IMPLEMENTATION OF THE GAUSSIAN MIXTURE MODEL ALGORITHM FOR FOREGROUND DETECTION USING SEGMENTATION AND THRESHOLDING FOR HIGH DEFINITION VIDEO SIGNAL

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Abstract- Foreground detection is very critical in video signal. For foreground detection we take video signal from the static camera. In foreground detection we follow these steps pre-processing, background modelling and foreground detection. In pre-processing we removes the noise in background modelling we model the background model, in foreground detection in this paper we detect the foreground by the comparative analysis of number of Gaussian frame. Result we compare by the help of comparative analysis of number of Gaussian frame and percentage foreground detection.

Key words: - foreground, background, clustering, GMM, threshold, MSE, PSNR

I. INTRODUCTION
According to relativity theory, we assume that time axis is constant and when position of any object is changed with respect to time then it is called moving object. In video signal position of moving object is changed with respect to time. By the help of background subtraction algorithm technique, we detect the moving object in video signals. Detection of moving object is very critical and challenging task in real-time video signal. This striving becomes more critical in indoor and outdoor video signal under these circumstances such as illumination changed or steady and dynamic weather condition.

II. METHODOLOGY FOR MOVING OBJECT DETECTION AND RESULT
For moving object this steps are follows. Block diagram for foreground is the given below fig 1. We first take the input in the form of video signal then after we break the video signal into image frame. Then after we take the frame from the broken frame of video signal.

![Block Diagram of Methodology](image-url)
Pre-processing

In pre-processing we remove the noise from the image. In this project we take the two type of noise which is present in MATLAB library this noise Gaussian noise and Salt and Pepper noise. Fig 2 shows that the original image and sharpened image. For filtering we take the mean filter.

Background Modelling:

Background modelling plays very vital role in background subtraction algorithm.

Background estimation:

The absolute background subtracting estimation by the help of this equation

IF \( D = |C - B| > T \)

\( O = 1 \) (OBJECT)

ELSE

\( O = 0 \) (BACKGROUND)

Where \( C \) = pixel value of current images.

\( B \) = pixel value of background images.

\( D \) = absolute difference of current and background image

\( O \) = binary difference images.

Threshold error is produced between current pixel and background pixel.

Foreground Detection:

In foreground detection in this project we segmented image by the help of segmented image. Group of pixel in the image is defined as region. Region of pixel may be any shape such as circle; ellipse, polygon etc. when area of interest in the images does not extracted exactly then we use segmentation technique. Segmentation has two objectives: The first objective is to decompose the image into parts for further analysis. Figure 3 show that the original image and detected object is given below.
In background subtraction algorithm we compare two consecutive frames. Advantage of Background subtraction algorithm is does not previous knowledge of the frame it just take two consecutive frames so background subtraction algorithm is best method other than. After performing background subtraction algorithm we find the foreground which is given below figure 4. By the help of background subtraction we find the object with the help of MATLAB fig 6 shows foreground.

Filtering

Noise is unwanted signal which creates disturbance in input signal. In this paper we take the mean filter for removing noise in this paper we take the two types of noise Gaussian noise and salt and pepper noise. Fig 5 shows that the clean foreground.

We take the image at different Gaussian frame figure 6 shows that the image at different Gaussian frame as given below figure 6.
III. PERFORMANCE EVOLUTION

We compare the result by the help of number of Gaussian frame after experiment we find the when number of Gaussian frame is increased then percentage of foreground detection is increased comparative analysis is given below table 1.

Table 1. Comparative Analysis at Different Gaussian Value

<table>
<thead>
<tr>
<th>Number of Gaussian frame</th>
<th>Percentage Foreground Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>77.11</td>
</tr>
<tr>
<td>20</td>
<td>86.74</td>
</tr>
<tr>
<td>30</td>
<td>87.89</td>
</tr>
<tr>
<td>40</td>
<td>89.07</td>
</tr>
<tr>
<td>50</td>
<td>89.43</td>
</tr>
<tr>
<td>60</td>
<td>90.02</td>
</tr>
</tbody>
</table>

When we compare our result of proposed algorithm for foreground detection with respect to [17] then we find that the percentage foreground detection is increased. In given below fig 7 shows that image in which we compare result and table 2 shows that the comparative analysis of percentage foreground detection.

Table 2 Comparative Analysis of Foreground Detection

<table>
<thead>
<tr>
<th></th>
<th>Y Cb Cr feature</th>
<th>HSV feature</th>
<th>RGB feature</th>
<th>multi features</th>
<th>Proposed algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarity value</td>
<td>70 %</td>
<td>25 %</td>
<td>60 %</td>
<td>90 %</td>
<td>91.76%</td>
</tr>
</tbody>
</table>

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REFERENCES


