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OBJECT DETECTION AND TRACKING FROM VIDEO USING SUPPORT VECTOR MACHINE

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ABSTRACT

This paper presents an accurate and flexible method for robust detection and tracking of vehicle objects in video sequence. Object tracking is the process of separating the moving object from the video sequences. Tracking is essentially a matching problem in object tracking. In order to avoid this matching problem, object recognition is done on the tracked object. Background separation algorithm separate moving object from the background based on white and black pixels. Support Vector Machines Classifier is used to recognize the tracked object. SVM classifier is supervised learning that associates with machine learning algorithm that analyse and recognize the data used for classification. SVM uses median filter which makes the system more robust by tracking and reduce the noise introduced by inaccurate detections.

Keywords: KEYWORD: OBJECT TRACKING, SVM, GABOR OPTICAL FLOW MEDIAN FILTER ETC.

I.INTRODUCTION

Consider a video stream taken by a hand-held camera depicting various objects moving in and out of the camera's field of view. Given a bounding box defining the object of interest in a single frame, our goal is to automatically determine the object's bounding box or indicate that the object is not visible in every frame that follows. The video stream is to be processed at frame-rate and the process should run indefinitely long. We refer to this task as long-term tracking.To enable the long-term tracking, there are a number of problems which need to be addressed. The key problem is the detection of the object when it reappears in the camera's field of view. This problem is aggravated by the fact that the object may change its appearance thus making the appearance from the initial frame irrelevant. Next, a successful long term tracker should handle scale and illumination changes, background clutter, and partial occlusions and operate in real-time.

Figure 1.1 Given a single bounding box defining the object location and extent in the initial frame (LEFT), our systemtracks, learns and detects the object in real-time. The red dot indicates that the object is not visible.

II.LITRATURE REVIEW

Xu and Ahuja [2] proposed a contour based object tracking algorithm to track object contours in video sequences. In their algorithm, they segmented the active contour using the graph-cut image segmentation method. The resulting contour of the previous frame is taken as initialization in each frame. New object contour is found out with the help of intensity information of current frame and difference of current frame and the previous frame.

Dokladal et al.[3] the proposed approach is active contour based object tracking. For the driver's-face tracking problem they used the combination of feature-weighted gradient and contours of the object. In the segmentation step they computed the gradient

of an image. They proposed a gradient-based attraction field for object tracking.

Li et al. [4] proposed a corner feature based object tracking method using Adaptive Kalman Filter. To represent moving object corner feature are firstly used. Then, the number of corner point variation across consecutive frames to is used to automatically adjust the estimateparameters of Kalman Filter.
Xue et al. [5] uses the discriminative features which are chosen by object/background separation, using a voting strategy. With the help of discriminative features they presented an improved mean-shift algorithm for object tracking.

Xu et al.[6] presented a new method for supervised object segmentation in video sequence. In the proposed method the user input object outline is considered as video object. In moving object tracking, the model incorporated the object's region segmentation and the motion estimation. Active contour model is also employed for contour fine-tuning.

Gu and Lee [7] introduced video object tracking system using backward region based classification. Their system consists of five steps, pre-processing of region, region extraction, motion estimation based on region, region classification and post-processing of the region. Semantic video object boundary is found using a combination of morphological segmentation tool and human assistance. Motion estimation, semantic video object compensation and frames boundary information is taken to find out other video objects in the remaining frames.

III.PROBLEM STATEMENT

Object tracking fundamentally entails estimating the location of a particular region in successive frames in a video sequence. Properly detecting objects can be a particularly challenging task, especially since objects can have rather complicated structures and may change in shape, size, location and orientation over subsequent video frames. Various algorithms and schemes have been introduced in the few decades, that can track objects in a particular video sequence, and each algorithm has their own advantages and drawbacks. Any object tracking algorithm will contain errors which will eventually cause a drift from the object of interest. The better algorithms should be able to minimize this drift such that the tracker is accurate over the time frame of the application. In object tracking the important issue that has to consider while the operating a video tracker are when the background is appear which is similar to interested object or another object which are present in the scene.

IV. SYSTEM MODEL

To overcome the different issue as discussed in previous section thereare following main component of object detection and tracking

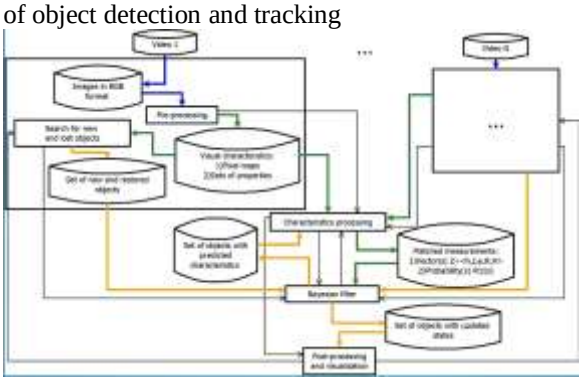

Figure 1.2: Pipeline of objects recognition and tracking in videos

Basic component of object tracking algorithm

a. Feature extraction

Any object tracking algorithm can be analyzed by the quality of information that can be extracted from video frames or an image. To get more exploit information from image, we use image formation technique to extract feature which are more important, significant to identify interested object uniquely without any disambiguation.

- From the image background in the scene and
- From many another objects which are present in the scene

For any tracking algorithm extracting feature is the important step which isallowing us to highlight the information of the interested object from the videoframes or target image plane. Extracted feature can be of three types:

- Low level extraction, e.g., motion, color, gradient
- Mid-level extraction, e.g., edge, corner, interest point, region
- High level extraction, e.g., centroid, area, orientation, whole object

b. Target representation

The model that can be used by any tracking algorithm to represent the interested object is known as target

representation. That model includes the information of interested object about the shape, size and appearance in an image. The model depends on the interested object and tracking algorithm that are used. There are different ways to model an interested object:-

- It may define priori of interested object
- It may snapshot of interested object
- It may be decided by training sample
- There are two ways of target representation
- Shape representation, e.g., centroid, rectangle, ellipse, rigid model, contours or point distribution model
- Appearance representation, e.g., template, histogram.

c. Localization

In localization, we describe how to localize an interested object over time, depending on the initial position. After initialization the localization step of a video tracker recursively estimates the stake X_k given the feature extracted from the video frames and the previous state estimates X1 : Xk. We can classify methods into two major classes

- Single Hypothesis Localization (SHL)
- Multiple Hypothesis Localization (MHL)

d. Track management

The tracking algorithms presented generally rely on the estimate of the interested object position in the video frame plane. In a specific application, it is an operational condition which is acceptable while a developing a tracker where it canrely on initialization by user. In the real time varying application of a number of interested objects, the tracker needs to use automated initialization and automated termination capability.

e. Trajectory

A trajectory (state) is the path that a moving object follows through space as a function of time. A trajectory can be described mathematically either by the geometry of the path or as the position of the object over time. It stores the actual path of the object of interest, i.e. information about the target in consecutive frames. We will get the all information about a target object that in which direction it moves and what is the speed of target.

V. PROPOSED IMPLEMENTATION

The Algorithm for Object Detection

1. Initially the first frame is considered as the background (bg).

2. For each pixel of the next input frame (fr) Subtract the pixel intensity value from the background image.
Difference = fr-bg
IF(Difference> Threshold)
fg = bg
ELSE
fg = 0
3. For each pixel of the background
IF (fg> bg)
bg=bg+1
ELSE
bg=bg-1
4. Perform certain Morphological operations on the extracted image ‘fg’ to improve the image quality.
5. Calculate the Centroid (c1,c2) of the binary image fg. The result of this operation is a set of two integers which determine the position of the moving object in the given frame.
6. Use Median Filter to improve the accuracy of the obtained centroid values.
7. Get the next input frame and Goto (Step 2).
8. Assume each pixel moves but does not change intensity.
9. Pixel at location (x, y) in frame1 is pixel at (x+Δx, y+Δy) in frame2
10. Pixel at location (x, y) in frame1 is pixel at (x+Δx, y+Δy) in frame2
11. Support Vector Machines classifier is used to recognize the tracked object. SVM classifier are supervised learning that associates with machine learning algorithm that analyse and recognize the data used for classification. SVM uses Median filter which makes the system more robust by tracking and reduce the noise introduced by inaccurate detections.
12. Then Compute the Euclidean distance for one dimension. The distance between two points in one dimension is simply the absolute value of the difference between their coordinates.
13. Then initialize Tracks function creates an array of tracks, where each track is a structure representing a moving object in the video. The purpose of the structure is to maintain the state of a tracked object. The state consists of information used for detection to track assignment, track termination, and display using bounding box.

14. then Median filter is applied for image process, we need to reduce noise before image processing, median filter algorithms determine the principles of an odd pixel window W, window size of each pixel arranged according to Gray, middle gray value

instead of the original F(i,j) the gray value, gray value as the center of the window g(i,j).
G(i,j)=median{F(i-k,j-l),(k,l € w)}

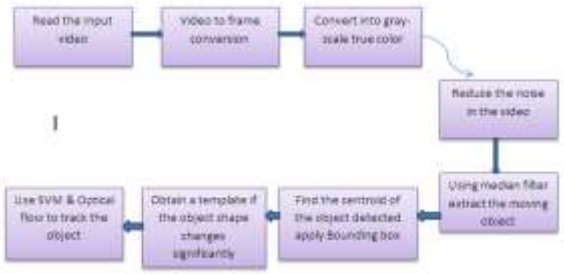

Figure 3: The Overall Process Of Moving Object Tracking From A Video Sequence

VI.RESULT

Object detection is a process of confirming a change in position of an object relative to its surroundings or the change in the surroundings relative to an object. Results of moving object detection in the continuous graph are shown in below figure.

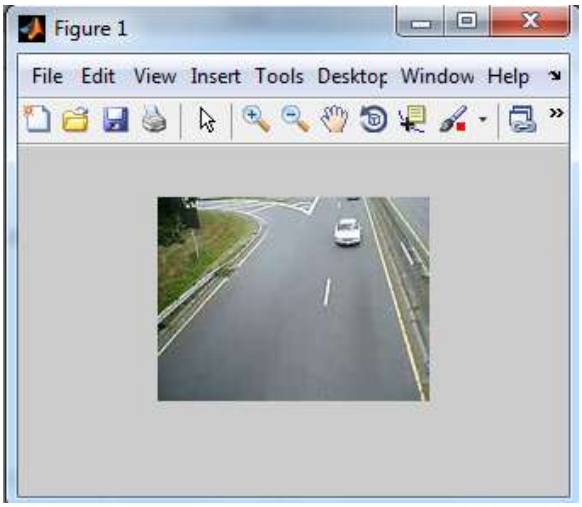

Figure 1: Input video frame moving object

Figure 1 shows the sample video frames taken for testing the algorithm, First we take the input video for track the object then it converts video in frame using Morphological operator.

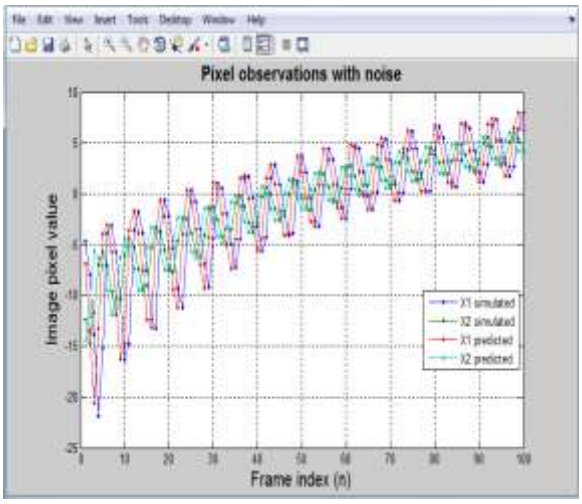

Figure 2: Pixel observation with noise of moving object

Figure 2 shows the noise of moving object, we can see that in above figure x1(in blue line), x2 (in green line) are simulated and x1 (in red line) , x2 (in cyan line) are predicted. The predicted value is always better than simulated value in pixel observation of noise.

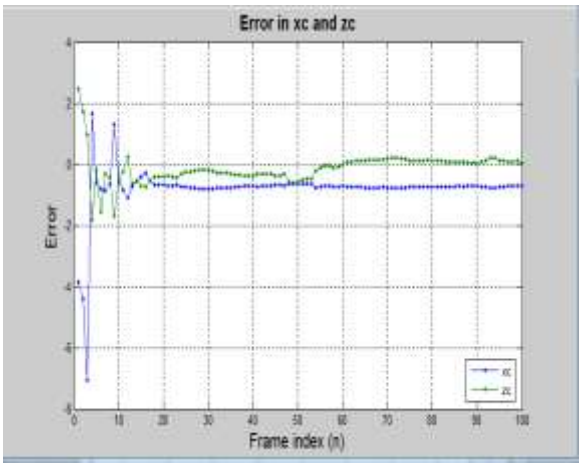

Figure 3: Error in XC & ZC of moving object

Error minimization for maximum no of frame index that lies from no of frame 10 to 100 that is (0, -1).

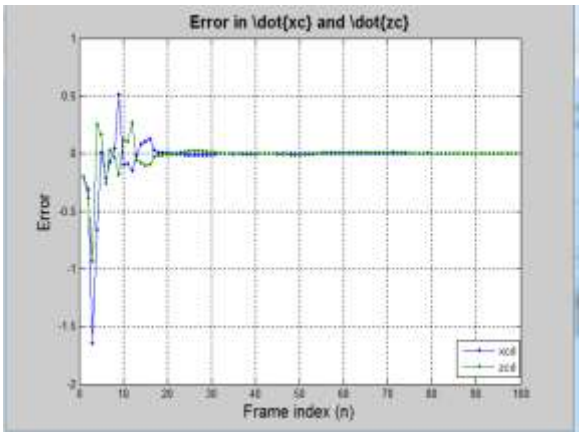

Figure 4: Pixel Error in dot {xc} & {zc} of moving object

The maximum error detection from 0 to 10 and rest 10 to 100 frames specifying maximum no of accuracy.

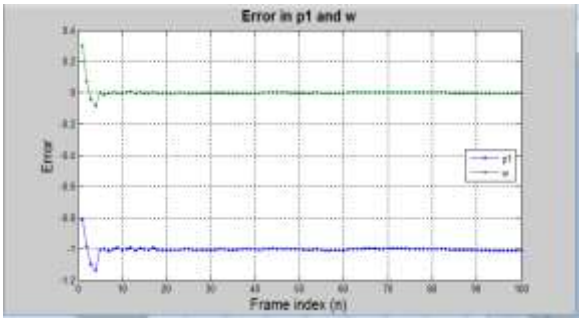

Figure 5: Error in p1 and w of moving object on Fame Index (n) & Error

we take in initial stage, video as input and then I have to find out the foreground detection from foreground Map ,current image and from that object and feature Extraction from that image after that object tracking and i want object processing and feature extraction.

VII.CONCLUSION

Support vector machine (SVM) is suitable for any type of video while the existing methods only suitable for compressed or ordinary videos. The noise and execution time is less compared to other methods. The morphological segmentation result of the initial frame is obtained by edge based modeling and an object framing algorithm. The segmentation result of the initial frame together with some change information from other frames is used to generate an initialization for segmentation of other frames. It is found that the proposed approach produces better objection and tracking results compared to edgeless and other schemes and comparable results with edge based approach. The scheme also gives better accuracy and is used for live stream purpose to the considered MRF based segmentation schemes for a number of video sequences.

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