APPENDIX

```
clc;
clear all;
close all;
%%%% To get the Input image file
   a=imread('btd.jpg');
   wd=256;
   Input=imresize(a,[256 256]);
        figure(1);
        imshow(Input); title('Input Image');
   [r c p]   = size(Input);
   if p==3
       Input= Input(:,:,2);
       figure(2);
       imshow(Input); title('Denoised image');
       Input = imadjust(Input,[0.4 0.8],[]);
       figure(3);  title('enhanced image');
       imshow(Input);
   end
 Input   =double(Input);
    Length = (r*c);
    Dataset = reshape(Input,[Length,1]);
              Clusters=5; %k CLUSTERS
              Cluster1=zeros(Length,1);
              Cluster2=zeros(Length,1);
              Cluster3=zeros(Length,1);
              Cluster4=zeros(Length,1);
              Cluster5=zeros(Length,1);
              miniv = min(min(Input));
              maxiv = max(max(Input));
              range = maxiv - miniv;
              stepv = range/Clusters;
```

```
incrval = stepv;
for i = 1:Clusters
   K(i).centroid = incrval;
  incrval = incrval + stepv;
end
update1=0;
update2=0;
update3=0;
update4=0;
update5=0;

mean1=2;
mean2=2;
mean3=2;
mean4=2;
mean5=2;
while  ((mean1 ~= update1) & (mean2 ~= update2) & (mean3 ~= update3) &
    (mean4 ~= update4) & (mean5 ~= update5))
    mean1=K(1).centroid;
    mean2=K(2).centroid;
    mean3=K(3).centroid;
    mean4=K(4).centroid;
    mean5=K(5).centroid;

  for i=1:Length
      for j = 1:Clusters
            temp= Dataset(i);
             difference(j) = abs(temp-K(j).centroid);

      end
    [y,ind]=min(difference);
```

```
 if ind==1
      Cluster1(i)   =temp;
 end
 if ind==2
      Cluster2(i)   =temp;
 end
 if ind==3
      Cluster3(i)   =temp;
end
if ind==4
      Cluster4(i)   =temp;
end
if ind==5
     Cluster5(i)   =temp;
end
end
%UPDATE CENTROIDS
    cout1=0;
    cout2=0;
    cout3=0;
    cout4=0;
    cout5=0;

    for i=1:Length
          Load1=Cluster1(i);
          Load2=Cluster2(i);
          Load3=Cluster3(i);
          Load4=Cluster4(i);
          Load5=Cluster5(i);
              if Load1 ~= 0
                  cout1=cout1+1;
              end
```

```
                if Load2 ~= 0
                    cout2=cout2+1;
                end
                if Load3 ~= 0
                    cout3=cout3+1;
                end

                if Load4 ~= 0
                    cout4=cout4+1;
                end

                if Load5 ~= 0
                    cout5=cout5+1;
                end
            end
 Mean_Cluster(1)=sum(Cluster1)/cout1;
Mean_Cluster(2)=sum(Cluster2)/cout2;
Mean_Cluster(3)=sum(Cluster3)/cout3;
Mean_Cluster(4)=sum(Cluster4)/cout4;
Mean_Cluster(5)=sum(Cluster5)/cout5;
    %reload
     for i = 1:Clusters
        K(i).centroid = Mean_Cluster(i);
     end
       update1=K(1).centroid;
       update2=K(2).centroid;
       update3=K(3).centroid;
       update4=K(4).centroid;
       update5=K(5).centroid;
     end
      AA1=reshape(Cluster1,[wd wd]);
      AA2=reshape(Cluster2,[wd wd]);
```

```
AA3=reshape(Cluster3,[wd wd]);
AA4=reshape(Cluster4,[wd wd]);
AA5=reshape(Cluster5,[wd wd]);
figure(4);
imshow(AA1); title('cluster 1');
figure(5);
imshow(AA2); title('cluster 2');
figure(6);
imshow(AA3); title('cluster 3');
figure(7);
imshow(AA4); title('cluster 4');
figure(8);
imshow(AA5); title('cluster 5');
SE = strel('diamond',1);
open = imopen(AA5,SE);
figure(9 );  title ('Mrophological image')
imshow(open);
Ibw = im2bw(open);
Ibw = imfill(Ibw,'holes');
Ilabel = bwlabel(Ibw);
stat = regionprops(Ilabel,'centroid');
imshow(open); hold on;
    for x = 1: numel(stat)
        plot(stat(x).Centroid(1),stat(x).Centroid(2),'ro');
    end

     p = size(open);
    col = round(p(2)/2)-90;
     row = min(find(open(:,col)));
     boundary = bwtraceboundary(open,[row,col],'N');
     imshow(open) Title('Extracted brain tumor');
     hold on
```

```
    plot(boundary(:,2),boundary(:,1),'g', 'linewidth',2);
    labeledImage = bwlabel(open, 8);
    blobMeasurements = regionprops(labeledImage, 'Centroid');
    numberOfBlobs = size(blobMeasurements, 1);
  hold on;
  for k = 1 : length(blobMeasurements)
   x = blobMeasurements(k).Centroid(1);
  y = blobMeasurements(k).Centroid(2);
  plot(x, y, 'r.', 'MarkerSize', 20); %, 'LineWidth', 3);
str = sprintf('The centroid of shape %d is at (%.2f, %.2f)', ...   k, x, y);
 uiwait(helpdlg(str));
 end

Area = bwarea(open);
```

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