

# **A Robust Background Subtraction Technique for Object Detection**

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## **Abstract**

Background subtraction approach is used to detect the moving object from background. Different methods have been proposed to detect object motion by using different background subtraction techniques over recent years. Each technique has its own benefits and limitations such as some techniques can only applied for static background using static cameras. This paper provides review of main methods used to detect foreground object with its merits and demerits. I propose a flexible approach of object detection based on an adaptive background subtraction technique which also effectively eliminates shadows based on color constancy principle in RGB color space. It extracts the objects based on local thresholding value. The strength of the scheme lies in its simplicity and the fact that, it defines an intensity range for each pixel location in the background to accommodate illumination variation as well as motion in the background

## **Keywords:**

Background modeling, Region based ,pixel based, Foreground Extraction, Pixel Model, object detection, shadow, thresholding, computer vision, , background template, image segmentation

## **1 Introduction**

In computer applications, it is basic & principle thing is to extract the foreground objects from background template from video sequence [1],[2][3][8]. Background subtraction is one of the methods used for foreground object extraction from given background template. So it detects the moving objects. This background template contain scene with no moving objects.

Each frame of the video is compared with background template. If the frames contain pixels that are not in the background model, then that pixels are considered as foreground. There are many subtraction methods that had been developed such as Mixture of Gaussians [4], Kernel density estimation (KDE) [5], [6] and the co-occurrence of image variations [7]. While developing a good background subtraction algorithm, the researchers faced many challenges like Camera motion due to environmental factors, Different parts of the day (Lighting condition), Shadow, The objects may be occluded by other objects, Due to noise in the image during image acquisition process. These challenges must be accounted while developing a background subtraction algorithm.

The task of automatic object detection is very critical including video surveillance [8], remote sensing [9], and crack detection in concrete pipe [10], under water object detection [11] and driver

assistance systems [12]. Background subtraction is best for detecting foreground objects with static background, [13]. It also depends on environmental conditions. For that main criteria are:

- 1) Illumination changes and unessential events, and
- 2) Slow objects motion.

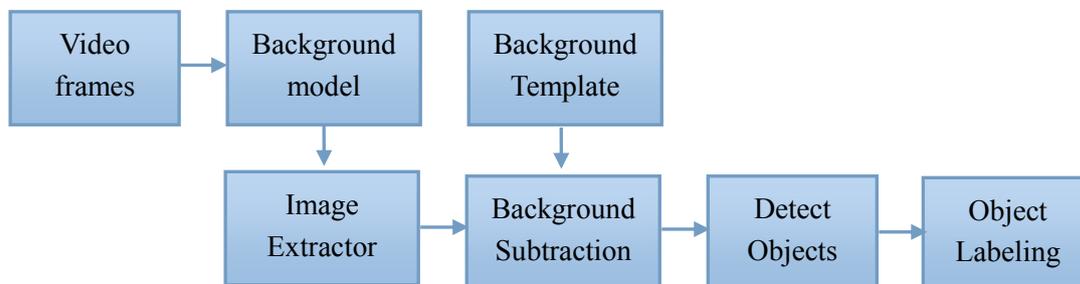
In order to carry out foreground object detection in a dynamic environment, two types of methods have been proposed:

- 1) In case of minor change or motionless background model with an acceptable range of image differences at each pixel or local image area.
- 2) Using dynamically updated background model.

Most of the methods under the first type set a permissible range according to the formulation of background variations [14-16], or according to the statistical analysis of training samples of background images [17-19]. A proper threshold value that can be chosen from Histogram that should be set so that, when a pixel value or local image pattern is mapped outside or greater than of this value, it is detected as a foreground object or labeled as a background otherwise. As a result, the detection sensitivity decreases for those pixels have a wide range of possibility [20].

## 2 Proposed Approach for Generic Background Subtraction

Even though there exist many background subtraction algorithms, most of them follow a simple flow diagram shown in Figure:



The three major steps in a background subtraction algorithm are,

1. Extract frames from video(Preprocessing),
2. background modeling and
3. Foreground detection.

Preprocessing consists of a collection of simple image processing tasks that change the raw input video into a format that can be processed by subsequent steps. Background modeling uses the new video frame to calculate and update a background mode.

## 3 Overview of the distributed tracking system using Background Subtraction

Here I describe basic algorithm for Object Detection. That works based on extraction each pixel value one by one. Each pixel gives intensity value or red, green and blue.

**Step 1:** Input image template  
Input regular image

**Step 2:** Find height, width of image

**Step 3:** For I = 1 to j  
    For J = 1 to w  
        T = Current Pixel value of Template [I, J] (R, G, B)  
        R = Current Pixel value of regular Image [I, J] (R, G, B)  
  
        If (abs(r-t) < threshold)  
            Set pixel with R=G=B=0  
        Else  
            Set Pixel with regular image R,G,B value.  
        End if  
    Next J  
Next I

**Step 3:** Save new file

**Step 4:** Stop

We can improve this algorithm for faster result. We can jump to specific pixel and if object detect with specific pixel value in that can we can move back to pixel. Ultimate goal is to detect object in efficient way.

#### **4 Experimental result**

The experiments are conducted for videos having objects in motion and in results give detect objects. If the background is not properly subtracted the foreground will result in segmentation and gives the less efficiency in detection of object in motion. In following figure, shows the original image in which two objects are in motion and the results of background subtraction algorithm, file & bag is resultant object from background subtraction.



Object File

Object Bag

Detect File

Detect Bag

5

#### **5 Conclusions**

This paper has provided a basic method to detect moving objects using background subtraction framework. The strength of this technique is very basic without any dependency. It produces result that

is based on given image template only. Multiple feature integration algorithms for background modeling and subtraction, where the background is modeled with a generative method and background/foreground are classified by a discriminative technique. In video surveillance, it given video frames base of network speed & camera that is fast. So here algorithm should produce result very fast. Also it is very important to specify appropriate threshold value.

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