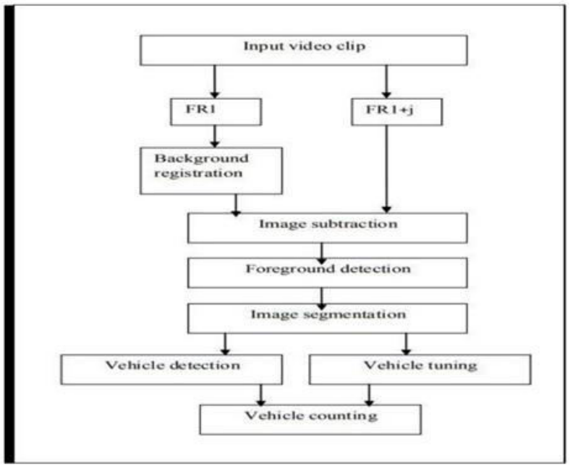
Advantages:

- Detection of multiple moving vehicles in a video sequence
- Tracking of the detected vehicles.
- Identification of Vehicle types.
- Counting the total number of vehicles passing in videos. 4.Objectives
- Detection of multiple moving vehicles in a video sequence.
- Tracking of the detected vehicles.

• Colure identification of Vehicles.

• Counting the total number of vehicles in videos.

IV. SYSTEM ARCHITECTURE



V. MODULES

Region of Interest selection: In the very first frame of the video, I define a ROI by drawing a close line on the image. The goal is to recognize that ROI in a later frame, but that ROI is not a salient vehicle. It is just a part of an vehicle, and it can deform, rotate, translate and even not be fully in the frame.

Vehicle Detection: Active strategy to choose a search window for vehicle detection using an image context was proposed a deep CNN framework (AttentionNet) to capture the vehicle by sequential actions with top-down attention. AttentionNet has achieved satisfactory performance on vehicle detection benchmark, by sequentially refining the bounding boxes. Proposed a sequential search strategy to detect visual vehicles in images, where the detection model was trained by proposed a deep RL framework to select a proper action to capture an vehicle in an image

DNN Training: One of the compelling features of our network is its simplicity: the classifier is simply replaced by a mask generation layer without any smoothness prior or convolution structure. However, it needs to be trained with a huge amount of training data: vehicles of different sizes need to occur at almost every location.

Vehicle Tracking: Visual tracking solves the problem of finding the position of the target in a new frame from the current position. The proposed tracker dynamically pursues the target by sequential actions controlled by the ADNets. The ADNet predicts the action to chase the target moving from the position in the previous frame. The bounding box is moved by the predicted action from the previous position, and then, the next action is sequentially predicted from the moved position. By repeating this process over the test sequence, we solve the vehicle tracking problem. The ADNet is pre-trained by SL as well as RL. During actual tracking, online adaptation is conducted.

Location updating The ADNet is designed to generate actions to find the location and the size of the target vehicle in a new frame. The ADNet learns the policy that selects the optimal actions to track the target from the state of its current position. In the ADNet, the policy network is designed with a CNN , in which the input is an image patch cropped at the position of the previous state and the output is the probability distribution of actions, including translation and scale changes. This actionselecting process has fewer searching steps than sliding window or candidate sampling approaches. In addition, since our method can precisely localize the target by selecting actions, post processing, such as bounding box regression, is not necessary

Vehicle Counting: In this module detected vehicles will be counted and these counted results will be updated frequents based on vehicle detection, results will be printed streaming video using opencv.

VI. CONCLUSION

And Future Work The proposed solution is implemented on python, using the OpenCV bindings. The traffic camera footages from variety of sources are in implementation. A simple interface is developed for the user to select the region of interest to be analyzed and then image processing techniques are applied to calculate vehicle count and classified the vehicles using machine learning algorithms. From experiments it is apparent that CC method outperforms than BoF and SVM method in all results and gives more close classification results to the ground truth values. Currently proposed system works with already captured videos but it can be modified to be used for processing live video streams[4] by adding microcontrollers. One of the limitations of the system is that it is not efficient at detection of occlusion of the vehicles which affects the accuracy of the counting as well as classification. This problem could be solved by introducing the second level feature classification such as the classification on the bases of color. Another limitation of the current system is that it needs human supervision for defining the region of interest. The user has to define an imaginary line where centroid of the contours intersects for the counting of vehicles hence the accuracy is dependent on the judgment of the human supervisor. Furthermore the camera angle also affects the system hence camera calibration techniques could be used for the detection of the lane for the better view of the road and increasing the efficiency. The system is not capable of detection of vehicles in the night as it needs the foreground objects to be visible for extraction of contour properties as well as features for the classification using SIFT features[31].The system could also be improved for better accuracy using the more sophisticated image segmentation and artificial intelligence operations.

REFERENCES

[1] S.-Y. Cheung, and P.P. Varaiya, “Traffic surveillance by wireless sensor networks: Final report”, PhD diss., University of California at Berkeley, 2006.

[2] S. Oh, S. Ritchie, and C. Oh, “Real-time traffic measurement from single loop inductive signatures”, Transportation Research Record: Journal of the Transportation Research Board, (1804), pp. 98-106, 2002.

[3] B. Coifman, “Vehicle level evaluation of loop detectors and the remote traffic microwave sensor”, Journal of transportation engineering, vol. 132, no.3, pp. 213-226, 2006

[4] M. Tursun, and G. Amrulla, “A video based real-time vehicle counting system using optimized virtual loop method”, IEEE 8th International workshop on Systems Signal Processing and their Applications (WoSSPA), 2013.

[5] M. Lei, D. Lefloch, P. Gouton, K. Madani, “A videobased real-time vehicle counting system using adaptive background method”, IEEE International conference on Signal Image Technology and Internet Based Systems (SITIS'08), pp. 523-528, 2008.

[6] N.C. Mithun, N.U. Rashid, and S.M. Rahman, “Detection and classification of vehicles from video using multiple time-spatial images”, IEEE Transactions on Intelligent Transportation Systems, vol 13, no 3, p. 1215-1225, 2012.

[7] R.T. Collins, et al., “A system for video surveillance and monitoring”, VASM final Report, Robotics Institute, Carnegie Mellon University, 2000, pp.1-68.

[8] G. Yang, “Video Vehicle Detection Based on SelfAdaptive Background Update”, Journal

of Nanjing Institute of Technology (Natural Science Edition), vol 2, p. 13, 2012.

[9] F. Liu, and H. Koenig, “A survey of video encryption algorithms”, computers & security, vol. 29, no 1, pp. 3-15, 2010.

[10] E. Bas, A.M. Tekalp, and F.S. Salman, “Automatic vehicle counting from video for traffic flow analysis”, IEEE Intelligent Vehicles Symposium, 2007