

COSC 6370: Fundamental of Medical Imaging

Assignment – 1

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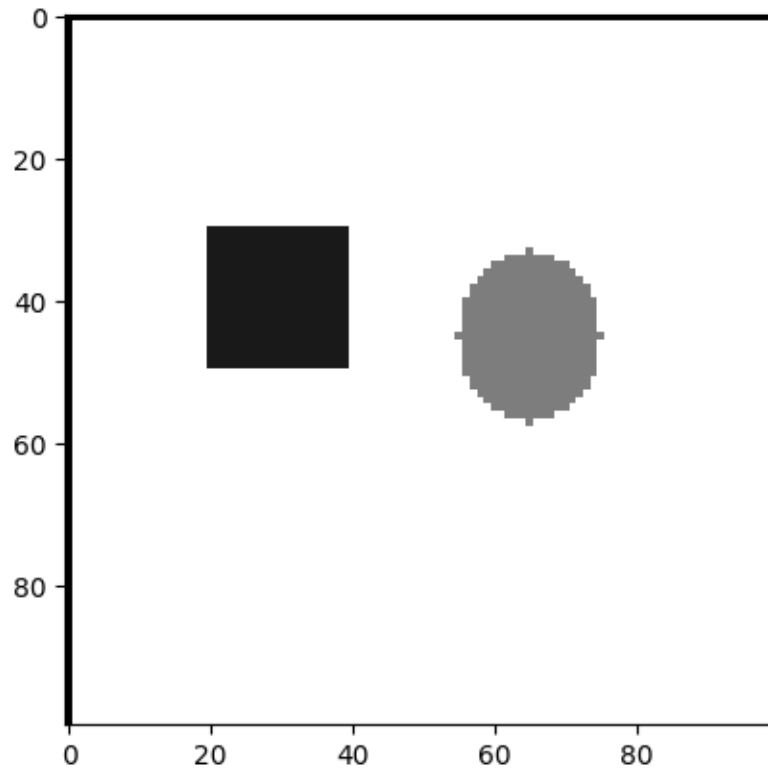
The code:

```
1  import cv2
2  import numpy as np
3  import matplotlib.pyplot as plt
4
5  def BigSquare(N1, N2, PosB1, PosB2, LengthB1, LengthB2, PosC1, LengthC1, LengthC2, SIA, SIB, SIC):
6      whiteBlankImage = np.zeros(shape=[N1, N2, 3], dtype=np.uint8)
7      for i in range(1,N1):
8          for j in range(1,N2):
9              whiteBlankImage[i,j] = SIA
10             if (((j-(LengthB1 + (2* PosB2) + (0.5 * LengthC2)))/LengthC2)**2 + ((i-PosC1)/LengthC1)**2 <= 1):
11                 whiteBlankImage[i, j] = SIC
12             if i >= PosB1 and i < PosB1+LengthB1:
13                 for j in range(PosB2,PosB2+LengthB2):
14                     whiteBlankImage[i,j] = SIB
15
16         plt.imshow(whiteBlankImage)
17         plt.show()
18
19     BigSquare(100,100,30,20,20,20,45,12,10,255,25,50)
20
```

About the code:

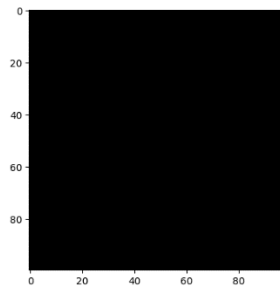
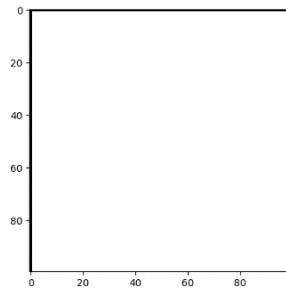
1. Created phantom matrix of size N1xN2.
2. Given SIA is applied on first compartment.
3. Compartment 1 and Compartment 2 will be created simultaneously.
4. Compartment 1 will be created precisely at 'PosB1' and 'PosB2' with 'LengthB1' and 'Length2' lengths and with intensity SIB.
5. Compartment 2 will be created 'PosB2' away from Compartment 1 with lengths 'LengthC1' and 'LengthC2' and with intensity SIC.
6. Generated image is shown on screen.

The Output:

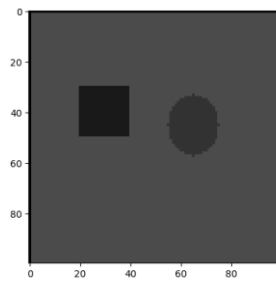


Answers:

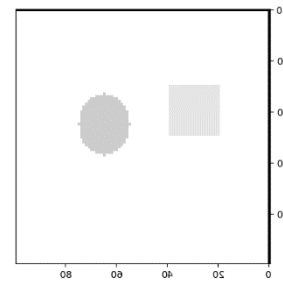
1. We cannot give same intensity values to all the compartments, if given, we cannot see the difference between the compartments. A 25 difference between the intensity values is clearly visible.
2.
 - All compartments having same intensity values.



-
- Compartments having 25 differences in their intensity values.



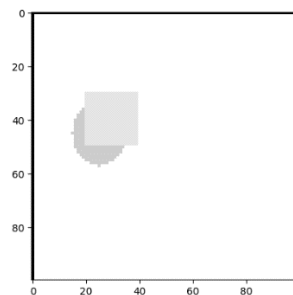
Intensity Values: 0,25,50



Intensity Values: 255,230,205

3. In our case, objects won't overlap because we have given PosB1 distance between B and C compartments. In other cases: if two objects overlap, then the area of the object with higher density will be given higher intensity value. As professor mentioned in the class: The more material is given more signal, thus it looks more brighter than others. Alternatively, if two materials are equally combined, then we can average the intensity values of both the objects at the overlapping region, so that two objects will be visible clearly.

- In the below case. Compartment 2(square) is given more signal intensity (230) than compartment 3(ellipse) whose intensity value is 205. So, square compartment is brighter than ellipse compartment.



Intensity Values: 255,230,205

- In the below case, we have averaged the intensity values of the overlapping region.

