

# DIP ASSIGNMENT 1

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## 1 Histogram Computation:

After finding the frequency of pixels for each intensity level  $\{0,1,\dots,255\}$ , Figure 1 shows the histogram plot (frequency vs intensity level) for coins.pg (figure 2). Looking at the histogram I found out that most of the pixels are dark and there are very few high-intensity pixels. The background of the image is dark and objects are light in colour.

*average intensity : 103.305*

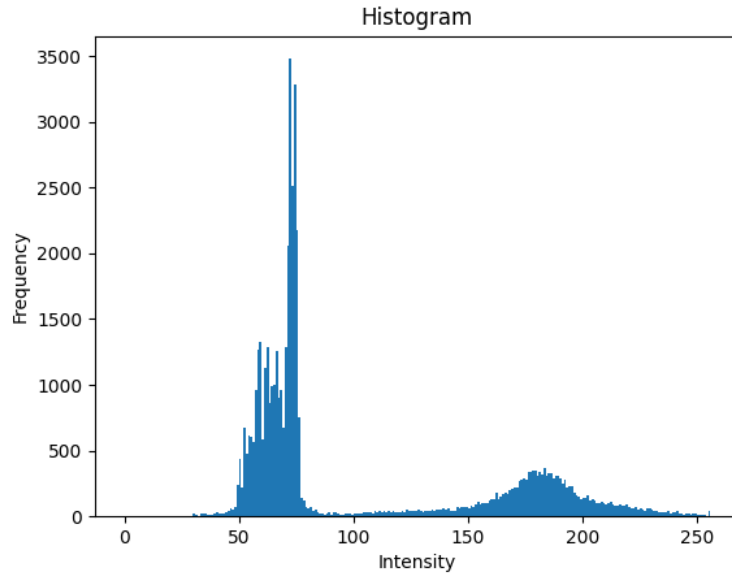


Figure 1: Histogram of frequency w.r.t intensity

## 2 Otsu's Binarization:

To binarize the image coin.png (Figure 2), I implemented the function Otsus\_Binarization. It used two methods for finding threshold  $t$  for binarization a) minimizing the within-class variance and b) maximizing the between-class variance.

*Time taken for within class variance : 2.321*

*Optimal Threshold by minimizing within class variance : 125*

*Time taken for between class variance : 2.303*

*Optimal Threshold by maximizing between class variance : 125*

After getting the above result, it is clear that both methods are equivalent and take almost the same time to find the optimal threshold. Figure 3 shows the image after binarization using the threshold obtained.

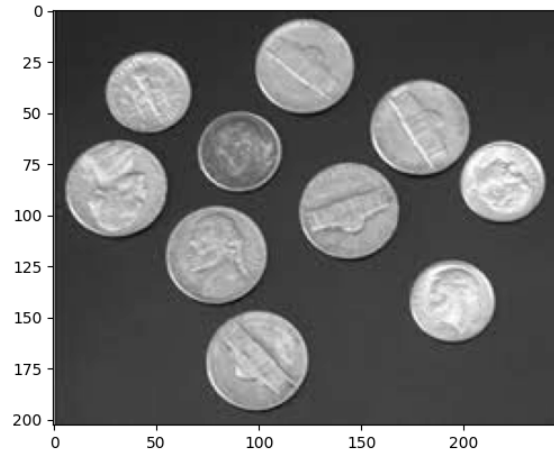


Figure 2: coin.png

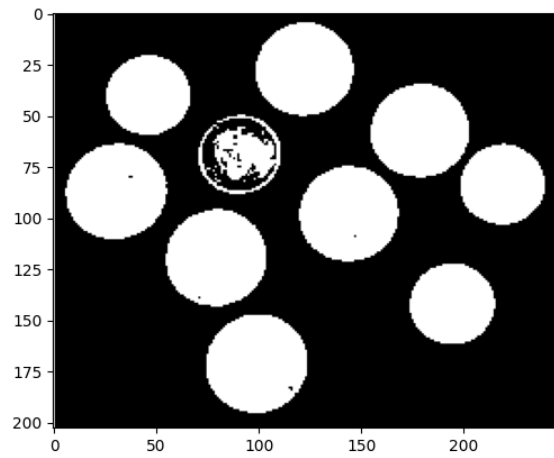


Figure 3: Binarization image of coin.png

### 3 Depth based Extraction:

Binarizing the inverse depth map IIScTextDepth.png and then using it I find out the pixel location to take out from IIScText.png(Figure 4). Then using the pixel location (Figure 5), I display it over the background imageIIScMainBuilding.png(Figure 6). The Final superimposed image is given in Figure 7.

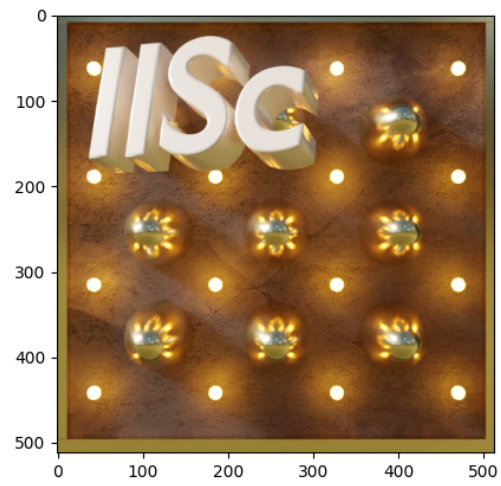


Figure 4: IIScText.png

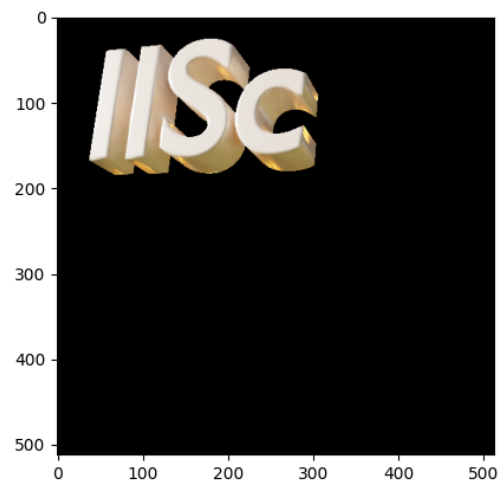


Figure 5:

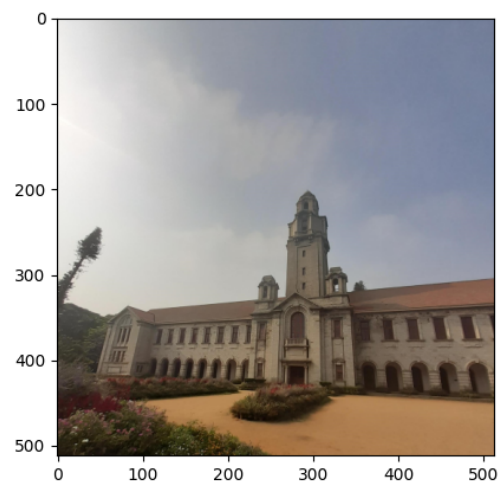


Figure 6:

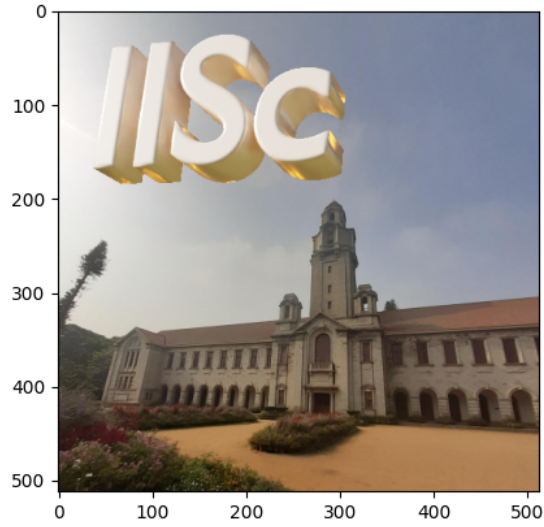


Figure 7: Plot from data just before training parameters

#### 4 Connected Components:

After binarizing the image quote.png, Figure 8. Using connected component analysis, I count the total number of characters, excluding punctuations. I found the connected component by using the breath-first-search algorithm and calculated the size of the component. If the size of the component was less than  $(\text{mean size})/3$ , I did not include it.

$$\text{Number of character} = 64$$

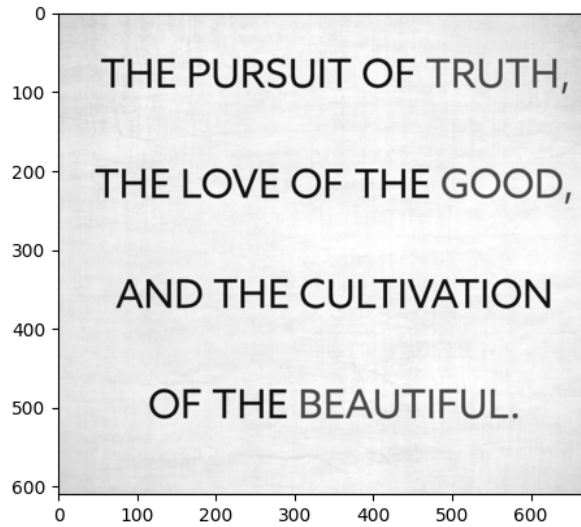


Figure 8: quote.png

## 5 MSER:

Components cannot be found using Otsu binarization as characters have different intensity levels; hence, one threshold cannot be used to binarize it. Below images show that different characters are visible for different threshold values.

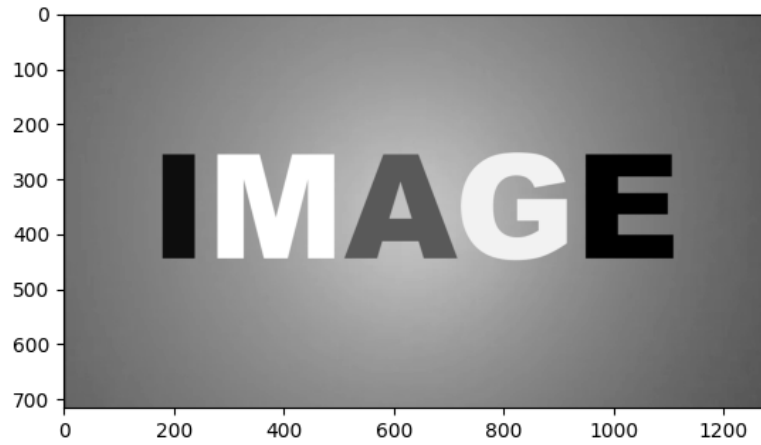


Figure 9: Characters.png

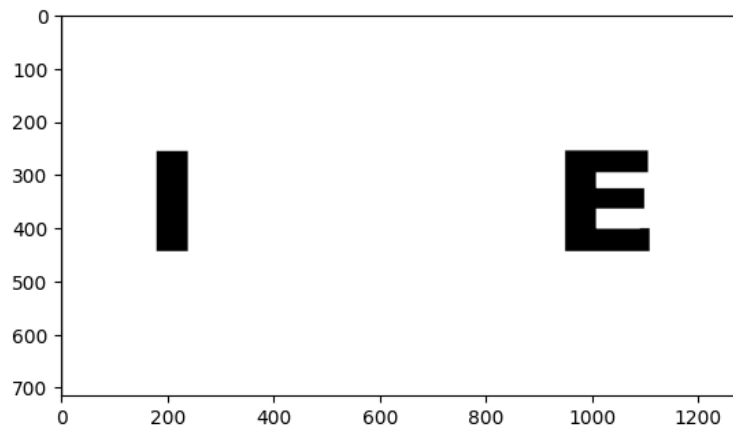


Figure 10: Only characters I and E are visible for threshold 50

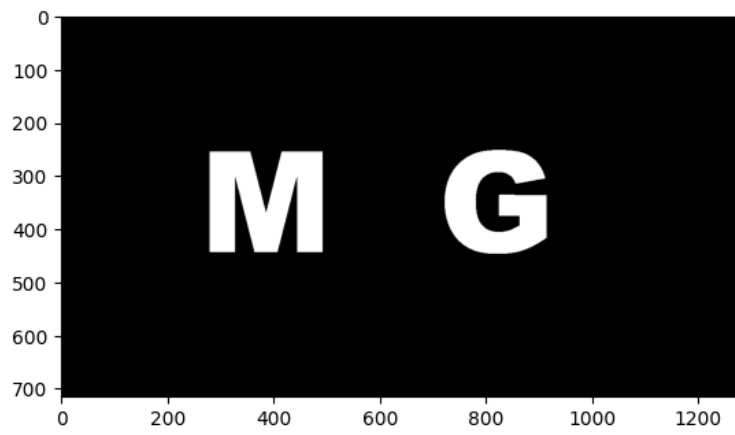


Figure 11: Only characters M and G are visible for threshold 200

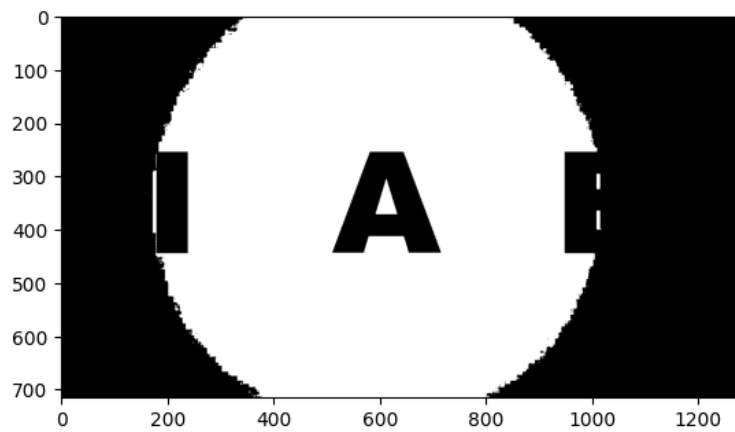


Figure 12: Only character A is visible for threshold 130