VEHICLE COUNTING AND TRACKING IN A TRAFFIC VIDEO SEQUENCE

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Abstract
Tracking and counting vehicles in unsupervised video on highways is a very challenging problem in computer vision with important practical applications such as to monitor activities at traffic intersections for detecting congestions, and then predict the traffic flow which assists in regulating traffic. Manually reviewing the large amount of data they generate is often impractical. The background subtraction and image segmentation based on morphological transformation for tracking and counting vehicles on highways is proposed. This algorithm uses erosion followed by dilation on various frames. Proposed algorithm segments the image by preserving important edges which improves the adaptive background mixture model and makes the system learn faster and more accurately, as well as adapt effectively to changing environments.
Index Terms: Vehicle detection, background subtraction, morphological operator, traffic analysis

I. INTRODUCTION

In recent year, as the result of the increase in vehicle traffic, many problems have appeared. For example, traffic accidents, traffic congestion, traffic induced air pollution and so on. Traffic congestion has been a significantly challenging problem. It has widely been realized that increases of preliminary transportation infrastructure e.g., more pavements, and widened road, have not been able to relieve city congestion. As a result, many investigators have paid their attentions on intelligent transportation system (ITS), such as predict the traffic flow on the basis of monitoring the activities at traffic intersections for detecting congestions. To better understand traffic flow, an increasing reliance on traffic surveillance is in a need for better vehicle detection such at a wide-area. Automatic detecting vehicles in video surveillance data is a very challenging problem in computer vision with important practical applications, such as traffic analysis and security. Vehicle detection and counting is important in computing traffic congestion on highways. A system like the one proposed here can provide important data for a particular design. The main objective of our study is to develop methodology for automatic vehicle detection and its counting on highways.
A system has been developed to detect and count dynamic objects efficiently. Intelligent visual surveillance for road vehicles is a key component for developing autonomous intelligent transportation systems. The algorithm does not require any prior knowledge of road feature extraction on static images. We present a system for detecting and tracking vehicles in surveillance video which uses segmentation with initial background subtraction using morphological operator to determine salient regions in a sequence of video frames. Edges will be counting which shows how many areas are of particular size then particular to car areas we locate the points and counting the vehicles in the domain of traffic monitoring over highways.

II.PROPOSED WORK

Brief survey of the related work in the area of video segmentation and traffic surveillance is presented in this section. Chen et al., [1], [2] have addressed the issues regarding unsupervised image segmentation and object modelling with multimedia inputs to capture the spatial and temporal behaviour of the object for traffic

monitoring. In [3] algorithms for vision-based detection and classification of vehicles in monocular image sequences of traffic scenes are recorded by a stationary camera. Processing is done at three levels: raw images, region level, and vehicle level. Vehicles are modelled as rectangular patterns with certain dynamic behaviour. Daniel et al., [4] presents the background subtraction and modelling technique that estimates the traffic speed using a sequence of images from an uncalibrated camera. The combination of moving cameras and lack of calibration makes the concept of speed estimation a challenging job. Cheng and Kamath [5] compare the performance of a large set of different background models on urban traffic video. They experimented with sequences filmed in weather conditions such as snow and fog, for which a robust background model is required. Kanhere et al., [6] applies a feature tracking approach to traffic viewed from a low-angle offaxis camera. Vehicle occlusions and perspective effects pose a more significant challenge for a camera placed low to the ground. Deva et al., [7] proposes a concept to automatically track the articulations of people from video sequences. This is a challenging task but contains a rich body of relevant literature. It can identify and track individuals and count distinct people. Toufiq P. et al., in [8] describes background subtraction as the widely used paradigm for detection of moving objects in videos taken from static camera which has a very wide range of applications. The main idea behind this concept is to automatically generate and maintain a representation of the background, which can be later used to classify any new observation as background or foreground. In [9] background subtraction also involves computing a reference image and subtracting each new frame from this image and thresholding the result. This method is an improved version of adaptive background mixture model, it is faster and adapts effectively to changing environments.

IV.MATHS:

Dilation:

$$X \oplus Y = \{z \in E | (Y^8)_z \cap X \neq \phi\}$$

Where

$$Y^8 = \{a \epsilon E | -a \epsilon Y\}$$

$$D(X,Y) = X \oplus Y = \bigcup_{x \in X} Y_x$$

Erosion:

$$x \ominus y = \{z \in E | Y_z \subseteq X\}$$

Where

$$Y_z = \{y + z | y \in Y\}, \forall z \in E$$

$$D(x,y) = x \ominus y = \bigcap_{y \in Y} X_{-y}$$

V.RESULTS AND DISCUSSION

Simulation is performed using MATLAB Software. This is an interactive system whose basic data element is an array that does not require dimensioning. It is a tool used for formulating solutions to many technical computing problems, especially those involving matrix representation. This tool emphasizes a lot of importance on comprehensive prototyping environment in the solution of digital image processing. Vision is most advanced of our senses, hence images play an important role in humans' perception, and MATLAB is a very efficient tool for image processing.

Fig.1 Original Image

Fig.2 Extracting Frames from video sequence

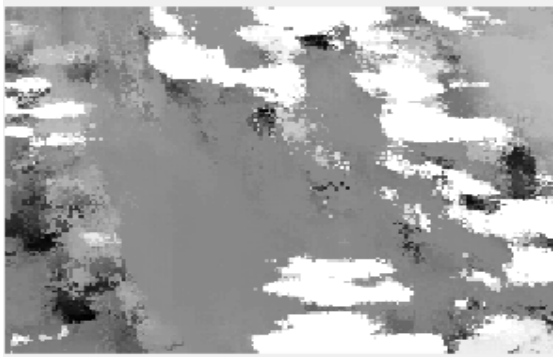

Fig.3 Background Detection

Fig.4 Grayscale of the frames

Fig.5 Background subtraction

Fig.6 Morphological image

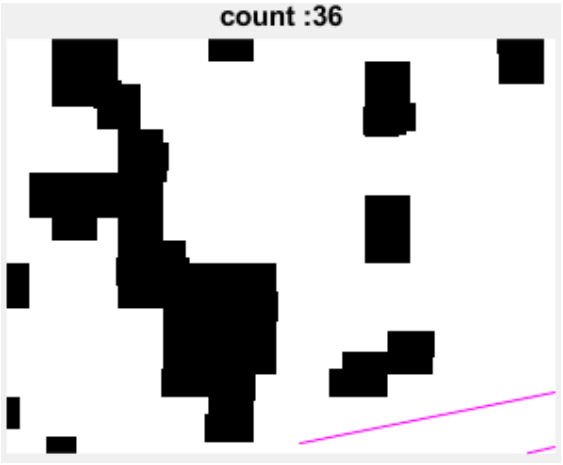

Fig.7 Counting vehicles

V.CONCLUSION

In this paper, we present a background registration technique and segmentation using morphological operator A system has been developed to detect and count dynamic objects on highways efficiently. The system effectively combines simple domain knowledge about object classes with time domain statistical measures to identify target objects in the presence of partial occlusions and ambiguous poses, and the background clutter is effectively rejected. The experimental results show that the accuracy of counting vehicles was 96%, although the vehicle detection was 100% which is attributed towards partial occlusions.

The computational complexity of our algorithm is linear in the size of a video frame and the number of vehicles detected. As we have considered traffic on highways there is no question of shadow of any cast such as trees but sometimes due to occlusions two objects are merged together and treated as a single entity.

IV. REFERENCES

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