MULTIPLE HUMAN OBJECT TRACKING USING BACKGROUND SUBTRACTION AND SHADOW REMOVAL TECHNIQUES

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Abstract: *This paper introduces a completely new moving object detection algorithm from a static background scene that uses colour images to contain shadows. Motion estimation and detection, background subtraction and shadow removal have been supported by object tracking. Initially, an organisation is used and thought of as background data. The foreground information and background information are identified using the reference frame as the background model when a brand new object enters the frame.The shadow of the background information is combined with the foreground object most of the time and makes the tracking process a fancy one. Morphological activities are used within the strategy to identify and remove the shadow. With the suggested algorithm, video sequences are captured and tested. Experimental outcomes are shown, showing the performance of the system.*

Keywords: Background modeling and subtraction, human motion detection, shadow removal

1. INTRODUCTION

Pixel-based approaches are used for object tracking. Against the context of inter-fusion methods, this technique is solid. The failure detection and automatic failure recovery can be effectively allocated during this rational process.

In computer vision, a very basic and challenging task is the identification and tracking of moving objects in video sequences. Possible uses are as follows I Visual surveillance: image sequences of a personality action recognition system operation recorded by video cameras monitoring sensitive areas such as banks, department stores, parking lots and country boundaries to see if one or more individuals involved are suspicious or engaging in illegal activity. (ii) Video retrieval based on content: an individual's system of comprehension of actions scans an input video and an action or event as output per application-oriented language.

For sportscasters to quickly retrieve important events , especially games, this application is noticeably useful. (iii) Accurate athletic performance analysis: Athlete action video analysis is becoming a critical method for sports training because it is not an intrusion in athletic training.

In all these applications, fixed cameras with a static background of interest are used and a standard background subtraction technique is used to get an initial estimation of moving objects. To yield a reference model, first perform context modelling. In context subtraction, this reference model is used in which each video sequence is compared with the reference model to see potential variations. The discrepancies between the organisation's current video frames in terms of pixels reflect the presence of moving objects. For object localization and tracking, the variation that also reflects the foreground pixels is further processed. Ideally, context subtraction can detect actual moving objects with high accuracy and restrict the maximum possible amount of false negatives (not detected). Pixels of moving objects with the highest possible pixels should be extracted at the same time, thereby eliminating shadows, static objects and noise. The foreground artifacts are very frequent in the identification of shadows, causing undesirable effects. For example, shadows connect different people walking in a group, generating a single object (typically called blob) as output

of background subtraction. In such case, it is more difficult to isolate and track each person in the group.

In video sequences, there are several techniques for shadow detection[1].

The main aim of this paper is to develop an algorithm for object tracking applications that can detect human motion at certain distances. We perform different tasks, such as motion detection, background modelling and subtraction, foreground detection, detection and removal of shadows.

The paper organized as follows. Section 2.0 the object segmentation of the video frames from the HSV color space is presented and proposed method is explained. In section 3, we present the experimental results and we conclude the paper in the last section of the paper.

2. BACKGROUND SUBTRACTION

The primary task of computer vision-based problems is human motion analysis and detection. The objective of human detection is to segment regions corresponding to individuals from the entire image. It is an important issue in the system of human motion analysis because motion detection is followed by subsequent procedures such as tracking and action recognition. The algorithm for movement detection and foreground object extraction consists of several sequential processes. As follows, the process algorithm is described.

- Sequences of video frame
- If Motion is detected. Then perform Background modeling, otherwise stop
- Perform Background subtraction/foreground object extraction

- Shadow detection and removal
- Morphology process
- Draw bounding box and human object tracking

A ***Background Subtraction***

Background subtraction is a popular technique used in a frame to segment the objects involved. This method involves subtracting an image containing the object, with the previous background image having no objects of interest in the foreground. The pixel location of the moving objects[2] is indicated by the area of the image plane where a significant difference exists within these images.

To perform the context modelling, the mode model has been selected, which provides better performance. If the absolute difference is greater than the threshold between the current pixel and the mode-modeled background pixel, that pixel is considered to be the foreground object[3,4]. RGB values of current pixel frames, subtracted from the background modelling frame values. The mean is the absolute difference between the red value, the green value, and the blue value. If the absolute difference greater than threshold, indicates the foreground pixels else background pixels. Foreground pixels are detected by calculating the Euclidean norm,

$$D(x,y) = \begin{cases} 1, if \mid I(x,y) - B(x,y) \mid > T \\ 0, Otherwise \end{cases}$$

1. (a) 1.(b)

Fig1. Background subtraction and moving object identification (a) Video Frame, (b) Background,

Fig.1 shows the video frames used for the background

Subtraction and moving object identification. In Fig. 1(a) shows video frame. In Fig. 1(b), the background frame is shown and that has been used for constructing the background model.

B. ***Shadow Detection and Removal***

Each foreground pixel can check whether it is part of a shadow or an object until the foreground object has been identified. This method is necessary, because some of the background object's shadow can be combined with the foreground object. This makes the task of object tracking to be a dynamic task. The Normalized Cross Covariance (NCC) in neighbouring region B(x, y) is found for pixels (x , y) in a shadowed region and the shadow can be detected using the equation below.,

nccc NCC(x, y) L

Where the fixed threshold is ncc L. If ncc L is poor, it can mis-classify some foreground pixels corresponding to moving objects as shadows. On the other hand, choosing a greater value for ncc L results in less false positives, but it is not possible to detect pixels relevant to real shadows [5]. NCC at position (i, j) for a pixel is given by

2.(a) 2.(b)

2.(c)

Fig.2. Background subtraction and shadow removal (a)Video Frame, (b)Background Subtraction, (c)Remove Shadow

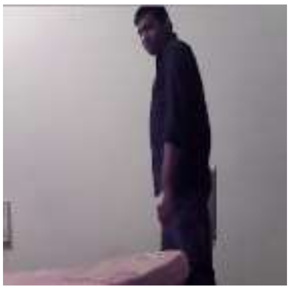
Fig.2 displays shadow video frames and the recognition of the same ones. The objects in the foreground and background are known and are shown in Fig. 2(b) and (c) respectively. Just in Fig. 3(c), Eqs.5-8, is introduced and shadows are recognized. Two dilation and one erosion activity processes were carried out in this approach. Removed less than 0.5 percent of the total area of the image for objects with area.

3. EXPERIMENTAL RESULTS

The experimental results are presented to demonstrate that promising performance in context subtraction and foreground object extraction can be achieved by the proposed methods. The moving objects are identified and monitored precisely by this method. In this method, a series of background image frames is used to model the background scene, which essentially consists of 5-30 consecutive frames. The object pixels are segmented out from its background followed by post- morphological process such as dilation and erosion to eliminate noisy pixels thus producing better results.

Fig. 3(a)-(d), shows the object tracking process. This video is a homemade video and objects were tracked. In Fig. 3(a) and 3(c) the original Video frame is shown.. Using 3(a) and (c), the foreground and background information are extracted and subtracted for getting the target object, which is shown in Fig. 3(b) and 3(d). It is observed that the proposed work detects the object effectively.


3.(a)


3. (b)


3.(c)


3.(d)

Fig.3.Object tracking process (a) Video Sequences, (b) shadow detection and removal(c) Video Sequences, (d) shadow detection and removal

4. CONCLUSION

In this paper , an approach has been identified that is capable of detecting motion and extracting object data involving humans as objects. The algorithm requires modelling the desired background as a reference model to generate foreground pixels later used in background subtraction, which is the variance of the current frame from the reference frame. In order to locate and extract the information, the deviation that represents the moving object inside the analysed frame is further processed.

5. REFERENCES

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