



**PES UNIVERSITY**  
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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<b>Course Title: Image Processing and Data Visualization Using MATLAB</b>		
<b>Course code: -UE19CS257B</b>		
<b>Semester : 4<sup>th</sup> sem</b>	<b>Branch: CSE</b>	<b>Team Id:59</b>
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## **PROJECT REPORT**

### **Problem Statement:**

Tracking the same objects present in the frame by using image processing techniques and statistics obtained from the image.

### **Objectives:**

The main objective of Object Countometer is to count the number of same objects present in the input video file. The technique involved here is blob Analysis. By creating a blob system we count the number of same objects in the frame and find their centroids to locate them.

## Description:

The input video stream contains images of objects of one kind(in this project we have used collection of books).We used the top-hat morphological operation to remove uneven illumination, and the opening image morphologically .

We then convert the images to binary, using a threshold calculated using Otsu method for each frame. Once this threshold is applied, we count the number of objects and calculate the centroid of each object.

In the Stream Processing Loop ,we call the image processing objects to count the books in the input video. This loop uses the System objects we instantiated(ie hVideoSrc,hBlob,hVideoOut)

The loop is stopped when you reach the end of the input file, which is detected by the BinaryFileReader System object.

The output video shows the individual objects marked with a circle and plus sign. It also displays the number of objects that appear in each frame.

## New Concept Learnt(Explanation):

We have learnt **Blob analysis** for calculating the statistics of the binary image. The Blob Analysis block calculates statistics for labelled regions in a binary image. The block returns quantities such as the centroid, bounding box, label matrix, and blob count. The Blob Analysis block supports input and output variable-size signals .We have used this in our project to calculate the centroids and thereby the number of centroids helped us to know the number of objects in the image.

### Morphological Operations:

- **Top-hat filtering** with a square structuring element to remove uneven background illumination from an image with a dark background.

- A **strel** object represents a flat morphological structuring element, which is an essential part of morphological dilation and erosion operations. We used it to create a morphological structuring element and open the image morphologically i.e an erosion followed by a dilation, using the same structuring element for both operations.

### **Learning Outcome:**

- ❖ Importing video and extracting each frame till the video ends.
- ❖ Using blob analysis for calculating centroid of the objects.
- ❖ Top-hat filtering for removing uneven illumination in the background.
- ❖ Creating a morphologically structuring element and using it for applying erosion and followed by dilation on the image.
- ❖ Inserting the text and markers on the output window.
- ❖ Displaying the processed image with all the required details(number of books,markers) in it.

### **Code:**

```
filename = 'book5.mp4';
hVideoSrc = VideoReader(filename);
hBlob = vision.BlobAnalysis( ...
    'AreaOutputPort', false, ...
    'BoundingBoxOutputPort', false, ...
    'OutputDataType', 'single');
hVideoOut = vision.VideoPlayer('Name', 'Object counter');
hVideoOut.Position(3:4) = [960 350];

while hasFrame(hVideoSrc)
    I = im2gray(readFrame(hVideoSrc));
    Im = imtophat(I, strel('square',579 ));

    Im = imopen(Im, strel('rectangle',[960 50]));

    th = multithresh(Im);
```

```
BW = Im > th;
```

```
Centroids = step(hBlob, BW);
```

```
BooksCount = int32(size(Centroids,1));  
txt = sprintf('Book count: %d', BooksCount);  
It = insertText(I,[10 280],txt,'FontSize',22);
```

```
Centroids(:, 2) = Centroids(1,2);
```

```
It = insertMarker(It, Centroids, 'o', 'Size', 6, 'Color', 'r');  
It = insertMarker(It, Centroids, 'o', 'Size', 5, 'Color', 'r');  
It = insertMarker(It, Centroids, '+', 'Size', 5, 'Color', 'r');
```

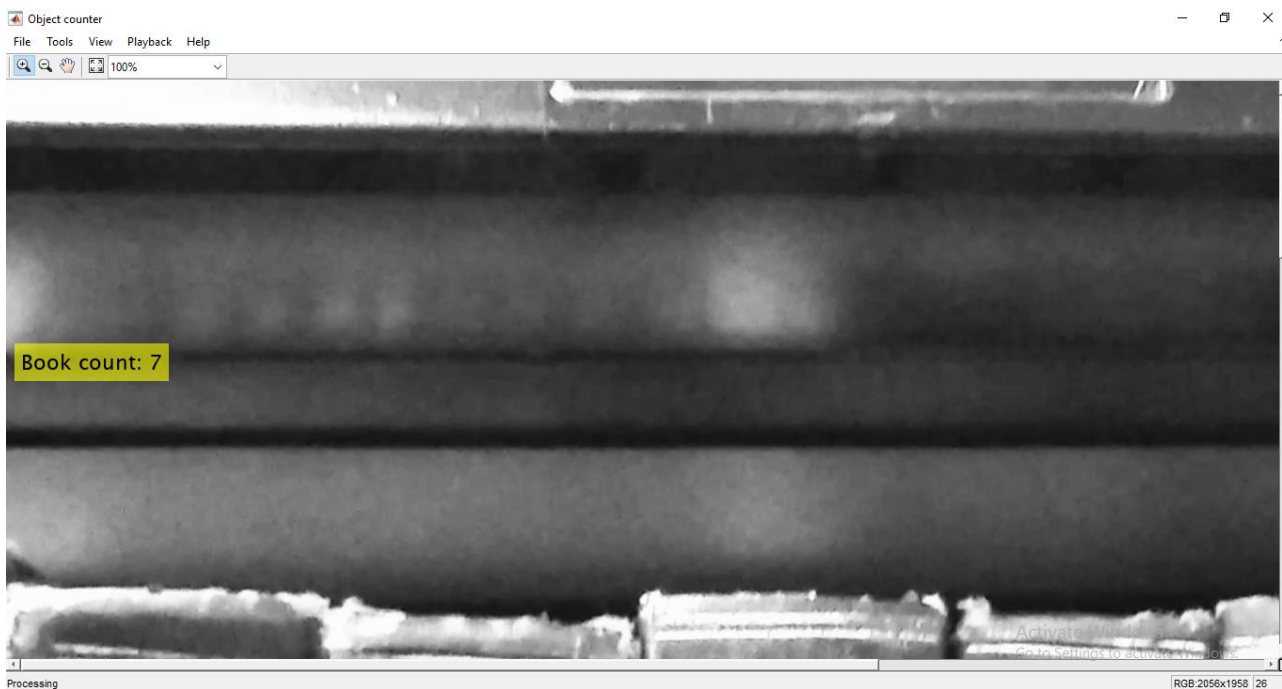
```
step(hVideoOut, It);
```

```
end
```

## Output Screenshots:



Output window



Number of books in the frame displayed at the left end



Markers placed on the centroid in the book

**Conclusion:**

This Image Processing can be further Integrated with a Autonomous library Management System as well to keep track of books issued and books retrieved which will reduce the human resources needed to manage the library.