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Detection of Dancer using Morphological Operations

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Abstract:- Recognition of dancer in video is a tough mission because of its complicated backgrounds, illuminations and variations in the dancer costume. The purpose of this article is to identify dancer in a video. In this work we identify the dancer from videos through movement analysis. The dance movement consists of primary movements and that motion analysis is required to detect these components. These motions should be synchronized with dance steps. This paper uses morphological operations such as erosion and dilation for detection and segmentation of dancer. In Background subtraction model adaptive frame difference method is used for foreground detection.

Keywords:- *Erosion, Dilation, Adaptive Frame Difference Method, Motion Analysis.*

I. INTRODUCTION

People identification is required for further processing and understanding the activities of the person.[1] Background subtraction model is used for generating foreground through motion analysis. Segmentation is done to check the dancer is present in the video or not.[3]The human identification is an interesting topic in the research field and hence it is a basic requirement to develop more efficient technique for this detection purpose.[2]Identifying different activities of a dancer in video is helpful in computer vision system.[4]Recognition of human is a tough mission from a machine vision due to frequently changes in bending moves ,different costumes, and cluttered background. The identification of a person occurs in two steps: People recognition and classification. Dancer identification can be done by background subtraction, optical flow and spatio-temporal filtering.[5] Human movement analysis is mainly used for the detection and tracing the people.[6] the stairs of people motion detection for video carries modeling of environments, detection of movement, object detection and category human detection, hobby recognition and behavior know-how.[7] a human detection approach based on histogram of orientated gradients (hog) functions and human frame ratio estimation is executed and applies the discriminative strength of hog capabilities for human detection.

II. BACKGROUND GENERATION

Identifying moving human and removing non moving background is very difficult task in dance videos. Detection of object and background elimination are the important parameters in dance videos. In background subtraction technique, dancer moves are recognized by differencing the input frame from the background frame. We get the sub image or difference image .If the pixel value is higher than the threshold value, then the pixel was taken as a background pixel. The non moving objects are considered as background where as moving objects are considered as foreground. The sub image is converted into binary image.

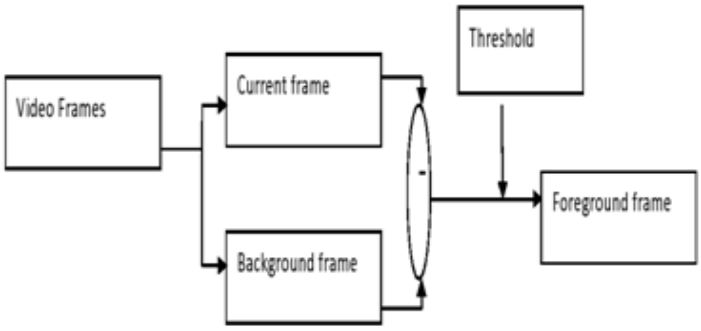

Fig 1.Background Subtraction Model

For a video framesf,$I_k(X,Y)$ represents a input frame ,BF(X,Y) represents a background frame. $D_k(X,Y)$ is the difference between input frame and background frame.

$$D_k(X,Y) = I_k(X,Y) - BF(X,Y) \quad (1)$$

$$D_k(X,Y) = \begin{cases} 1 & D_k(X,Y) \geq T \\ 0 & \text{Else} \end{cases} \quad (2)$$

A .Adaptive frame difference Technique

In frame subtraction technique, the subtraction between the frames at time t and t-1 were computed. In two images subtraction technique, two frames were taken and done difference pixel wise. The optimal threshold for the difference frame was computed using the adaptive threshold ‘technique as shown in Figure 2.

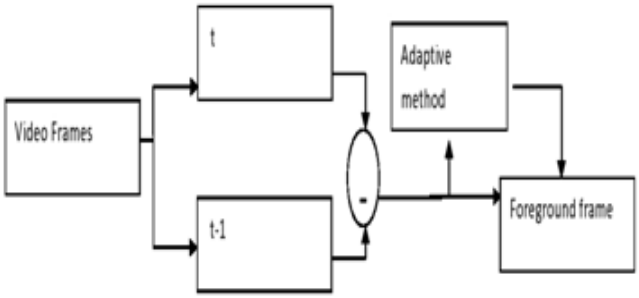

Fig 2. Adaptive frame difference method

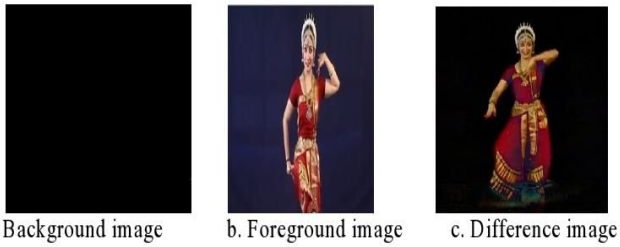

Fig 3.Results of Adaptive Frame difference method

III. PREPROCESSING

The pre-processing step is necessary to enhance the data which is required for further processing due to low quality of an image. When an image is taken it is affected by some noise. So when image is processed, filtering techniques are applied. The main goal of filter is to remove noise from image and to modify the input image. Here we will resize the input image and remove the, noise content from resized image by using Median filter. The size of the original frame is [420,640] then resized it to [360,640].Then that frame is converted to grayscale image. As the complexity of the background this frame includes poor lightning condition so normalization is done, in addition to this it includes huge noise. By applying median filter method the area based noise is removed.

IV. HUMAN SEGMENTATION

Segmentation is done using morphological operations . Morphological techniques such as dilation and opening are applied to remove noise from the frame . These two are mathematical operations that are useful for checking the frames in order to reduce noise from background .Dilation thickens the boundaries. **FI** dilation (—) **BI** is represented in (1) where FI is the foreground frame and BI is the disk structuring element. This enlarges the white pixel based on the locus of points **b** covered by B [14].

$$FI — BI = \cup_{b\ B} A_b \quad (1)$$

Opening is the dilation of the erosion of a set, in other words, it is erosion followed by dilation process. **C** opening (□) **D** is represented in (2) as follows where FI is the foreground image, BI is the disk structuring element and Q is erosion symbol.

$$C \circ D = (FIQBI) — B \quad (2)$$

The blob is continued to use inside the foreground using Connected Component labeling (CCL). Averaging is done among foreground photo is acquired after doing morphological functions and the binary photograph received in the CCL method thereby resulting in the human binary photograph. The neglected element in considered among one of two is reconstructed within the averaging method. The Contour is applied for human segmented blob.

V. HUMAN DETECTION

In human detection first the difference image is generated. That image is converted into binary image. Here morphological operations are applied for human detection. The main purpose of morphological image processing is to eliminate all the defects without altering the shape of frame. Morphological functions validates the frame with a SE. This SE is applied among possible location of the input image and generates the same size result. This approach creates a binary image if test is achieved it returns non-zero pixel value at that position in the input image. In this paper only two operations are used dilation and erosion. Dilation enlarges broders while erosion eliminates the pixels at boundaries of the objects. Adding and removing the pixel is purely based on SE.

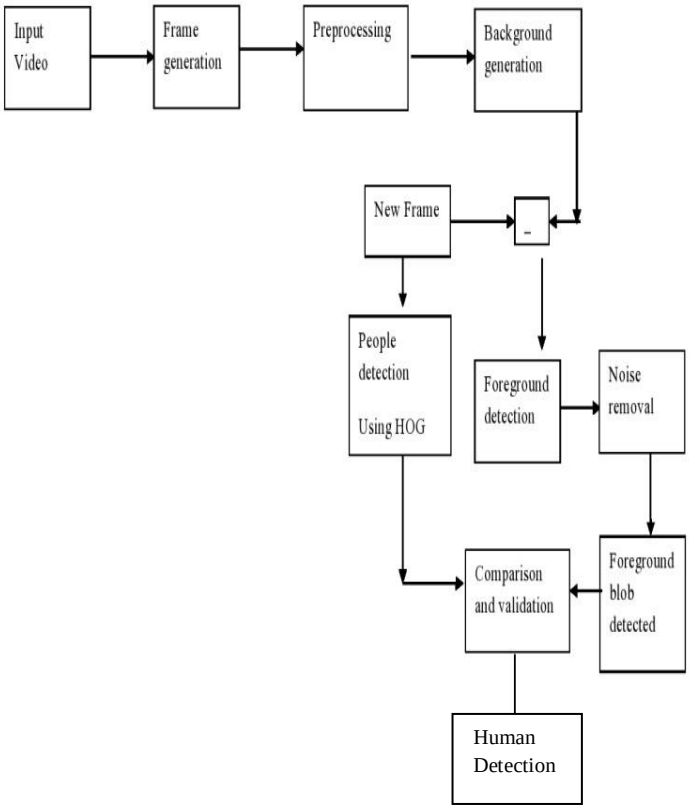

Figure 1: Block Diagram for Human Detection

As shown in Fig 1, first we are giving the input video the video is converted into frames by using built-in function video reader. In preprocessing Median filter technique is applied to remove the high frequency noise and smoothing of the image is due to illumination variation in the background. After preprocessing 15 to 20 frames are sent to the background generation. During preprocessing the new frames are taken as the input image. The background frame is generated by differencing the input frame from the background frame then the foreground image has detected. For the foreground image the area based noise removal

method is applied to remove the noise. For the new frame human detection has been done using HOG method. The HOG method gives only 93% and 7% errors. To remove 7% of errors we are applying morphological operations such has erosion and dilation.

VI. EXPERIMENTAL RESULTS

The output is obtained from kuchipudi video contains different gestures of hand face and leg movements are shown in Fig. 2

Fig 2: Preprocessing Results

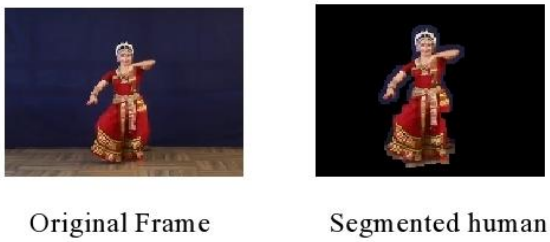

Fig 3: Segmented human

Figure 3 shows the segmentation frames of kuchipudi dance .The preprocessed frames are taken as the input frames for finding the segmented human. In figure 4 for the segmented human contour is applied for the detection of human.

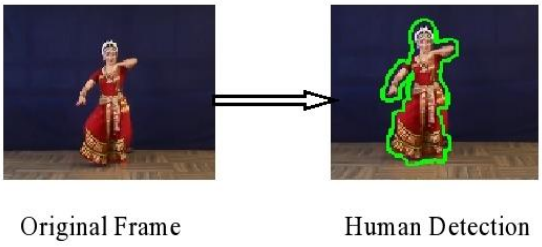

Fig 4: Results of Human Detected

VII. CONCLUSION

In this paper segmentation of dancer is done in an indoor environment. Dancer identification is done using morphological operations such as dilation and erosion. They are very simple to use and works well for set theory. Adaptive frame difference method is used for foreground detection. The contour is applied for the segmented human.

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