DEVELOPEMNT AND ANALYSIS OF OBJECT TRACKING TOOL

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Abstract: Image processing is a technique of mining certain valuable information by transforming picture into digital form and through applying few operations over it. Detection and tracking of an object are significant and interesting jobs which are used in video surveillance and automobile navigation. Video surveillance is a methodology that operates in dynamic atmosphere for different types of applications events like games, public protection, and traffic handling. In today scenario, the video surveillance is an essential element of our daily routine life. At every public or private place we required object tracking mechanism for safety of the humans. Visual observation of actions of objects through programmed cameras without human involvement is an interesting issue. Detection of moving object is quite significant during intelligence observations. This article develops and analyses the results of proposed method of detecting and tracking an object into moving video. We have also separated the background section from the image. The main objective of this article is to provide a new method for object detection and tacking in an unfamiliar background which may diverge from an uncomplicated or white background to an enormously complicated background comprising of several objects of dissimilar form and dimensions. It significantly enhances the applicability of the application in a actual atmosphere instead of a simulated atmosphere.

Keywords: Object Detection and tracking, Image processing, Background detection

Introduction: The Image processing is a procedure which transforms a given image into digital sequence and accomplishes few procedures on it. It results either in an improved image or some mined information from it. The uses of image processing are distributed into several classes as follows:

1. Face Recognition – Identify a face from a sight [1-4].
2. Facial Expressions: Determine the expressions of a person in an image [5-6].
3. Visualization - Detect the objects which are not detectable.
4. Image improving and renovation - To produce a clear image.
5. Image retrieval - Search for the image of concern.
6. Object Tracking – Track a moving or still objects in a scene [7].

The object tracking performs a crucial part in the area of computer vision. Object tracking based methods have gained popularity owing to the accessibility of extremely refined computers, effective eminence and cheap image capturing devices. The primary phases of detection and tracking of objects are exhibited in figure 1.

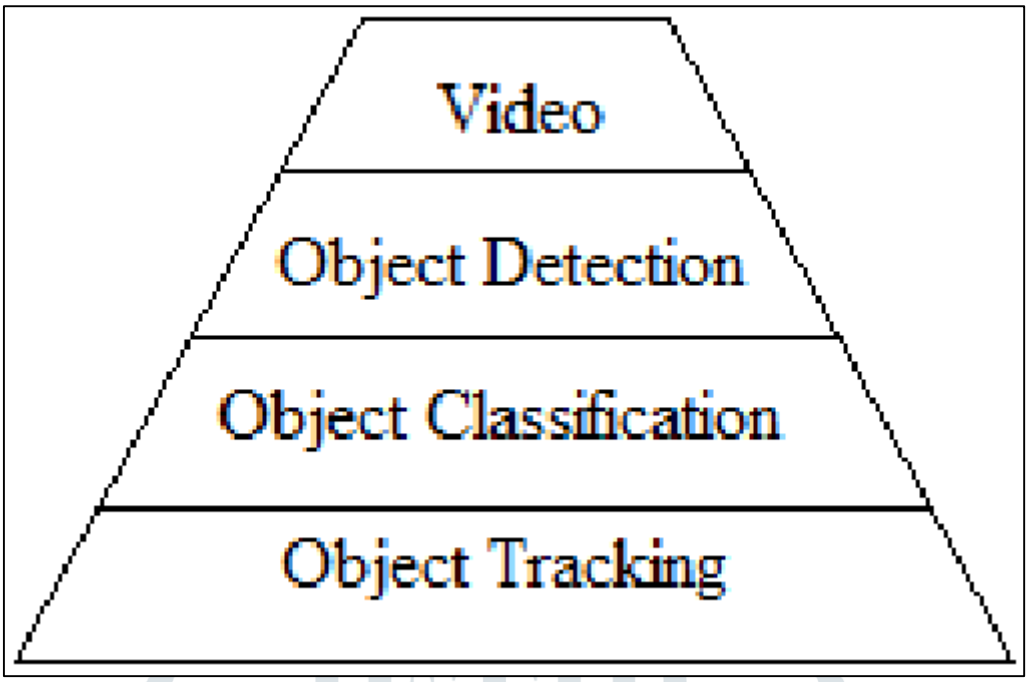

Figure 1: Object Tracking Steps

To accomplish the object tracking, the video examination, object movement identification, object categorization and frame to frame object comparing have been performed. The object detection manages the recognition of objects and its cluster pixels from video tape. In case of object classification, the objects are grouped into animals, human-being, automobiles and other moving substances. The tracking of object performs the election of Region of Interest and continuously tracks the movements and locations of objects from a video scene.

The Object tracking is a challenge of deciding the exact location of the object in a scene and other appropriate info of object's movement in an image structure. Recognition of an object from a scene has been one of the popular research areas. Plentiful methods have been suggested for detection of objects, however only few of them are used world-wide. Additionally, the actual world deployment of these structures is restricted through constraints like static or white context.

Related Work: Authors in [8] have suggested that in numerous applications of computer vision and image processing, the beginning of the processing are done through object detection and successively tracking. In current time, a widespread research in the area of object detection and tracking has been performed. Various outstanding methods have been established for this purpose comprising color segmentation, edge tracking etc. But, these methods are not much successful when employed in the actual world and were also confined by the restrictions like background of the scene must be white or uncomplicated. The authors have developed a method which can detect and track an object even in a complicated background in actual world video tapes or through a single camera. The recommended mechanism has been widely analyzed to work in complicated, actual atmosphere, non-simple, light variation and varying context.

Authors in [9] have analyzed that object detection and tracing are especially significant job in various computer vision areas of the life. The characteristics tally methods have some issues that have extreme computation intricacy and vulnerable sturdiness in different atmospheres. The authors have suggested a less complex and vigorous object detection and chasing through superior characteristics comparing in physical

atmosphere. The method identifies object through constant attributes and decreases size of attribute descriptor to handle different issues. The tests illustrates that their method is extra quick and vigorous than the conventional techniques and may trace object precisely in numerous situations.

Authors in [10] have illustrated the manner of performance of visual object tracing as well as semi-managed video object reduction in actual scenario through an uncomplicated method. Their method is known as SiamMask which enhances the offline teaching process of widespread complete involution Siamese methods of object tracing by enhancing their damage through a binary segmentation process. After training SiamMask is exclusively depends upon a one bordering box initialization and functions online generating class based uncertain object segmentation covers and swapped bordering boxes with few frames per second. In spite of its easiness, adaptability and quick velocity, their permits the establishment of a fresh condition between actual time trackers on VOT-2018 and simultaneously demonstrating the similar time reasonable enactment and the finest speediness for the semi-supervised video object segmentation process on DAVIS.

Authors in [11] have suggested that in current scenario, objects recognition, detection and tracking are the wide spread research fields in computing vision. An actual scenario objects tracking structure has been anticipated by the authors. They have focused on enhanced CamShift procedure that may track the moving objects with great precision. A flexible Gaussian contextual prototype has been suggested in this article. The system spontaneously revises the background and discovers the shape of relocating objects. Through analysis of various methods the article discovers the methods to endorse the enactment. The CamShift method completely detects the motion and performs the object tracking and it is employed for fixed background video series. The investigation outcomes illustrate that this method may discover overall moving objects in the scene and it is able to trace approximately all moving objects.

Object Tracking: Object tracking is the procedure of:

1. Receiving an original group of object recognitions (e.g. input array of surrounding rectangle coordinates)
2. Generating an exclusive ID for every starting recognitions
3. Now tracking movement of every object as it relocated across frames in a video while upholding the allocated unique IDs

Additionally, object tracking permits us to use a unique ID for every tracked object.

Proposed Solution:

We have used centroid measuring method to detect the movement of an object. It depends upon the Euclidean distance among previous object's centroids and the new object centroids across successive frames in a video. We have also used background subtraction method to make difference among current and reference frame (background).

Stage 1: Receive bounding box coordinates and calculate centroids using them as shown in figure 2.

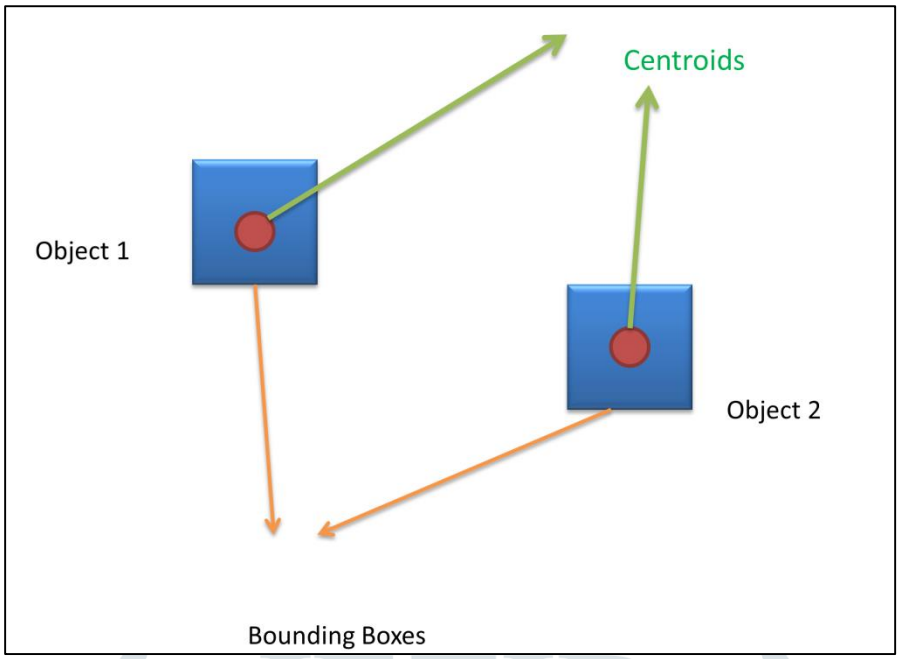

Figure 2: computation of centroids through Bounding Boxes

The centroid tracking method accepts that object tracker is going through an array of bounding box coordinates(x ,y) for all identified objects in each frame. These bounding boxes may be generated by any of object detector such as contour extraction, Haar cascades and SVM. After coordinates of bounding box have been computed the centroid or the center (x, y)-coordinates of the bounding box can also be computed. Each bounding box has been assigned a ID.

Stage 2: Calculate Euclidean distance among new bounding boxes and present objects.

For each succeeding frame in a given video stream, apply the stage 1 and compute the centroids. Now we should decide if the centroids of new objects can be linked to with the centroids *of* previous object.

Stage 4: Revise *(x, y)*-coordinates of previous objects.

Although the movement of a given object takes place among succeeding frames, however the distance among the centroids for consecutives frames will be lesser than all other distances among objects. Consequently, if we can relate centroids of minimum distances among succeeding frames, we may generate the object tracker.

Stage 5: Record new objects

In case extra inputs are identified than current objects being tracked, the new objects should be registered by allocating a new object ID to the it and by saving the centroid position of the bounding box of this new object.

Stage 6: Deregister previous objects

De-allocate ID from objects which are lost or disappeared.

The object boundaries can be measured by

$$Z(s) = \sum_{i=1}^{N} z_i b_i(s) \quad (1)$$

Where the variable s defines the position of a point z on an edge.

Experimental Results:

The suggest method has been tested for real as well as for recorded videos. Real world Background has been of used for experiments. Figure 3,4, and 5 detect moving objects(cars) from a recorded video. Figure 6 illustrates detection of cluttered background. This background contain white, colored and obstructed roof. The roof is obstructed by a moving fan. Therefor our method is successful in capturing a complicated background. Figure 7 illustrates detection of an object and its coordinates. There are two objects in the image, one moving human and one fixed object. The image has been captured through web cam. The method is successful in detecting both fixed and moving objects along with their coordinates. Figure 8 and 9 measure the coordinate position of a moving object in consecutive frames. Figure 10 differentiate between Foreground and Background images. Figure 11 illustrates that our method is successful in a complicated background.

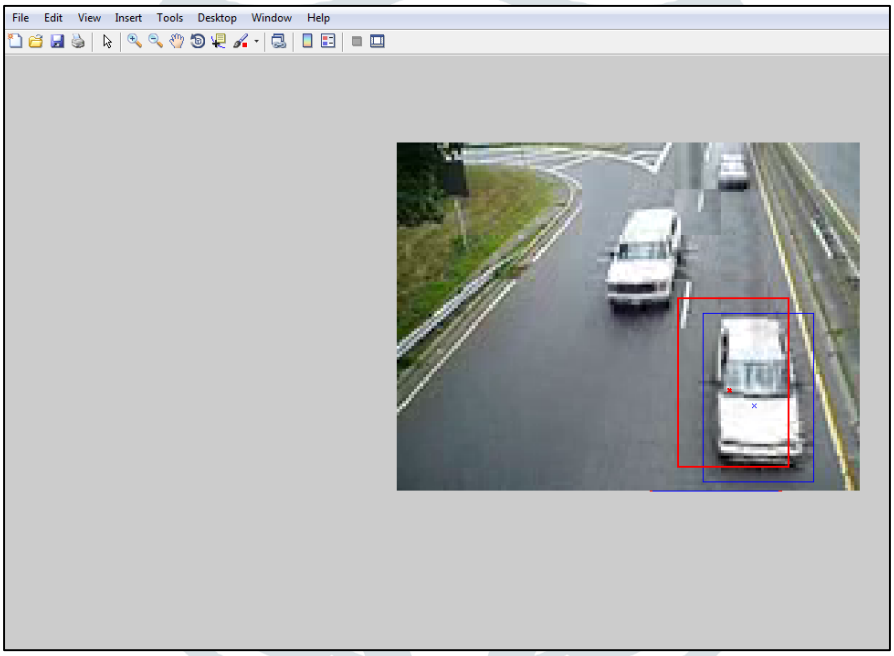

Figure 3: White Car detection from a recorded video

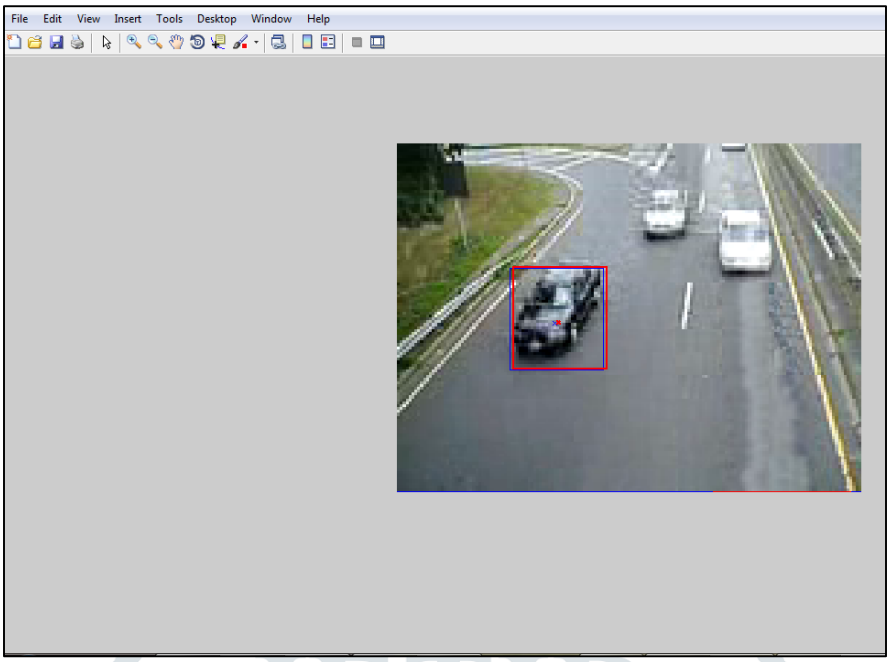

Figure 4: Black Car detection from a recorded video

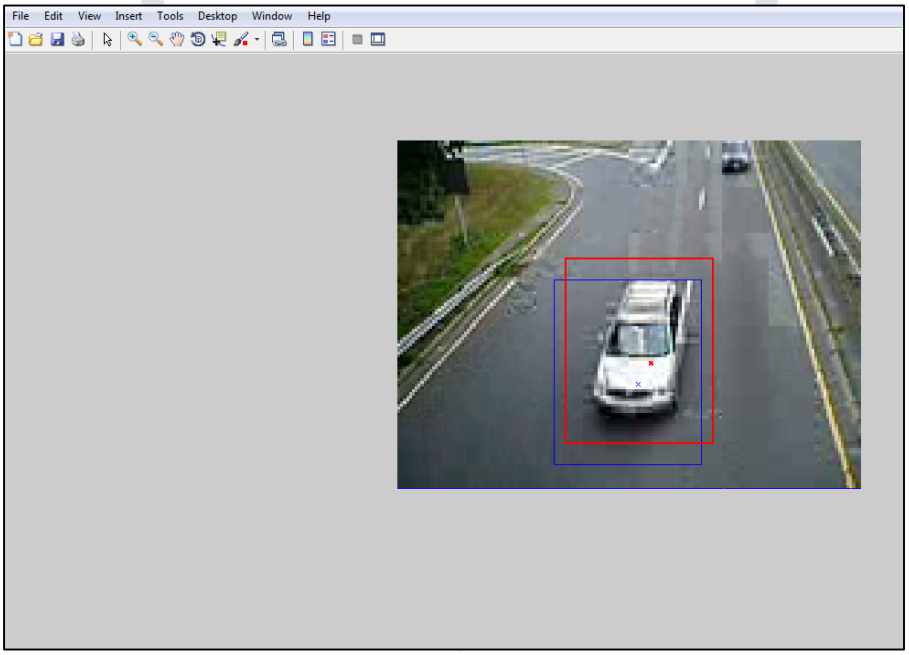

Figure 5: Car detection through centroid method

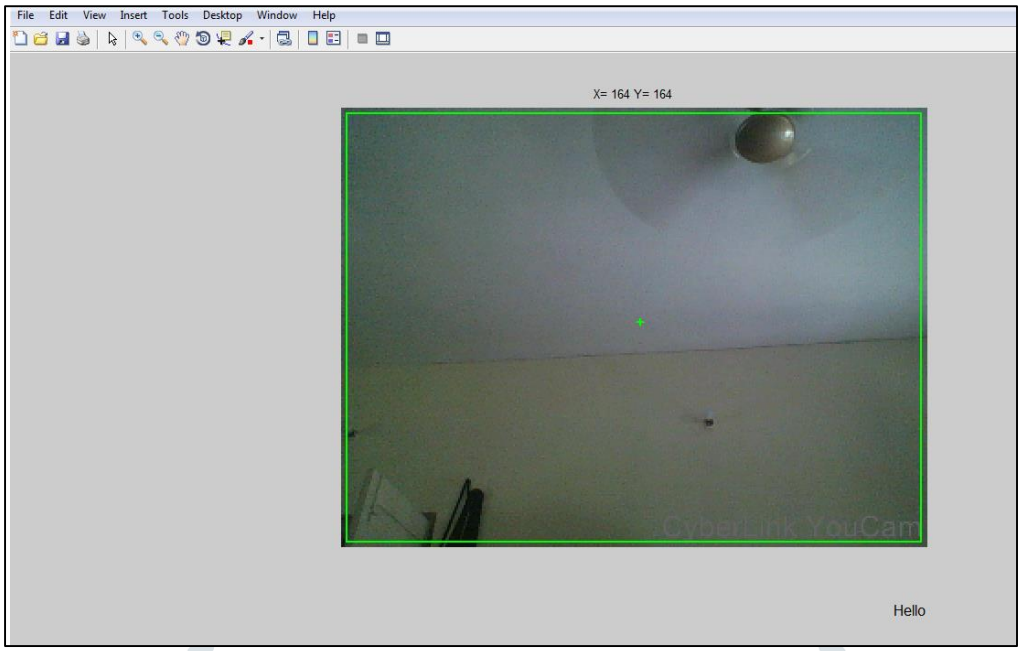

Figure 6: Detection of cluttered background

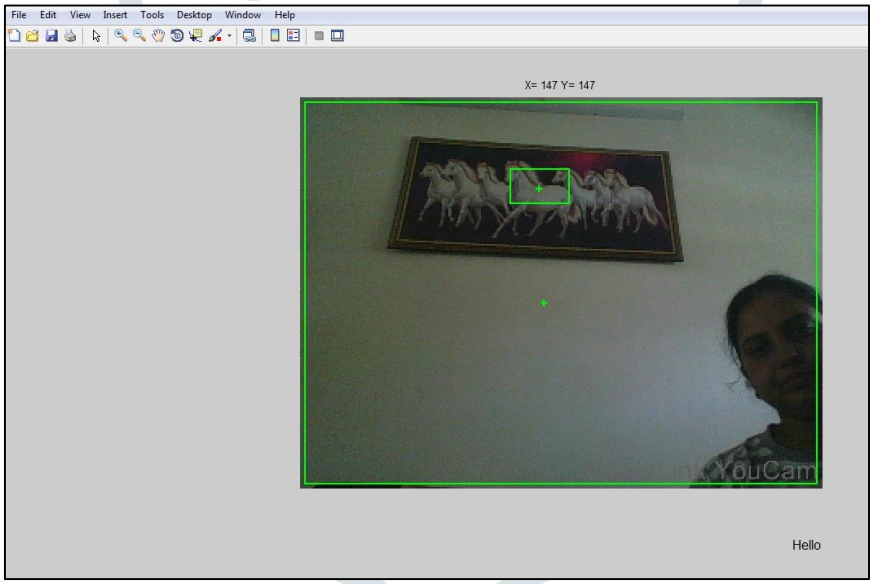

Figure 7: Detection of an object and its coordinates

Figure 8: Coordinate determination of a moving object

Figure 9: Coordinate determination of a moving object

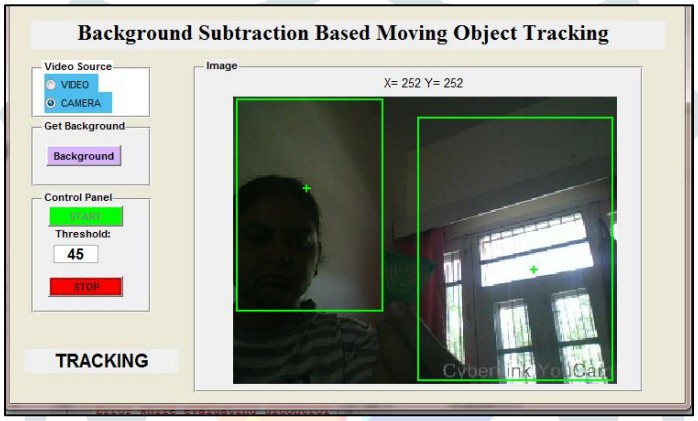

Figure 10: Differentiate between Foreground and Background

Figure 11: Capturing of mixed background

CONCLUSIONS

The projected method is used for object detection and tracking in new, simple and complicated real world scenarios. This method is based on centroid and background subtraction techniques. It is well examined to work in composite, physical world, non-simple and varying backgrounds. This work has been investigated the anticipated method to track mixed objects across an atmosphere involving messy objects of changing dimensions, outlines and colors. The employment of the method is quite quick and vigorous. It is also

capable of tracking the objects in illumination variation circumstances. Therefore, the planned method of object detection and tracking in unidentified and identified atmosphere is very useful in the area of computer vision for emerging actual world applications and also inventing presently prevailing methods to be functioning in the actual world.

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