Question_4

April 22, 2018

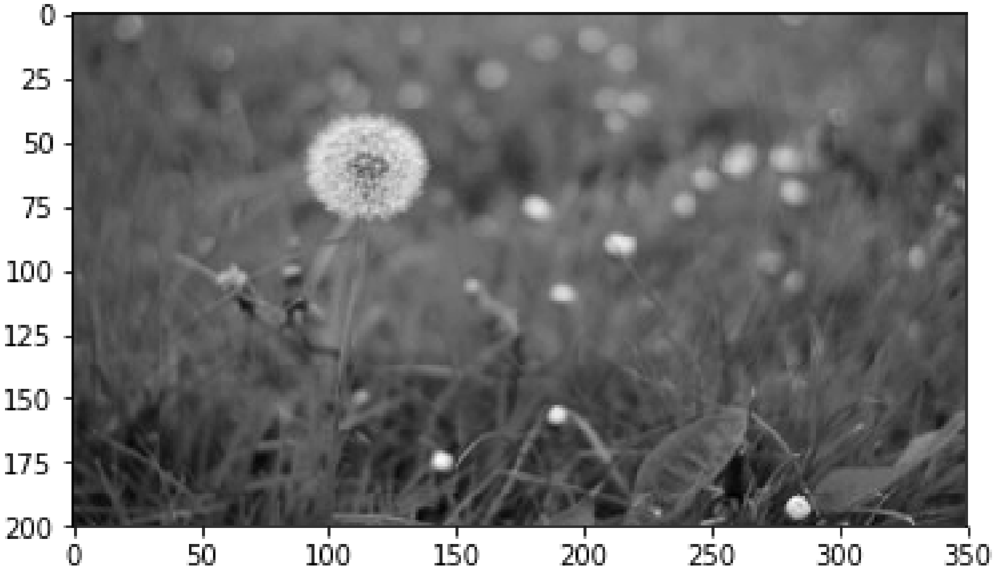
0.0.1 4) Read the image shown below.

0.0.2 Call it I_low. Now extract the foreground (single flower) using Otsu's threshold, T_low. Run Histogram Equalization of I_low to obtain a new image I_HE. Now again extract the foreground (single flower) using Otsu's threshold, T_high. Compare the results.

```
In [8]: import numpy as np
        import cv2
        import matplotlib.pyplot as plt
```

0.0.3 Read the image , Call it I_low

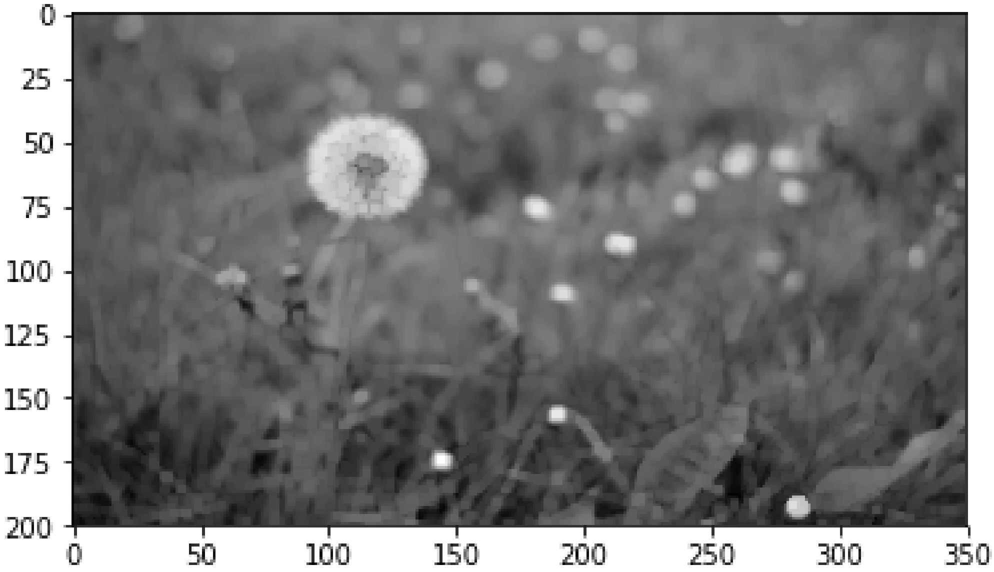
```
In [9]: I_low = cv2.imread('./images/4.png',0)       # this will load as gray scale image (imgna

        plt.imshow(I_low, cmap = 'gray')

Out[9]: <matplotlib.image.AxesImage at 0x7fd148369d30>
```



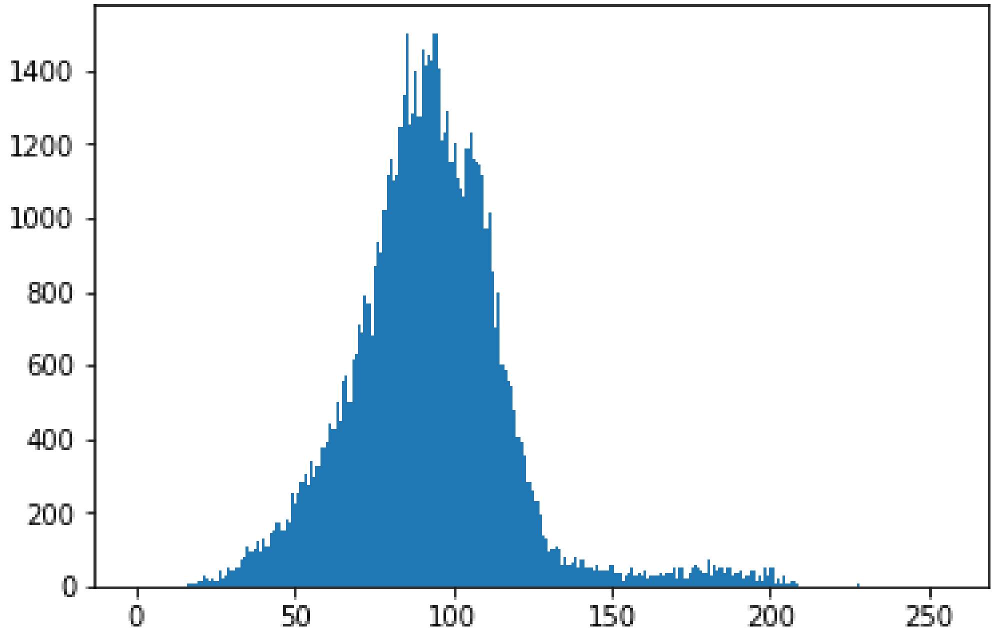
0.0.4 Now extract the foreground (single flower) using Otsu's threshold, T_low.

```
In [10]: import cv2 as cv
         import numpy as np

         kernel = np.ones((3,3),np.uint8)
         #erosion = cv2.erode(img,kernel,iterations = 2)

         opening = cv.morphologyEx(I_low, cv.MORPH_OPEN, kernel)

         plt.imshow(opening, cmap = 'gray')
```

```
Out[10]: <matplotlib.image.AxesImage at 0x7fd148240470>
```



```
In [11]: # we apply otsu's thresholding when the image is bimodal : means two peaks in the his
         # so first we hv to make an image bimodal

         plt.hist(opening.ravel(),256,[0,256]); plt.show()
```

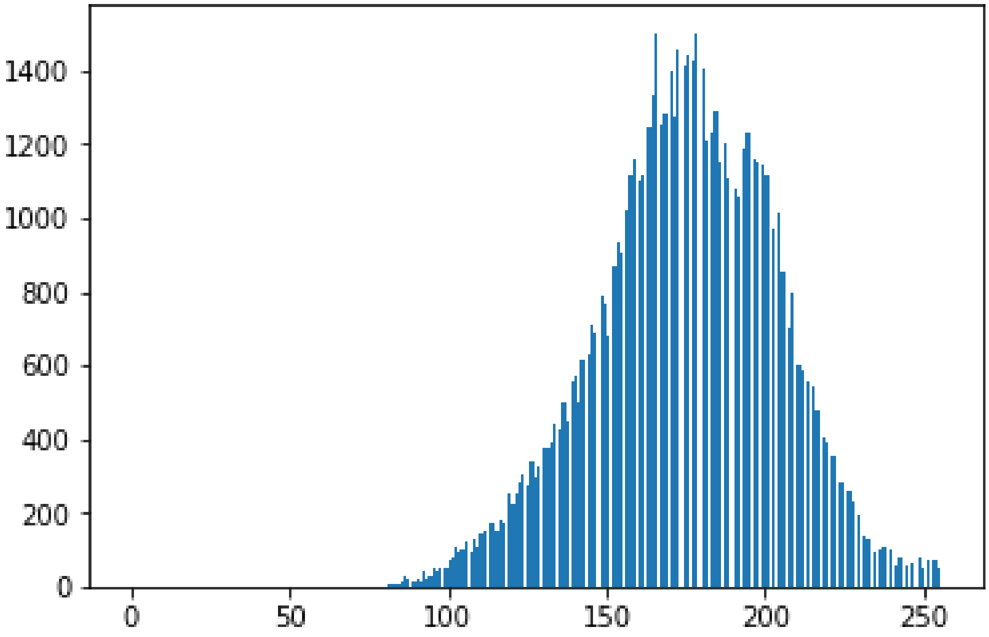


```
In [12]: # preprocessing

         x = np.array(opening)
         x.shape
         x_bck = x


         # taking exponential function and then normalizing
         x = x/255
         x = np.exp(x)
         minx  = np.min(x)
         maxx = np.max(x)
         x = x - minx / (maxx - minx)
         x = x*255
         print(x)

         #x1 = np.log(x)
         #x1 = (1/x1) * 255
         #x1 = (-1) * x1
         #print(x1)
```

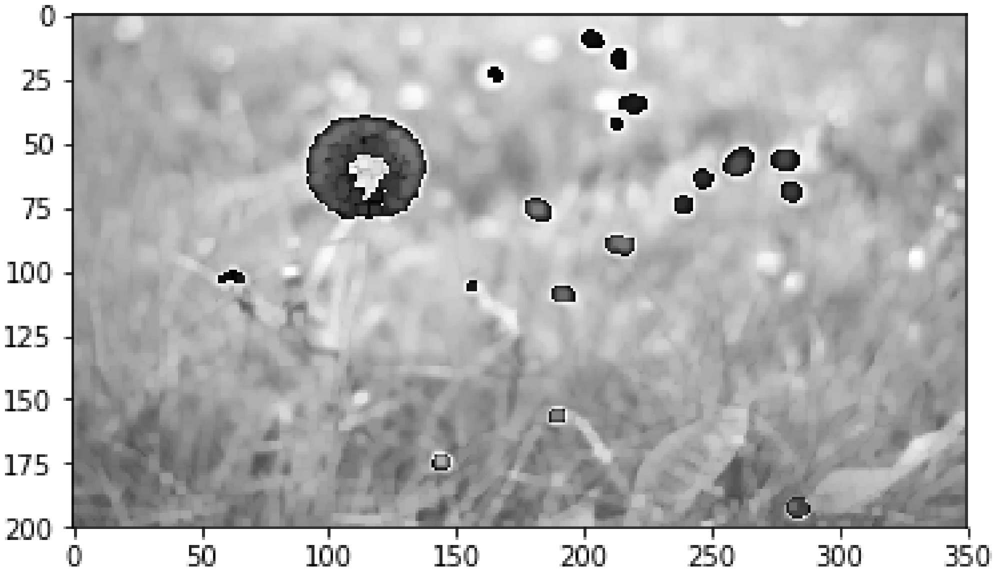
```
[[168.66021648 168.66021648 168.66021648 ... 174.33098257 174.33098257
  172.90494082]
 [168.66021648 168.66021648 168.66021648 ... 174.33098257 174.33098257
  172.90494082]
 [168.66021648 168.66021648 167.25636948 ... 174.33098257 174.33098257
```

```
  172.90494082]
 ...
 [101.34770559 101.34770559  93.45807439 ... 114.19167978 110.63365237
  109.45691492]
 [ 93.45807439  93.45807439  93.45807439 ... 114.19167978 114.19167978
  114.19167978]
 [ 93.45807439  93.45807439  93.45807439 ... 114.19167978 114.19167978
  114.19167978]]
```

```
In [13]: #y = np.exp(np.array(nimg))
         #print(y)

         plt.hist(x.ravel(),256,[0,256]); plt.show()
         x.shape
         x = x.astype(np.uint8)
```

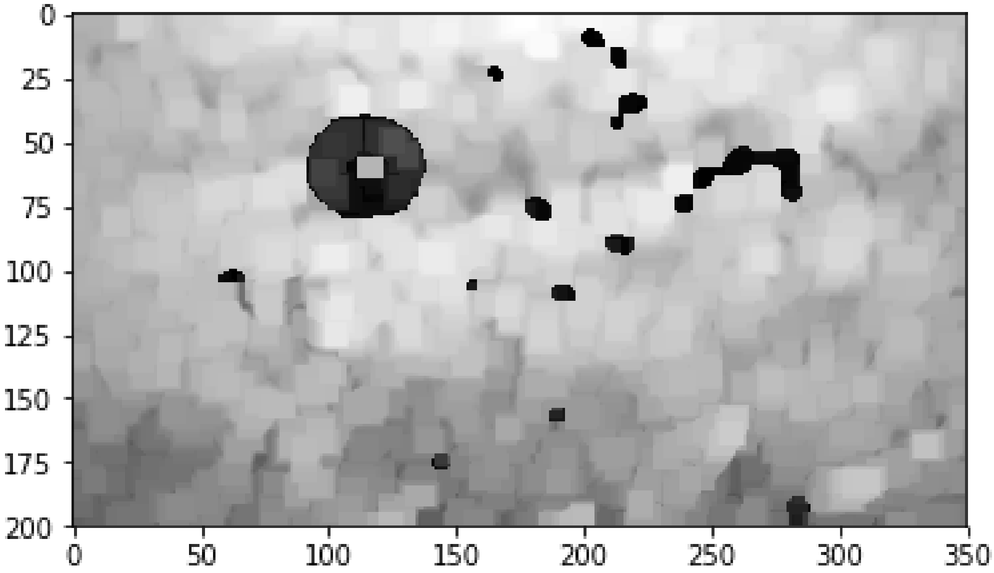


```
In [14]: plt.imshow(x , cmap = 'gray')

Out[14]: <matplotlib.image.AxesImage at 0x7fd1437dc1d0>
```



```
In [15]: kernel = np.ones((9,9),np.uint8)
         #erosion = cv2.erode(img,kernel,iterations = 2)

         openingx = cv.morphologyEx(x, cv.MORPH_OPEN, kernel)

         plt.imshow(openingx, cmap = 'gray')
```

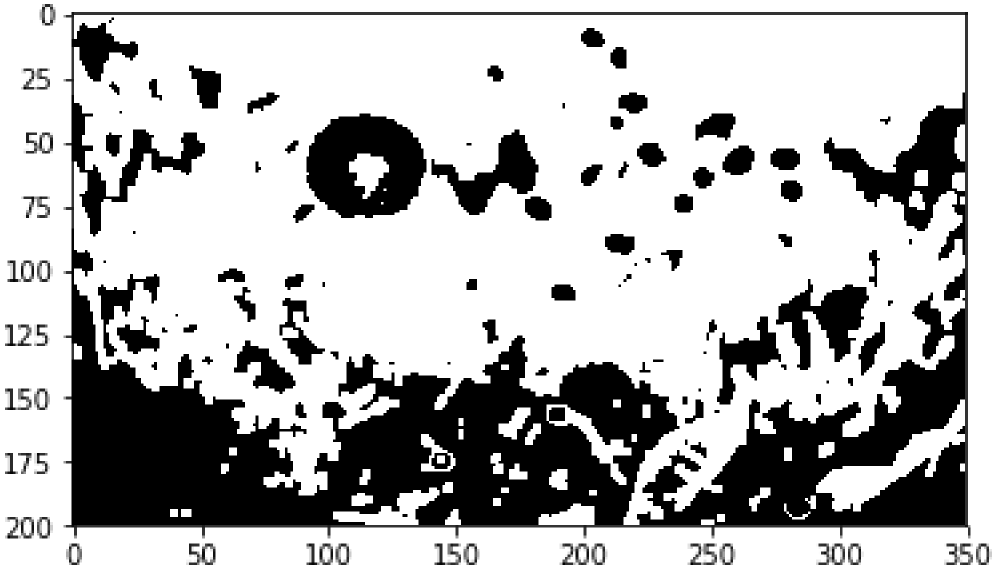
```
Out[15]: <matplotlib.image.AxesImage at 0x7fd1437b8550>
```



```
In [16]: # before applying hist eq / otsu's th : we hv to convert an image to grayscale

         #I_low_gray = cv2.cvtColor( I_low, cv2.COLOR_BGR2GRAY );  # to convert an image to gr

         #plt.imshow(I_low_gray)
         #plt.hist(I_low_gray.ravel(),256,[0,256]); plt.show()
```

```
In [20]: # blur = cv2.GaussianBlur(I_low_gray,(9,9),0)

         ret2,th2 = cv2.threshold(x,0,255,cv2.THRESH_BINARY+cv2.THRESH_OTSU)
         print(ret2) # threshold val decided by otsu's algo
         plt.imshow(th2 , cmap = 'gray')

         # SEPERATING foreground and background

         back = x - th2
         #plt.imshow(back , cmap = 'gray')
```

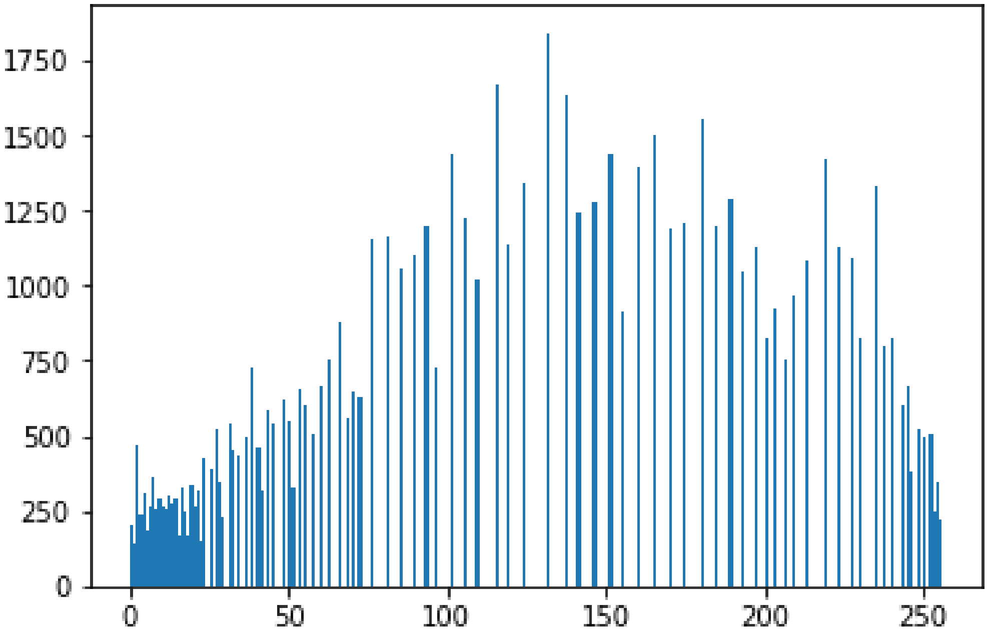
```
158.0
```



0.0.5 Run Histogram Equalization of I_low to obtain a new image I_HE. Now again extract the foreground (single flower) using Otsu's threshold, T_high.

```
In [21]: # applying hist equalization: https://docs.opencv.org/3.1.0/d5/daf/tutorial_py_histog

         I_HE = cv2.equalizeHist(openingx)
```

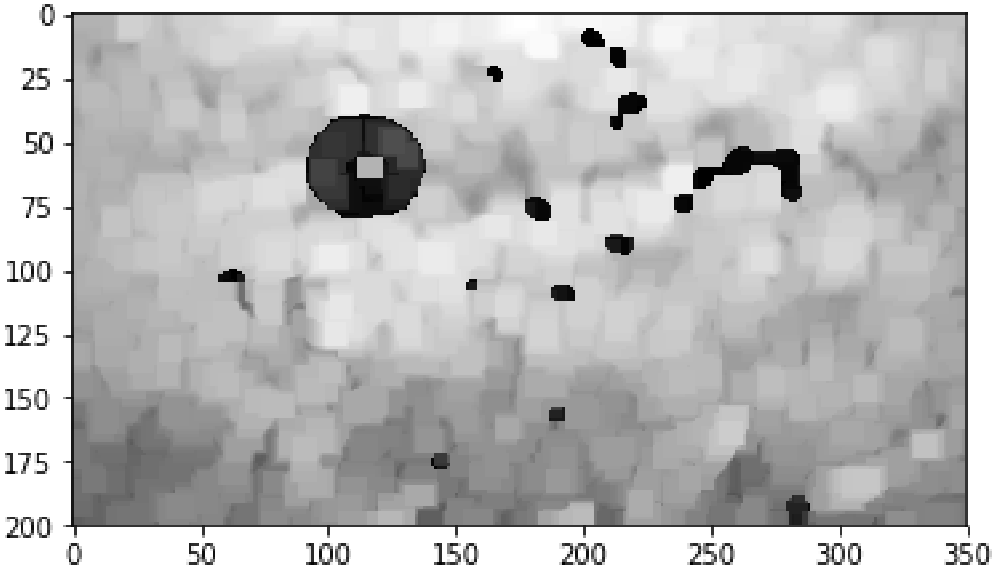
```
In [22]: plt.hist(I_HE.ravel(),256,[0,256]); plt.show()
```



```
In [23]: ret2,th2 = cv2.threshold(I_HE,0,255,cv2.THRESH_BINARY+cv2.THRESH_OTSU)
         plt.imshow(th2)
         print(ret2)
         back = openingx - th2
         plt.imshow(back , cmap = 'gray')
```

```
124.0
```

```
Out[23]: <matplotlib.image.AxesImage at 0x7fd148488668>
```



0.0.6 Observation : For otsu method we need a bimodal image but the given image is not bimodal , so i tried some preprocessing like exponential