

```
1   close all;
2   clear all;
3
4   % Problem 6a
5   I1 = im2double(imread('../Figures/ThreeRegions.jpg'));
6   xarr = [180 180 180];
7   yarr = [125 175 215];
8   reg_maxdist = [0.0485 0.2 0.15];
9
10  J1 = Prob6a(I1,xarr,yarr,reg_maxdist);
11  figure(), imshow(J1)
12  bw = J1(:, :, 1) + J1(:, :, 2) + J1(:, :, 3);
13  figure(), imshow(bw)
14
15
16
17  % Problem 6b
18  Area = sum(bw(:, :), 'all');
19
20  sumsx = 0; sumsy = 0;
21  for x = 0 : size(J1,1) - 1
22      for y = 0 : size(J1,2) - 1
23          sumsx = sumsx + x*bw(x+1,y+1);
24          sumsy = sumsy + y*bw(x+1,y+1);
25      end
26  end
27  xc = (1 / Area) * sumsx;
28  yc = (1 / Area) * sumsy;
29  centroid = [xc, yc];
30
31  bound = edge(bw, 'canny');
32  figure(), imshow(bound)
33  points = zeros(Area,3); i = 1;
34  for x = 1 : size(bound,1)
35      for y = 1 : size(bound,2)
36          if (bound(x,y) == 1)
37              points(i,1) = x;
38              points(i,2) = y;
39              points(i,3) = sqrt( ((x - xc)^2) + ((y - yc)^2) );
40              i = i + 1;
41          end
42      end
43  end
44  points = points(1:i,:);
45  dave = sum(points(:,3)) / size(points,1);
46
47  circ = 0;
48  for i = 1 : size(points,1)
49      circ = circ + ((points(i,3) - dave)^2);
50  end
51
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52
53 % Problem 6c
54 I2 = imresize(im2double(imread('../Figures/Beans.jpg')), 1 / 3);
55 color = [.64 .27 .29];
56 reg_maxdist = [0.14 0.12 0.13];
57 J2 = Prob6c(I2,color,reg_maxdist);
58
59 A = edge(rgb2gray(J2), 'canny');
60 [center1, radius1] = imfindcircles(A, [15 50]);
61
62 figure(), imshow(I2)
63 viscircles(center1, radius1,'EdgeColor','r');
64
65
66
67 % Problem 6d
68 color = [.97 .81 .31];
69 reg_maxdist = [0.005 0.3 0.3];
70 J = Prob6c(I2,color,reg_maxdist);
71
72 A = edge(rgb2gray(J), 'canny');
73 [center2, radius2] = imfindcircles(A, [20 100]);
74
75 figure(), imshow(I2)
76 viscircles(center1, radius1,'EdgeColor','r');
77 viscircles(center2, radius2,'EdgeColor','r');
78 line([center1(1) center2(1)], [center1(2), center2(2)],...
79     'linewidth', 2 , 'color', 'red');
80
81 d = sqrt( ((center2(1) - center1(1))^2) + ((center2(2) - center1(2))^2) ) ...
82     - (radius1 + radius2);
83
84
```