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Survey Paper on Object Detection and Tracking in Layered Images and Videos

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ABSTRACT: The main contribution of this paper is addressing a real and practical problem in layered sensing and in proposing a solution to a critical step namely, segment and register two or more video sequences of an area from different perspectives at mid-range. We intended to propose a method to jointly segment and register a pair of mid-range layered images. The main three approach of this work is i) Lager representation, ii) Joint appearance and Shape detection, iii) Tracking and Shot segmentation, **First phase** is , image is subjected in to two layers they are background and foreground. Background objects are still objects and foreground objects are moving objects. Global model is used to registering the background images. Then the **second phase** consist of two steps they are i) shape-based classification and ii) Appearance based localization, in this phase the moving objects are detected are from the foreground layer it will jointly utilizing the shape and appearance. In the classification process the wavelet based appearance representations with Improved Support Vector Machine (ISVM) classifier were proposed to extract the compactness and leanness of the moving objects. In localization Principal component analysis (PCA) and time-delay neural networks is used to localize the moving objects with various sizes in the foreground layers. In the **third phase** is the shot segmentation problem, in this phase the object tracking for long sequence is attained by utilizing this segmentation. Then the sequence is segmented in to spot object tracking is produced as a matching problem on weighted bipartite graphs. Each and every object corresponds to a node every possible matching between two nodes in adjacent frames to a weighted edge whose weight reflects the trade-off between shape appearance similarity and geometric proximity. The proposed approach will be implemented in MATLAB and planned to be evaluated using various video clips.

KEYWORDS: Segmentation, Improved Support Vector Machine (ISVM), Principal component analysis (PCA).

I.INTRODUCTION

Traffic flow in many large urban areas are monitored and managed using data from a variety of sensors. The traditional technologies for traffic sensing, including inductive loop detectors and video cameras, are positioned at fixed locations in the transportation network. While these detectors do provide useful information and data on the traffic flows at particular points, but they generally do not provide useful data for traffic flows over space. So it is not possible to move the detectors, and hence they are not capable of providing data on vehicle trajectories and paths through the network. By using these sensors it is also difficult to identify traffic flow characteristics such as speeds, acceleration/deceleration and routing information of individual vehicles.

Multi View Imaging (MVI) has attracted great attention recently due to its increasingly wide range of applications and the decreasing cost of digital cameras. This opens up many new and interesting research topics as well as applications, such as virtual view synthesis for three dimensional (3-D) television (3-DTV) and entertainment, high-performance imaging, video processing and analysis for surveillance, distance learning, industry inspection . Tracking multiple targets using fixed cameras with non-overlapping views is a challenging problem. One of the challenges is predicting and tracking through occlusions caused by other targets or by fixed objects in the scene. Tracking multiple targets using fixed cameras with non-overlapping views is a challenging problem. One of the challenges is predicting and tracking through occlusions caused by other targets or by fixed objects in the scene. Many complex video-related vision tasks require the segmentation of moving objects from the background. For instance, tracking systems locate moving objects first and then find their temporal trajectories. Surveillance systems need to detect movement in their field of view.

II.SYSTEM MODEL AND ASSUMPTIONS

Due to increase in traffic there is a high demand in traffic monitoring of densely populated urban areas.
The traditional technologies for traffic sensing: Inductive loop detectors and video cameras, are positioned at fixed locations in the transportation network.

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Due to the increasing traffic over the last decades poses high challenges on today's traffic research and planning. Due to the increase in computerization road systems are equipped with a suite of sensors for monitoring traffic status. The Most of the examples are Induction loops, overhead radar sensors, and video systems. They all deliver accurate reliable timely yet point wise measurements. Airborne and space borne imaging systems, on the other hand, provide synoptic views of complex traffic situations and the associated context. These data are complementary to the ones of road sensors and can be used in research for improving traffic models or as information source for traffic-related statistics.

III.LITERATURE REVIEW

1)Hsu-Yung Cheng , This paper authors have presented, the video based systems are important as compared to traditional system it can capture a large variety of information. Vehicle tracking system is to deal with day time and night time traffic surveillance system, vehicles are treated at different conditions. Headlights are important features for tracking vehicle it need to be located and initialize vehicles. An algorithm based computation is developed to pair the headlights and initialize vehicles. Authors has applied specialized system state transition model of Kalman filter for the traffic surveillance cameras. Vehicles are detected through background modelling using Gaussian Mixture Model. It is difficult to segment out the vehicles at night, foreground image that can be detected the use of headlights, auxiliary lights and reflections of lights of vehicles. The experimental result shows that the proposed method is more efficient and reliable with the specialized state transition model, the prediction can be made error free and more accurately for tracking vehicles in both daytime and night time surveillance videos.

2) Jens Leitloff, Stefan Hinz, This paper authors have presented, a vehicle detection and tracking system that is designed to operate under the challenging conditions. Instead of tracking entire vehicles, vehicle features are tracked, which makes the system less sensitive to the problem of partial occlusion. The same algorithm is used for tracking in daylight, twilight and night time conditions, it is self-regulating by selecting the most salient features for the given conditions. Common motion over entire feature tracks is used to group features from individual vehicles and reduce the probability that long shadows will link vehicles together. Also during high wind camera motion is accounted by tracking a small number of fiducial points.

3) Pejman Niksaz, This paper have given a new approach for the size of the traffic estimation. This is implemented by the 4 main steps 1) image acquisition 2) RGB to grayscale transformation 3) image enhancement and 4) morphological operations. Two different methods of vehicle tracking methods are discussed 1) Object definition based on object contour extraction 2) Vehicle tracking based on motion detection. Advantages of this new method are 1) Non-use of sensors 2) Low cost and easy setup and relatively good accuracy& speed**.** Disadvantage of this system is it is more sensitive to light. This problem can be overcome by using specific filters during Image Processing or changes in Matlab code.

4) Goo Jun, J. K. Aggarwal, Muhittin Gokmen, For a given image, a background subtraction algorithm is applied to obtain foreground masks, from which blobs are obtained by a connected component analysis. Occluded vehicles are detected based on shapes and orientations of blobs. For segmentation, first compute motion vectors associated with the

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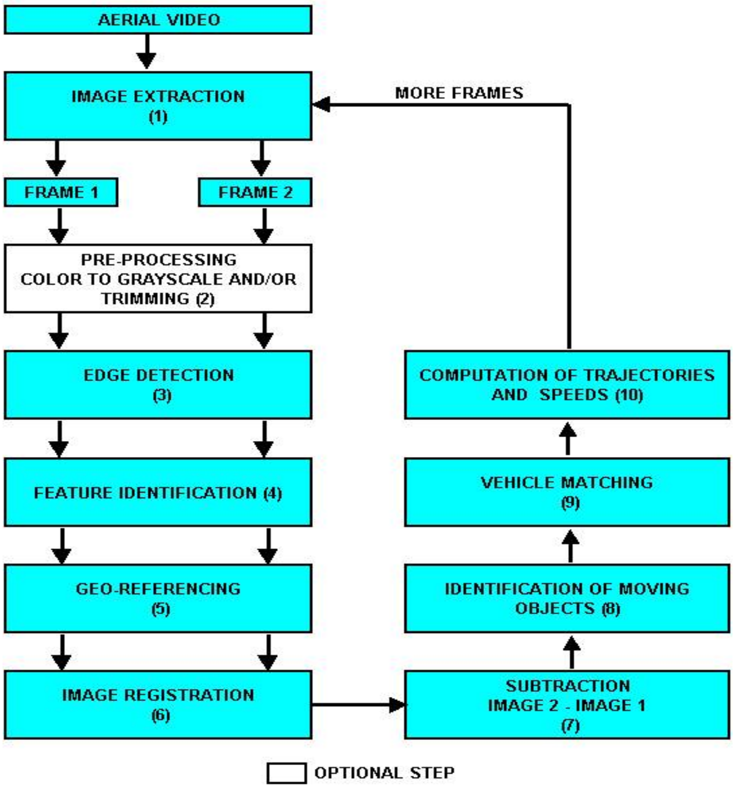
blob by detecting feature points from consecutive image frames. Obtained motion vectors are then grouped into two clusters, and over segmented image fragments are assigned to one of the clusters that best represents the fragment's or movement. In this authors have taken video clips of resolution 320*240 and 25 frames /sec. SIFT is used feature point extraction &descriptor matching. Hough transform is used for lane detection technique.

5) Ping-Feng Chen, Hamid Krim,, Layered images refer to imageries taken from different perspectives and possibly by different sensors. Registration and segmentation are therefore the two main tasks which contribute to the bottom level, data alignment, of the multisensor data fusion hierarchical structures. This approach is a combination of multiphase active contour method with joint segmentation & registration technique (MPJSR) carried out in the local moving window. The objectives of MPJSR are 1) To segment objects of interest using a multiphase active contour method 2) To register the segmented objects which are presented in both the images 3) To track the objects with in the video.

6) Fanjing Kong, Qixiang Ye, Ning Zhang, Ke Lu, Jianbin Jiao, In this paper authors have, we invented a new feature set, called the histograms of multi-scale orientations (H-MSO), for vehicle representation and detection. The multi-scale orientations on image pixels are calculated using Gabor filters of different scale and orientation parameters. Firstly, we divide the image into cells, and calculate the histograms of multi-scale orientations in each cell by statistics. Then, the values of histogram bins are normalized in each four adjacent cells and are assembled to form the feature set. Finally, the feature set is used to train an SVM classifier for on-road vehicle detection. Experiments validate the proposed feature set and the detection algorithm.

IV. GENERALIZED STEPS FOR VEHICLE RECOGNITION AND IMAGE REGISTRATION

The algorithm presented below for vehicle detection and tracking is still being developed and tested. However, the contribution of this technique is to compensate for the motion of the camera platform. To do this, the idea is to detect individual vehicles in a frame, to register consecutive frames, and then to employ image transformation, image subtraction, and object matching to track individual vehicles. This process is described below flow chart.



Description of the above flow chart:

1) Two frames 1 or 2 sec apart are extracted from the video
2) To accelerate vehicle identification, the frames are pre-processed. Pre-processing operations include converting the frames to 8-bit grayscale and trimming the areas of the frame that do not contain the road (e.g., the top and bottom). A geo-referenced roadway mask is used to define the roadway edges.
3) Standard edge detection is performed on the frames.
4) Standard edge detection is performed on the frames.
5) The coordinates of the center of each image are found from the GPS and IMU data. The frames are parsed to search for concentration of white pixels, which outline both moving and Stationary objects. Precise scale of each frame is calculated from the camera's focal length and the elevation of the air craft.
6) The second frame is registered to the first one using the location, orientation and scale information from step5.
7) The two frames are overlapped and subtracted. The overlap between the two frames is usually between 65% and 85%, depending on the frame sampling interval, the image scale and the speed of the air craft.
8) After subtraction, only moving objects (vehicles) should have pixel values different from zero in the overlapping portion of the two frames.
9) However, in many cases stationary objects may be seen as moving objects (pixel values different from zero) because of limitations in geo-referencing accuracy. This is solved by setting a minimum speed threshold for moving objects (e.g. only objects with a displacement of more than 20 pixels). The vehicles are thus identified.
10) Matching the cars in the two frames is done using a minimum cost matching algorithm
11) After matching the vehicles, vehicle trajectories can then be derived from the time and position information in order to obtain traffic parameters such speed, density, spacing, etc. This procedure is then repeated for all the frames.

IV.OBERVATION

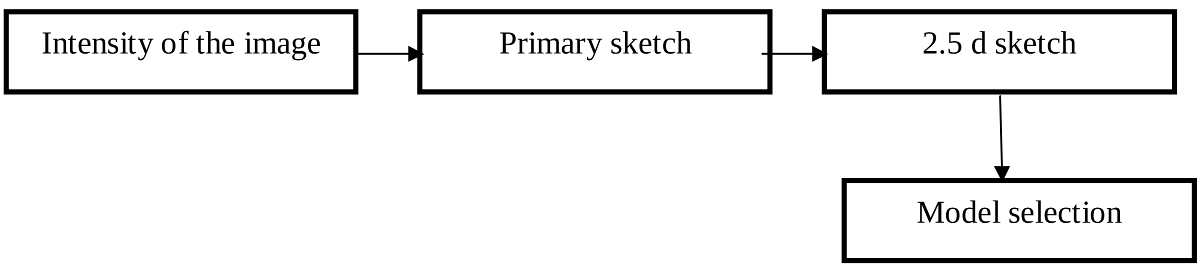
Object is existing in reality& discriminating from others. Object is a physical quantity.
Requirements of object recognition:

A) Process conditions and assumptions: 1) complicated shape, this is because of viewing from different directions.
2) Partially occluded by other objects.

B) Translation, Rotation, Scale Invariance: Robustness, stability & computing.

Approaches or object recognition:
1) Structural based
2) Model based
3) Stastical or appearance based approach
4) Category level or part approach
5) Constellation approach
6) Scalable or Indexed approach

1) Structural based: In this objects are recognized with colour, shape, size& position.
2) Model based:



3) Stastical or appearance based approach: It can classify a per colour, texture, shape or combination of two or three.

4) Category level or part approach: This helps in recognizing the parts ie: car, tyre, light etc….

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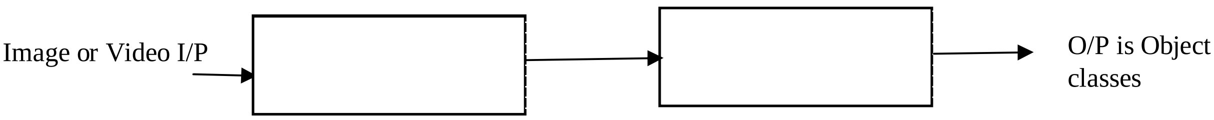
Conventional Recognition approach:



Fundamental steps in video analytics: There are 3 steps 1) Motion segmentation 2) Motion tracking 3) Motion Interpretation.
Support vector Machines: This is used to classify the classes.

IV. CONCLUSION

Study of several papers have given an over view on various vehicle tracking methods in real time. Different methods are proposed for vehicle detection for different weather conditions, heavy and light traffic. Different edge detection techniques and algorithms are presented. Each paper has its advantages and disadvantages. Recent study tells that SVM is playing an important role in dimensionality reduction for the accurate results. One can choose the correct algorithm and technique based on the individual idea and problem definition of the research.

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