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REAL TIME GENERIC OBJECT DETECTION AND TRACKING

A Report for the Evaluation 3 of Project2

Submitted by

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TABLE OF CONTENTS

CHAPTER NO.1

ABSTRACT:

This paper, introduces a technique for automating the methodology of detecting and tracking objects utilizing color feature and motion. Video Tracking is the methodology of finding a moving object over the long distance using a camera. The main aim of video tracking is to relate target objects in consecutive video frames. The relationship can be especially troublesome when the objects are moving speedy with respect to the frame rate. An interchange situation that grows the unpredictability of the issue is the time when the tracking object changes orientation after eventually. For these circumstances video tracking frameworks typically utilize a movement model which depicts how the image of the target may change for distinctive conceivable movements of the object. In this paper an algorithm is developed to track the real-time moving objects in different frames of a video using color feature and motion.

CHAPTER NO.2

INTRODUCTION:

Tracking can be characterized as the problem of assessing the trajectory of an object in the picture or image plane as it moves around a scene. The requirement for high power PCs, the accessibility of high quality and modest camcorders, and the expanding requirement for automated feature analysis has produced a lot of interest for object tracking algorithms. There are three key steps in feature analysis: recognition of target moving objects, tracking of such objects from frame to frame, and analysis of object tracks to perceive their conduct. In its least complex form, tracking can be characterized as the issue of evaluating trajectory of an object in the image plane as it moves around a scene.

The main goal of this investigation is to track the real time moving objects in different video frames with the assistance of a proposed algorithm. Median filtering is a non-linear operation which is utilized as a part of image processing to decrease noise. A median filter is more viable than convolution when the objective is at the same time to diminish noise and save edges. A variety of issues of current interest in computer vision require the capacity to track moving objects in live streaming for purposes such as inspection, video conferencing, robot navigation, and so on. The difficulties that drive a great part of the exploration in this field are the colossal information data transfer capacity inferred by high resolution frames at high frame rates, and the yearning for real-time intuitive execution.

Various innovative routine have been proposed. Nonetheless, the vast majority of these

routines use complex models, for example, edges, snakes, splines, formats or computationally expensive Eigen image or condensation algorithms. Despite the fact that these methodologies are expansive in their capacities offering reliable object recognition. In addition to tracking, they are so far not able to run on full video resolution images at high frame rates.Color has been generally utilized as a real-time tracking frame works. It offers a few noteworthy points of interest over geometric signs such as computational simplicity, robustness under partial occlusion, rotation, scale and resolution changes. In the tracking framework, the color blobs are being tracked. The idea of blobs as a representation for image characteristics has a long history in computer vision and hasvarious numerical definitions. It might be a reduced set of pixels that impart a visual property that is definitely not imparted by the surrounding pixels. Body movement analysis is an imperative innovation which combines modern bio-mechanics with Computer vision. It is broadly utilized as a part of intelligent control, human machine interaction,movement analysis and different fields. Presently, systems utilized as a part of moving object detection are chiefly the frame subtraction technique, the background subtraction strategy and the optical flow method. The remainder of this paper is outlined as follows. Section 2 describes the objective of the research work. Section 3 describes the literature survey of the previous work done on this topic. Section 4 describes the methodology of the work. Section 5 describes the implementation of the work. Section 6 describes the proposed algorithm for real-time object detection and tracking using color feature and motion. Section 7 describes the results and ultimately, we summarize the conclusion in section 8.

The imperativeness and prevalence of movement analysis has led to several previous surveys: Wang and Zhao [1] proposed the movement detection by utilizing background subtraction system. In this video sequence is made out of a progression of video images which contains the features of geometry data of the target, separate pertinent data to analyze the movement of targets. The compression ratio was incredibly progressed. Rakibe et al. [2] describe movement detection by creating a new algorithm based upon the background subtraction. In this firstly

dependable background model based upon statistical is utilized. After that the subtraction between the current image and background image is carried out based upon threshold. After that the detection of moving object is carried out. Morphological filtering is carried out to remove the noise and settle the background interruption trouble. Kavitha et al. [3] exhibited movement detection by overcoming the drawbacks of background subtraction algorithm. An effectively computed background subtraction algorithm has been utilized, which has the capacity to resolve the issue of local illumination changes, like shadows and highlights and worldwide illumination changes. Shafie et al. [4] exhibited movement detection utilizing optical flow strategy. Optical flow can emerge from the relative movement of objects and the viewer so it can give critical data about the spatial arrangement of the objects and the rate of change of this positioning. Discontinuities in the optical flow can help in sectioning images into areas that correspond to distinctive objects. Shuigen et al. [5] developed movement detection by utilizing a system based on temporal difference and opticalflow field. It is great at adjusting to the dynamic environment. Firstly, an outright differential image is computed from two continuous gray images. The differential image is filtered by low pass filter and converted into binary image. Also optical flow field is computed from image groupings by Hron's algorithm. Thirdly, moving object area is discovered by indexed edge and optical flow field. Devi et al. [6] describe movement detection utilizing background frame matching. This technique is exceptionally effective technique for looking at image pixel values in ensuing still frames captured after at regular intervals from the camera. Two frames are obliged to detect movement. First and foremost frame is called reference frame and the second frame, is called the input frame contains the moving object. The two frames are analyzed and the distinctions in pixel qualities are resolved. Lu et al. [7] exhibited movement detection by proposing a real-time detection algorithm. In this algorithm incorporates the temporal differencing strategy, optical flow system and double background filtering (DBF) strategy and morphological processing methods to attain to better execution. Wei et al. [8] describe an interactive offline

tracking framework for bland color objects. The framework attains to 60-100 fps on a 320 × 240 video. The client can consequently effectively refine the tracking result in an intelligent way. To completely exploit client input and lessen client interaction, the tracking issue is tended to in a worldwide optimization frame-work. The optimization is productively performed through three steps. Initially, from client's info we prepare a quick object detector that places user objects in the video based on proposed features called boosted color bin. Second, we misuse the temporal coherence to create various object trajectories in view of a worldwide best-first technique. Last, an ideal object way is found by dynamic programming. Jansari et al. [9] describe a differential approach for optical flow estimation in view of fractional spatial and temporal derivatives of the image signal. The correlation between background demonstrating method and Lucas-Kanade optical flow has been carried out for object recognition. Background subtraction strategies require the background model from many images while the Lucas-Kanade optical flow estimation technique is a differential two frames method, in light of the fact that it needs two frames to work. Lucas-Kanade technique is utilized which partitions image into patches and figuring a solitary optical flow on each of them. Wang et al. [10] introduced a real time movement detection approach that is based on the combination of accumulative optical flow and double background filtering system to accomplish better execution. The collective optical flow system is utilized to get and keep a stable background image to adapt to varieties on ecological changing conditions and the double background filtering strategy is utilized to wipe out the background data and separate the moving object from it.

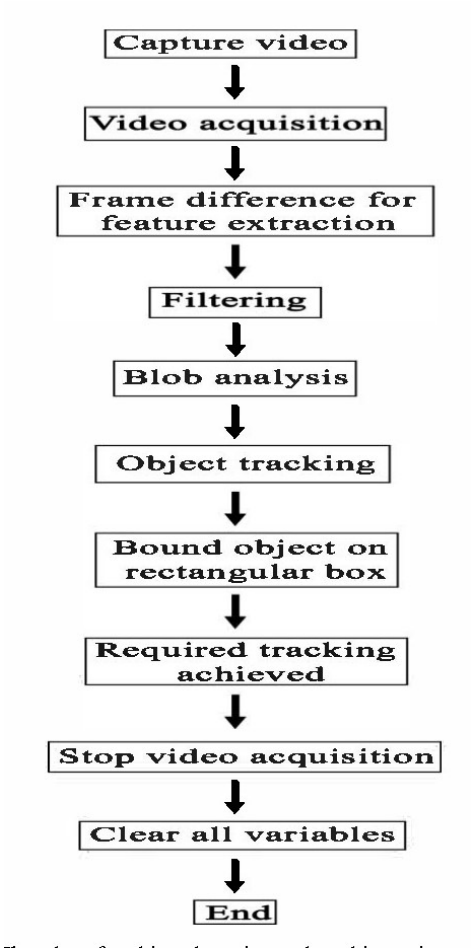
A few universally useful algorithm or approaches have been developed for object tracking. Since there is no general answer for the object tracking issue, these systems regularly must be consolidated with domain information so as to adequately tackle an object tracking issue for an issue space. Hence object tracking necessities to be approached from a wide assortment of points of view. As we have now seen that amid the tracking of the object light brightening

goes about as noise. Noise ought to be filtered out through processing, additionally we require that the time needed for the processing of the image or frame ought to be as low as could reasonably be expected, and also we have to see that the movement recognition and tracking of the object ought to be appropriate, in light of the fact that if there is no legitimate movement detection we will not be able to detect and track the target object. In this paper we bound to track the objects using color feature and motion. Different algorithm or methods have been developed for detecting and tracking object using color feature and motion. A problem inside an object tracking exploration is the quest for a powerful measure of tracking quality. Diverse systems for tracking exist using distinctive attributes e.g., shape, surface, or color, and so on. These strategies perform diversely relying upon the application and are frequently looked at just subjectively.

CHAPTER NO.4

PROPOSED MODEL:

The proposed algorithm for object detection and tracking using color feature is shown (Fig.) in the form of flowchart. The detail explanation of each block is given below the flowchart.



The explanation of each block shown above is as follows:

1: Camera used for image processing or tracking the object capture the frames from video input using video acquisition function.

2: Specify the characteristics or property of video input.

3: Begin with video acquisition.

4: Create a loop that begins after 60 frames of acquisition.This loop comprises of following steps:

a. Take the photo of the first frame from the video.

b. Presently to track the red objects continuously we need to subtract the red segment from the gray scale image to concentrate the red segments in the image.

c. Make use of median filter to remove noise.

d. Transform the gray scale image to binary image.

e. The pixels less the 300 pixels are eliminated.

f. Mark all the joined segments in the image to implement image blob analysis; here we get a set of properties for each one marked area.

g. Display the image.

h. A loop is used again to bound red color object in a rectangular formation.

5: Stop taking input from video camera.

6: Erase all data stored in memory.

7: Flush all variables.

The proposed algorithm for object detection and tracking using motion is shown (Fig.3) in the form of flowchart. Motion detection and tracking can be done in three ways background subtraction, frame subtraction and through optical flow technique. We will be showing two ways one is through background subtraction and second is by optical flow technique. The explanation of each block shown above is as follows:

1: Camera used for image processing or tracking the object,captures the frames from video input using video acquisition function.

2: Specify the characteristics or property of video input.

3: Begin with video acquisition.

4: Separate the frames from video input.

5: After separating frames from the acquired video generate image sequence.

6: Perform background subtraction by subtracting background frame from current frame. In the event that the pixel difference is more than the set threshold T, then it confirms that the pixels occur in the moving object, otherwise, as the background pixels.

7: Image obtained after subtraction contains motion region and noise. Median filter is used to eliminate noise. Morphological technique is used for further processing. Vertical along with horizontal projection is utilized to detect the height of motion part.

8: After detection of moving object, object can be tracked using the area and centroid.

The algorithm for object detection and tracking using optical flow technique is shown in Fig. The explanation of each block shown above is as follows:

1: Make the Video Device framework object.

2: Make a framework object to calculate path and velocity of object movement from one video frame to another utilizing optical flow technique.

3: set up the vector field lines.

4: Make Video Player framework objects to show the videos.

5: Set up a processing loop to implement motion detection in the input video. This loop utilizes the framework objects you instantiated previously. This loop comprises of the following steps:

a. Build up for stream.

b. Process for first 200 frames.

c. Take a single image from imaging gadget or camera.

d. Process the optical flow for that specific frame.

e. Down sample optical flow field.

f. Create lines on the top of image.

g: Show video with movement vectors.

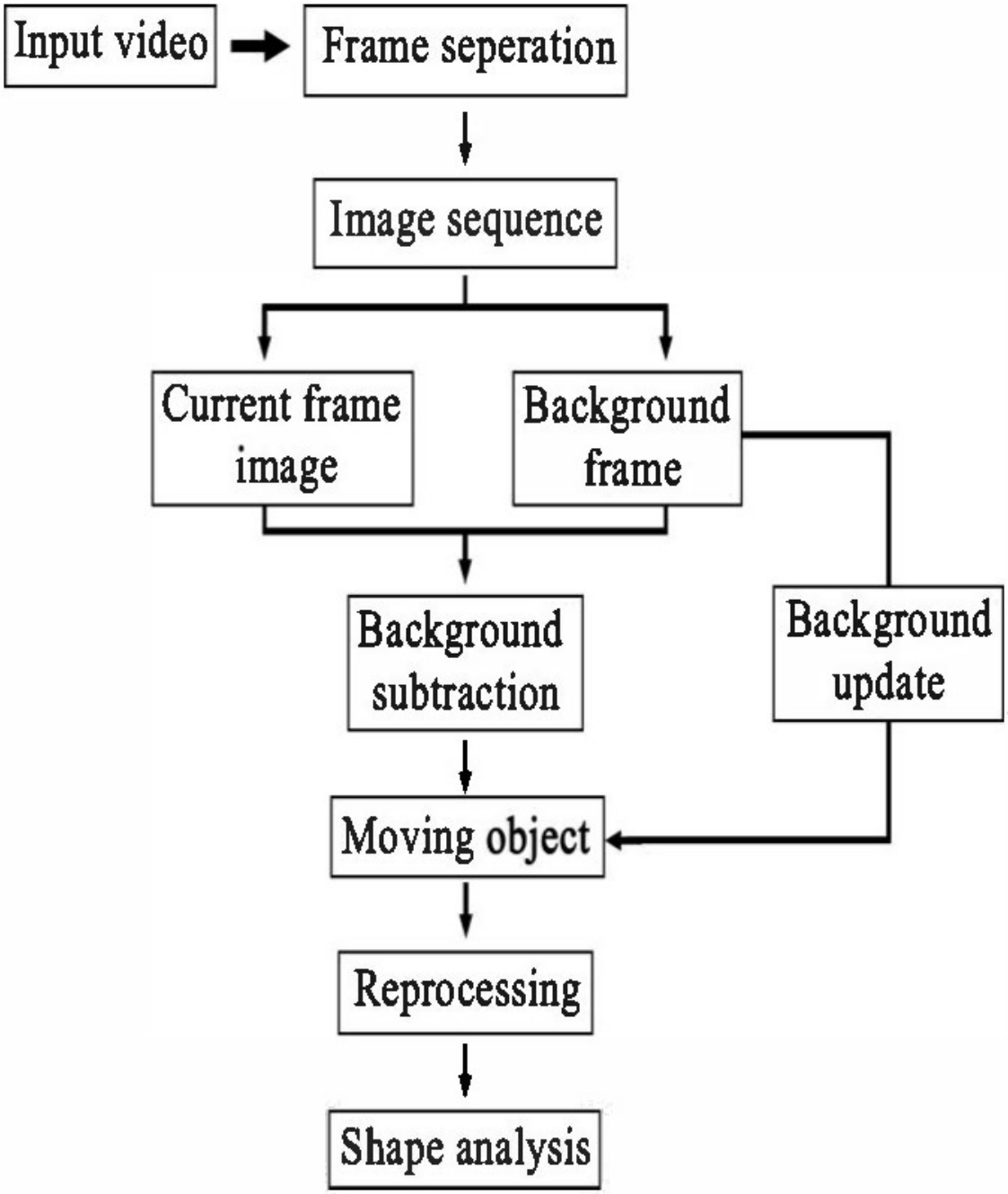


Fig. 3. Flowchart for object detection and tracking using background

CHAPTER NO.5

IMPLEMENTATION:

The implementation of the proposed work or approach is carried out utilizing MATLAB. The fundamental block diagram (Fig. 1) for detecting and tracking objects using color feature and motion is shown below: The fundamental block diagram comprises of four blocks named as Information Acquisition, Pre-processing, Feature Extraction and Tracking. The objectives or purpose of these blocks are as per the following:Information Acquisition: Information Acquisition intends to acquire the video frames utilizing the image processing Toolbox. The frames are gained with the assistance of the camera exhibit in/on your framework. Preprocessing: In pre-processing, first it changes the color picture into gray, on the grounds that it is not difficult to process the gray image in single shade rather than three shades. Gray images obliges less time in handling. At that point we apply median filter to expel clamor from images or frames got from the video. The images or frames analyzed out with the assistance of the command "medfilt2" show in the Image Processing Toolbox.

CHAPTER NO.6

Output:

The algorithms or approach described in this paper has been used for object detection and tracking. The output obtained using these algorithms or methods are shown below.It shows the detection and tracking of red color object and also shows its centroid value in terms of x and y. Similarly,shows the detection and tracking of red, blue and green color object. Detection and tracking of object is done by color feature and motion. Two methods are implemented in this paper for object detection and tracking using motion. The first method is optical flow technique as shown.

CHAPTER NO.7

Conclusion:

In this introduction, we have diagrammed the accompanying focuses –

Fundamental idea of Object Detection and Tracking.

Issues and challenges in Object Recognition.

Portrayal of articles.

Strategies in object acknowledgment.

Various and single article identification and AI process.

Item following.

Applications.

Therefore, we finish up –

• Object discovery is an errand of extricating Objects from explicit edges/pictures.

• Object identification is one of the most broadly utilized idea in the field of Artificial Intelligence.

• Has an incredible breadth in future for the advancement of the cutting-edge world.

CHAPTER NO.8

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