CECS-553 Machine Vision

Aastha Chaudhary

LAB – 2

1. Segment the given rocks in “colorful rocks 2.jpg” image.

Please find the image and code segment for the same below-

```
im = imread('colorful rocks 2.jpg');  % Read an image
figure,imshow(im);                    % Plot an image

%% Changing RGB to Gray
imgray = rgb2gray(im);            % Convert image to gray of scale 0-1
imgray = im2double(imgray);       % Changes the unit8 to double
figure, imshow(imgray);


%% Thresholding
level = graythresh(imgray);
bw = im2bw(imgray, level);
%figure,
```

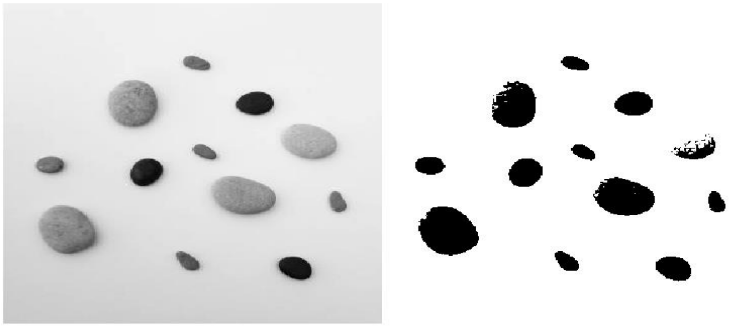
2. Plot the result and then save the resulting image as png.

Code segment is as follows-

```
imshowpair(imgray, bw, 'montage')

saveas(gcf,'final result.png')
```

The image obtained is –



3. Count the total number of the gray rocks in the image and print the result.

The total no. of gray rocks can be counted based on the total area each rock occupied. As it can be observed from the given image that all the gray rocks have comparatively larger area than the other rocks so we can try segregating them on the basis of the area. Please find the code segment for the same below.

4. Calculate the area of each gray rock and save the result in a file. Explain how you did that.

The area of the rocks can be calculated with the help of the Area function which can be applied on structured elements which can be obtained with the help of regionprops function in matlab and data is written in the file with the help of fopen(), fclose() and fprintf functions which enables the file to be opened in the writing mode and help in adding the data to it and then closing the file once the data is written into it. Please find the code segment for the same below.

5. Estimate the center of each gray rock and plot the image with red stars on the calculated centers. Explain how you found the centers.

The center of the gray rocks can be determined with the help of Centroid function which is applied on the structured elements. We can identify the centroid of those rocks whose are is greater than a particular threshold (which in this case are the gray rocks). We can plot the corresponding x and y coordinates using plot(centroidsX, centroidsY, '-.dr') command and hold on and hold off commands can be used to plot the centroids recursively to a single bar plot.

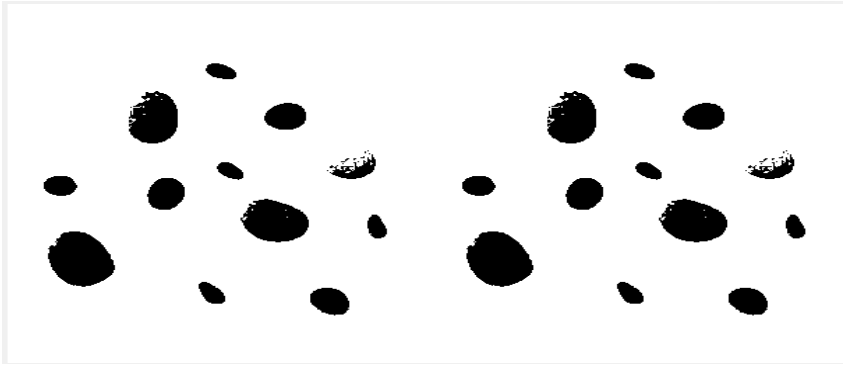
6. Upload a pdf file of your code, your answers to question 4 and 5, and the resulting images.

As stated above, we need to identify the total no. of gray rocks, their respective areas and centroids. An approach to identify the same can be to segregate the images based on their areas, as we can see here that all the gray rocks have larger area in comparison to the other rocks. Henceforth, tried to segregate the data based on their areas. Please find the code snippet below-

```
%% Counting the no of gray rocks and calculating the area & centroid for them

nrOfpixels = 1;
objs = bwareaopen(bw,nrOfpixels);  % Remove objects < nrOfpixels
%figure,
imshowpair(bw, objs, 'montage')
labels = bwlabeln(objs);            % Label the connected components/objects
nrOflabels = max(labels(:))
i = 0;
blobMeasurements = regionprops(bw , 'all');
```

The figure generated in this step is as follows-



```
fileID = fopen('exp.txt','w');
for k = 1 : nrOflabels
  if blobMeasurements(k).Area > 3
     i = i + 1;
     rockArea = blobMeasurements(k).Area;
     rockCentroid = blobMeasurements(k).Centroid;
     centroidsX = rockCentroid(1:2:end-1);
     centroidsY = rockCentroid(2:2:end);
     %subplot(2,2,i),
     plot(centroidsX, centroidsY, '-.dr')
     fprintf(fileID,'%g\n',rockArea);
  end
  hold on
```

```
end
hold off
fclose(fileID);

fprintf 'The total no. of grey rocks is ',i
fprintf 'The data of the file is '
type exp.txt
```

Please note- We have used all the functions which were discussed in the lecture here –

✓ Thresholding function: "**im2bw**"

✓ Removing objects (connected components) with fewer than some fixed pixels: "**bwareaopen**"

✓ Labeling connected components: "**bwlabeln**"

The output is as follows-

```
The total no. of grey rocks is
i =

     4


The data of the file is
100279
4
6
4
>>
```

The bar plot of the centroids of all the gray rocks is as follows-