REAL TIME VIDEO OBJECT TRACKING USING MOTION ESTIMATION

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Abstract – Real time object tracking is considered as a critical application. Object tracking is one of the most necessary steps for surveillance, augmented reality, smart rooms and perceptual user interfaces, video compression based on object and driver assistance.

The proposed method, efficient motion detection and object image capturing based on background subtraction using dynamic threshold approach with mathematical morphology. Here these different methods are used effectively for object detection and compare these performance based on accurate detection.

Here the techniques frame differences, dynamic threshold based detection will be used. After the object foreground detection, the parameter of coordinates will be determined. For this, most of previous methods depend on the assumption that the background is static over short time periods. In dynamic threshold based object detection, morphological process and filtering also used effectively for unwanted pixel removal from the background. The background frame will be updated by comparing the current frame intensities with reference frame. Along with this dynamic threshold, mathematical morphology also used which has an ability of greatly attenuating color variations generated by background motions while still highlighting moving objects.

Finally the results will be shown that used approximate median with mathematical morphology approach is effective rather than prior background subtraction methods in dynamic texture scenes and performance parameter.

Key Words: Contour, Motion Detection, Object Detection, Object Tracking, Shape Features

1. INTRODUCTION

Video object tracking has got wide application in vision, security, observational issues in natural science and in various other fields.

Video surveillance for security purpose is one of its major applications. Object tracking has high priorities in religious places, market buildings, courts, train stations and airports.

Various other applications include military, astronomy, road traffic regulation, robotics, medical imaging. Air traffic control is a typical application of video object tracking, where aircraft are more or less continuously visible on radar, but in case the transponders are absent the identity is only revealed when the pilot reports by radio.

Video analysis basically involves three key steps:

To detect the moving object under interest.

1) Track the object from frame to frame

2) Analyse the object tracks to know their behaviour.

In simple words, tracking may be defined as the estimation of the trajectory of a moving object in the image plane as it moves around the scene.

Consistent labels are assigned to the tracked objects in each frame of a video. Further based on the tracking domain, a tracker can give useful information such as area, shape, and orientation of the object under interest.

Object tracking can be complex due to following reasons -

- Noise in images,
- Complex object motion,
- Articulated nature of non-rigid objects
- Scene illumination changes, and
- Real-time processing requirements.

1.1CLASSIFICATION OF REAL TIME OBJECTDETECTION USING MOVING ESTIMATION TECHNIQUES:-

1.2.1 THRESHOLDING

Thresholding is based on clip-level or value to turn a gray-scale image into a binary image. It is the simplest method used for image segmentation. This method is carried out by first selecting a threshold value (or values in case of multiple-levels are selected) which is optimum. In industry several popular methods are used, including the maximum entropy method, Otsu's method (maximum variance) etc.

1.1.2 BACKGROUND SUBTRACTION:

We use only the successive I-frames for tracking in our algorithm and thereafter interpolate the object motion in the intermediate frames. We initially acquire a DCT image of an I-frame representing the background that is treated as the reference image. After that, all subsequent DCT images are compared with the reference image to segment the foreground object. Based on the model of the application the background image is created and is updated from time to time whenever there is a permanent change in the background.Details regarding Thresholding and Background Subtraction method have been described later.

1.1.3 BACKGROUND ESTIMATION:

In this technique the algorithm identifies the incomplete background as those pixels that do not belong to the foreground pixels. As the foreground objects move, the background estimation algorithm estimates more and more of the background pixels. Once background estimation is completed by the program, the background is subtracted from each video frame to produce foreground images. This foreground image is converted to binary image. This is carried out by implementing thresholding and performing blob-analysis and other morphological closing on each foreground image. Then object tracking is carried out by another program.

1.1.4 OPTICAL FLOW:

The optical flow of a video frame is a field of motion vector per pixel or sub-pixel. Multiple methods allow computing the optical flow among which partial differential equation based methods, gradient consistency based techniques and least squared methods.

In this model we have used an optical flow estimation technique to get an estimation of the motion vectors in each frame of the video sequence. Then the required moving object is detected by a program block and converted into binary image. This is carried out by implementing thresholding and performing blob-analysis and other morphological closing on each foreground image. Then object tracking is carried out by another program.

1.2 OBJECTIVE

Detecting regions that corresponds to moving objects in video sequence plays a very important role in many computer vision applications.

In simplest form, Object detection from video sequence is the process of detecting the moving objects in frame sequence using digital image processing techniques. Moving object detection is the basis of moving object identification and tracking.

In the past two decades object detection and tracking in video is a challenging problem and has been extensively investigated. It has applications in various fields such as video compression, video surveillance, human-computer interaction, video indexing and retrieval etc. Object detection involves locating object in the frames of a video sequence, while object tracking represents the process of monitoring the object's spatial and temporal changes in each frame. Object detection can be performed through region-based image segmentation, background subtraction, temporal differencing, active contour models, and generalized Hough transforms. In order to allow high-resolution images of the people in the scene to be acquired it is reasonable to assume that such people move about in the scene.

2. TECHNIQUES AND ALGORITHUM

In computer vision, segmentation is the process which divides a digital image into multiple segments (sets of pixels, also known as super-pixels). The main aim of segmentation is to simplify and/or change the representation of an image frame into something which is more meaningful and easier to analyze. Segmentation of image is typically used to detect/locate objects and boundaries (lines, curves, etc.) in an image frame. More precisely, segmentation of an image is carried out to assign a label to each pixel in an image such that pixels with the similar label share certain visual characteristics.

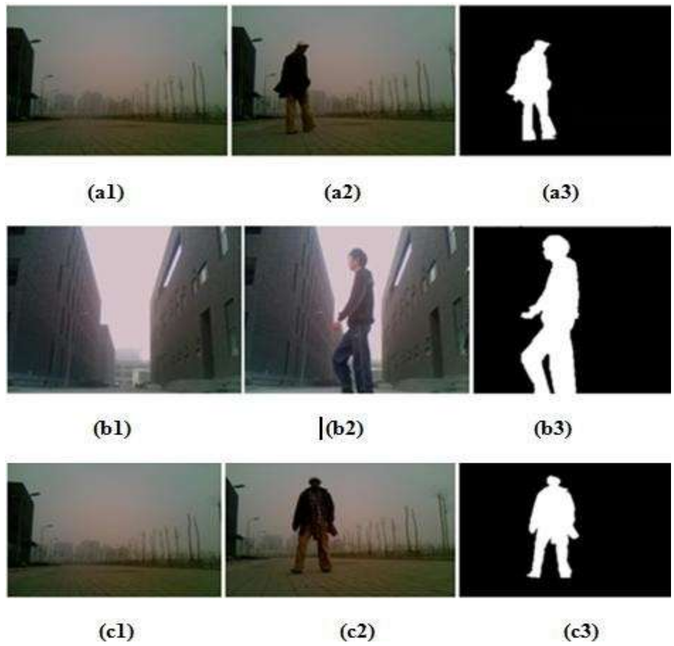

Fig.1 A Generic Framework for Video Processing Algorithm

Morphological Process

Morphological operations are applied on segmented binary image for smoothening the foreground region. It processes the image based on shapes and it performs on image using structuring element. The structuring elements will be created with specified shapes (disk, line, square) which contains 1's and 0's value where ones are represents the neighbourhood pixels. Dilation and erosion process will be used to enhance (smoothening) the object region by removing the unwanted pixels from outside region of foreground object. After this process, the pixels are applied for connected component analysis and then analysis the object region for counting the objects.

Code:- b = bwmorph(diference,'close');

Morphological operations on binary images.

BW2 = bwmorph(BW,operation)

BW2 = bwmorph(BW,operation,n)

gpuarrayBW2 = bwmorph(gpuarrayBW,___)

Examples

1) Perform Morphological Operations on Binary Image

Read binary image and display it.

BW = imread('circles.png');

imshow(BW);

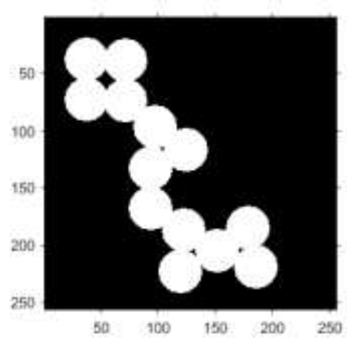

Fig.2 show object with background

Remove interior pixels to leave an outline of the shapes.

BW2 = bwmorph(BW,'remove');

Figure imshow(BW2)

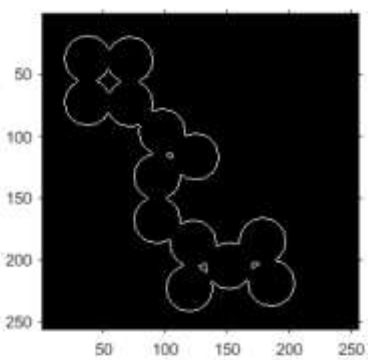

Fig.3 show object with only boundaries

Fig.4 shows the example of morphological operation.

ALGORITHM USED:

A pixel is marked as foreground if where is a “predefined" value threshold. The process thresholding is followed by closing with a 3 X 3 kernel and the discarding of small regions. The background is updated as where the value is kept small to prevent the detection of artificial “tails" forming behind moving objects.

Two background corrections are applied:

1. If a pixel is marked as foreground for more than m of the last M frames, then the background is updated. This correction is designed to compensate for sudden illumination changes and the appearance of static new objects.

2. If a pixel change is frequent that it changes its state from foreground to background frequently, it can be masked out due to inclusion in the foreground. This is designed to compensate for fluctuating illumination, such as swinging branches of trees.

Fig -5: System Architecture

FLOW OF THE PROCESS

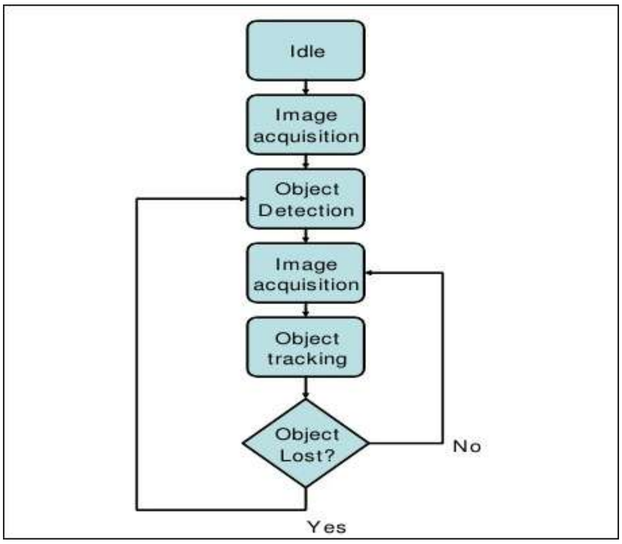

Figure.. Flow of the Process

Flow of the System

Step 1: Idle- capture image (static or dynamic)

Step 2: Image acquisition- load the image in system

Step 3: Object detection- detect the different objects in the video or image

Step 4: Object tracking- track Object and compare with each earlier frame

Step 5: Capture it in system with given path

Step 6: Count frames and give the numbering

Step 7: It store in the path

Step 8: Get the differences

Step 10: Final result

3. CONCLUSIONS

The objective has been to detect moving objects and thereafter, decide on objects of particular interest which would be tracked. While earlier we worked with object-intrinsic properties such as the centroid of a moving object in order to make a probable prediction of its immediate future motion, methods to detect a rectangular boundary for the object, then used background estimation method using Simulink models and got fair output for single object, but we did not obtain satisfactory results when the methods were worked with multiple objects. Further we made an attempt using the Optical Flow method wherein the morphological algorithm for motion estimation was put into effect. The latest method of Adaptive Contrast Change Detection gave satisfactory results in sufficiently reducing the noise while detecting multiple objects. But in some cases it gives unwanted noise. Hence, we have used correlation which basically gives the relation between to frames having significant contrast change. Use of correlation has significantly improved the output and gives better result even with multiple moving objects. The approach seems to have efficient practical applications in poorly-lighted conditions such as night-time visual surveillance systems.

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