CS 663 Assignment 3, Question 3

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Code

```
clc; clear all; close all;
warning('off', 'all');

tic;
```

Algorithm for foreground mask

Use K means segmentation with features as RGB and spatial coordinates. I have used it with K=3 for both images. Then identify the label given to maximum part of the object in foreground, lets say L. Now, first define a mask = 1 if the pixel belongs to L, or else mask = 0. Currently the mask will have many connected components. So now, use 'bwareafilt' function of matlab to filter out the connected components with lesser pixels. Now, we will have only one connected component in the mask which actually represents the foreground object. But the mask will have some holes in it corresponding to some pixels which got labelled incorrectly by our segmentation algorithm. So now, use matlab function 'imfill' to fill these holes and get the correct mask.

Bird image

We have downsampled the image by a factor of 2 on both axes. Hence, the value of alpha used for this is also halved i.e. alpha = 20.

Code for bird image

```
im = imread('../data/bird.jpg');
im = im(1:2:end, 1:2:end, :);
mask = myForegroundMask(im, 2);
im = double(im);
displayMask(im, mask);
mySpatiallyVaryingKernel(im, mask, 20);

toc;
```

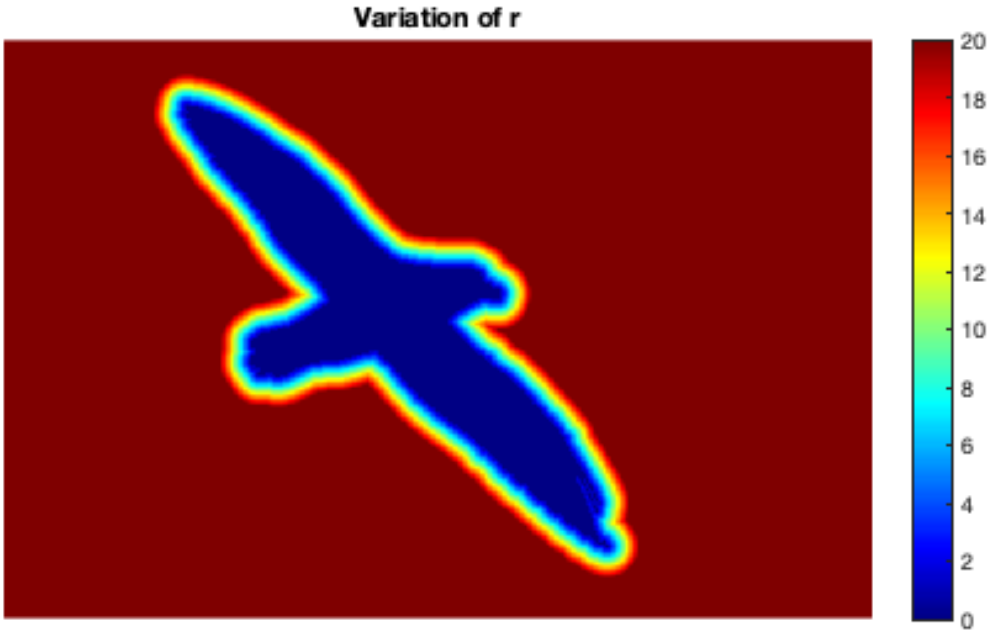
```
Elapsed time is 17.448356 seconds.
```

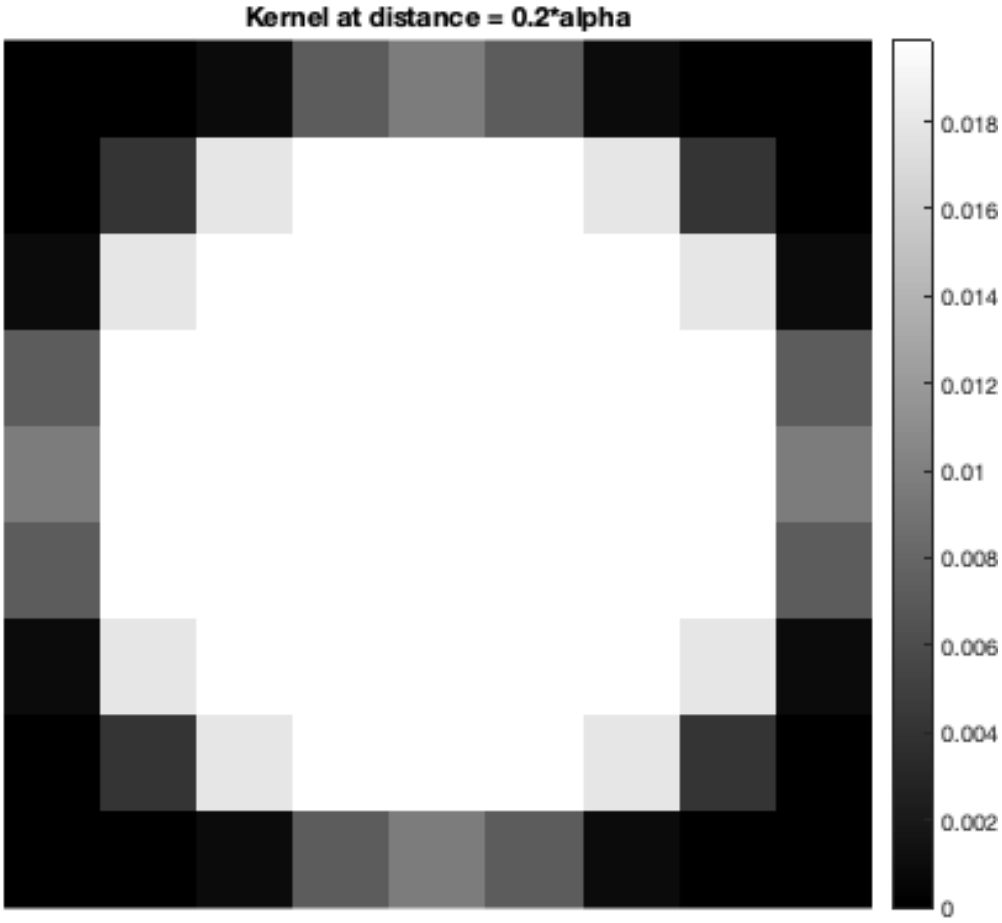
Original Image

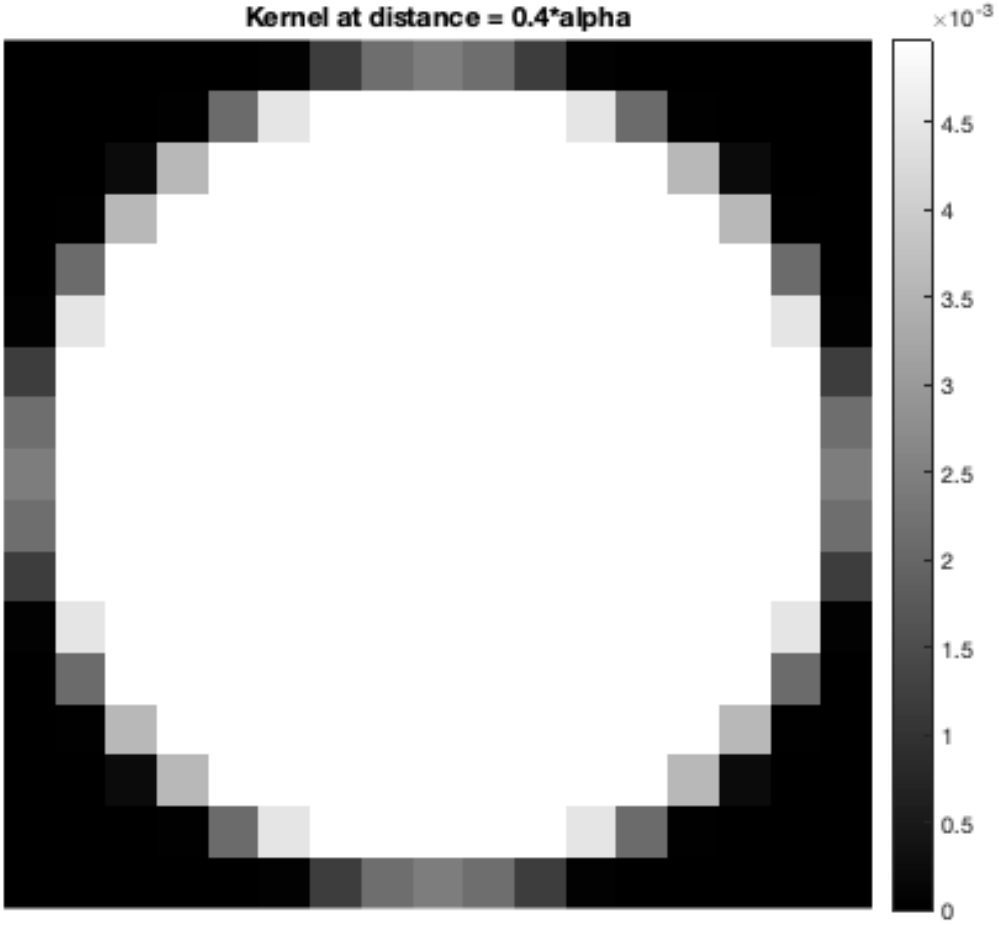
Mask

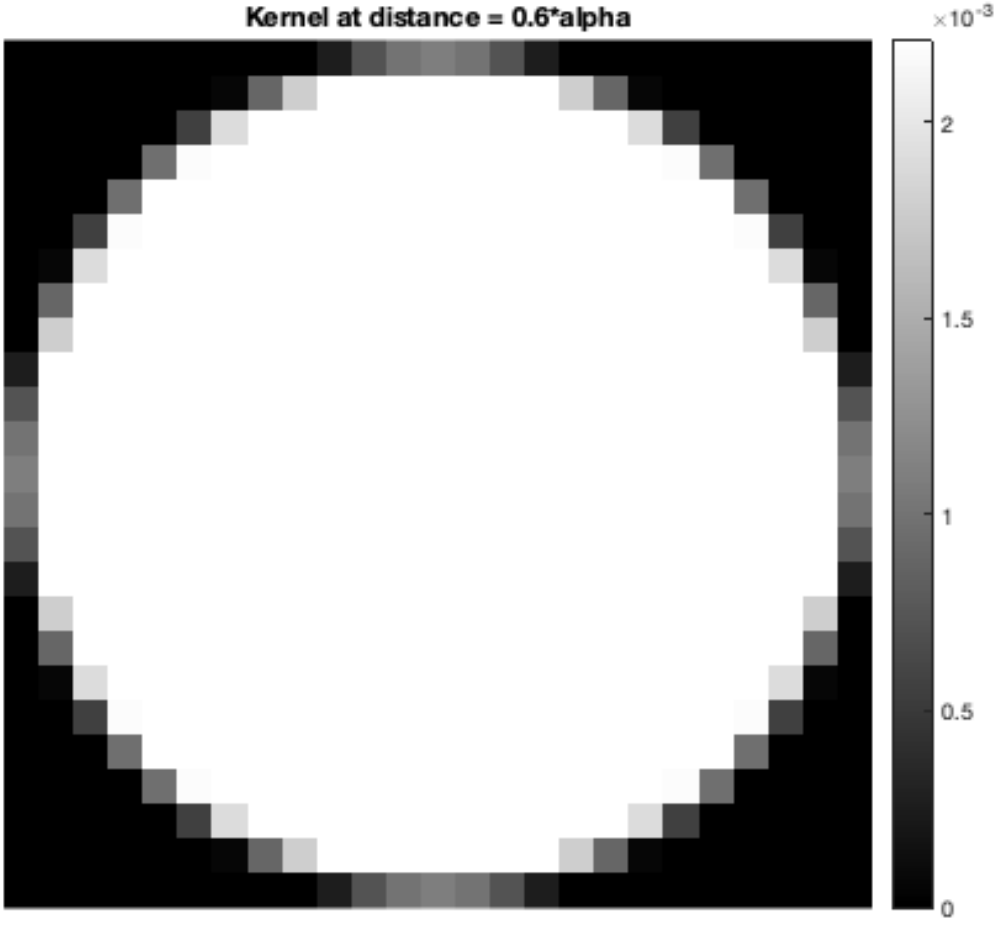
Foreground

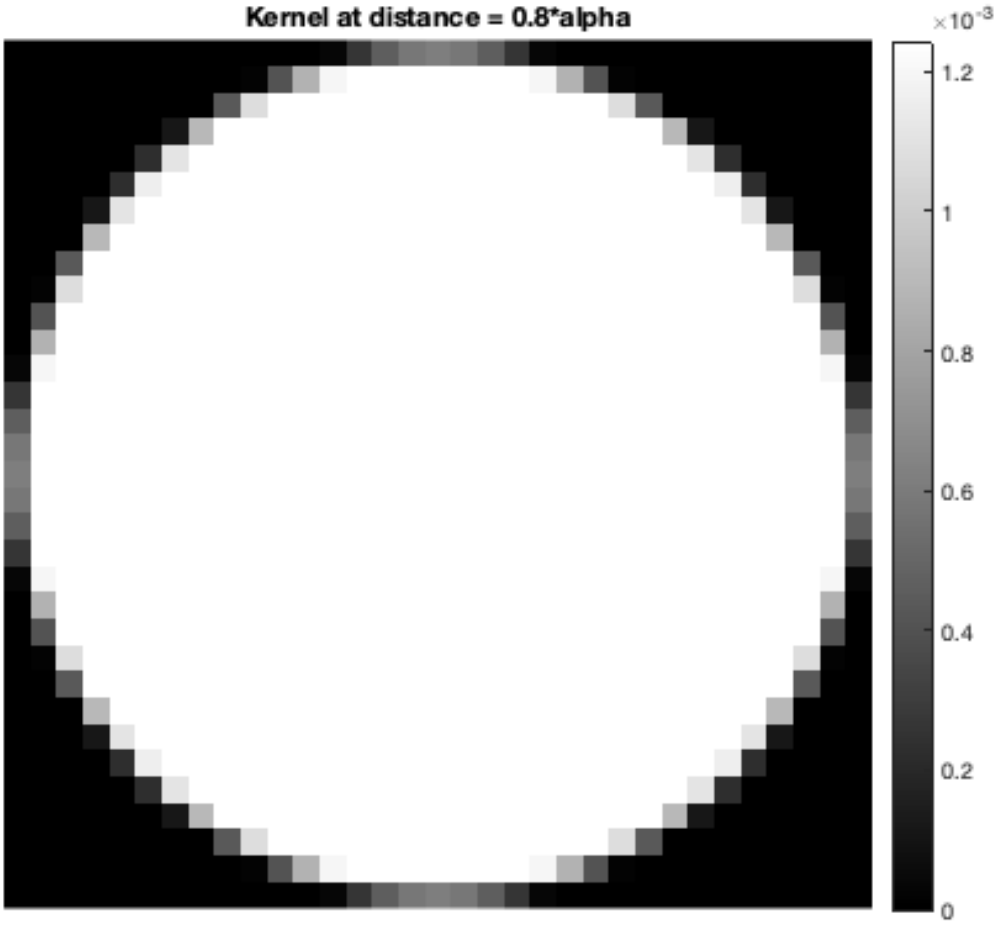
Background

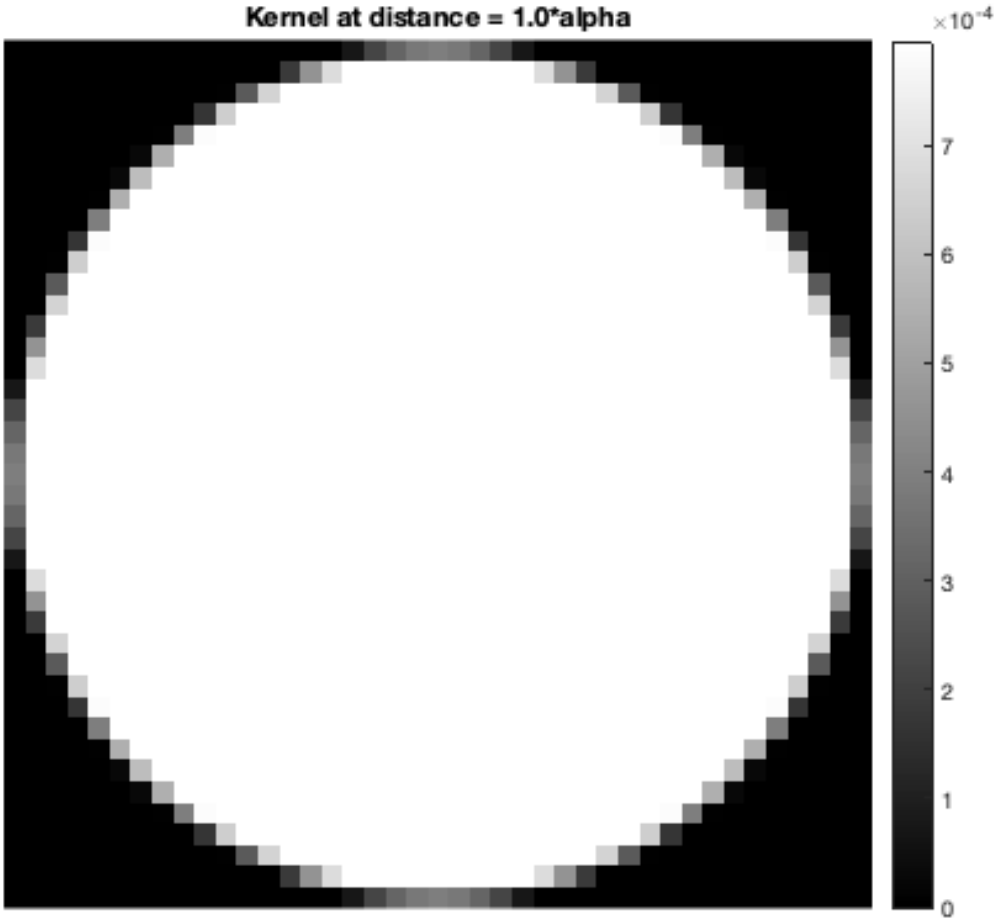

Variation of r
20
18
16
14
12
10
8
6
4
2
0


Kernel at distance = 0.2*alpha
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0


Kernel at distance = 0.4*alpha
×10^-3
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0


Kernel at distance = 0.6*alpha
×10^-3
2
1.5
1
0.5
0


Kernel at distance = 0.8*alpha
×10^-3
1.2
1
0.8
0.6
0.4
0.2
0


Kernel at distance = 1.0*alpha
×10^-4
7
6
5
4
3
2
1
0

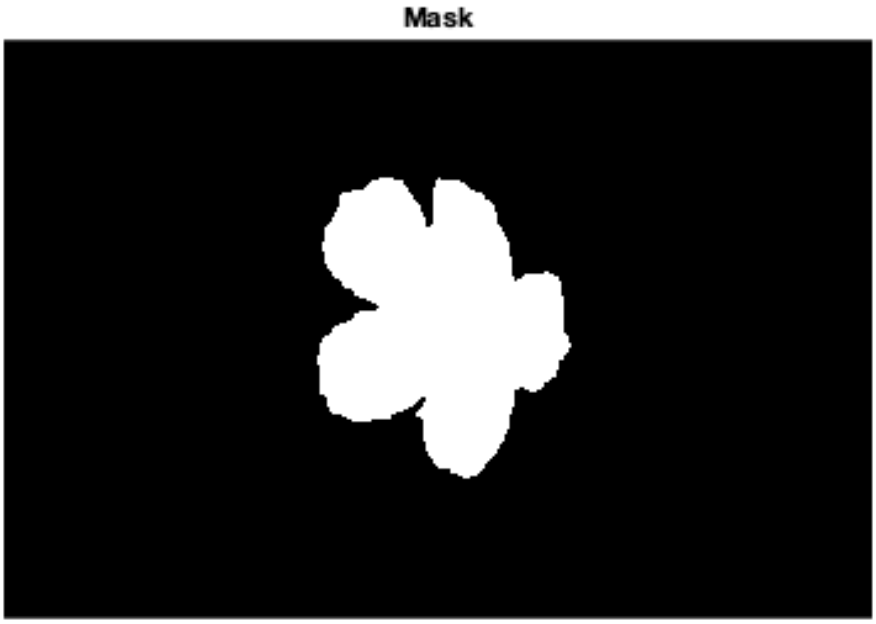
Flower image

We have kept the image intact i.e. no downsampling. Hence, alpha = 20.

Code for Flower image

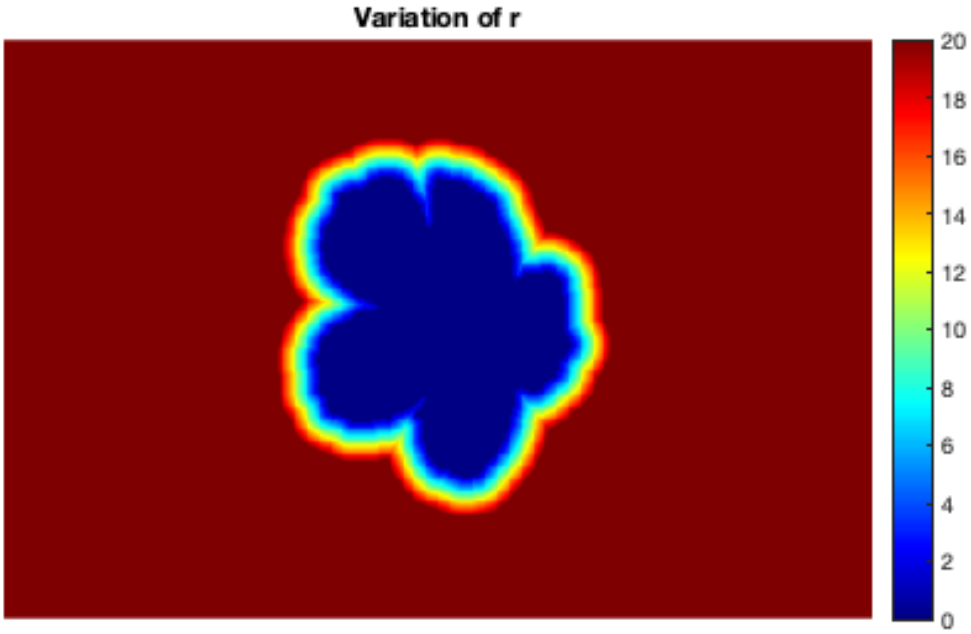
```
im = imread('../data/flower.jpg');
mask = myForegroundMask(im, 3);
im = double(im) ;
displayMask(im, mask);
mySpatiallyVaryingKernel(im, mask, 20);

toc;

Elapsed time is 32.448477 seconds.
```

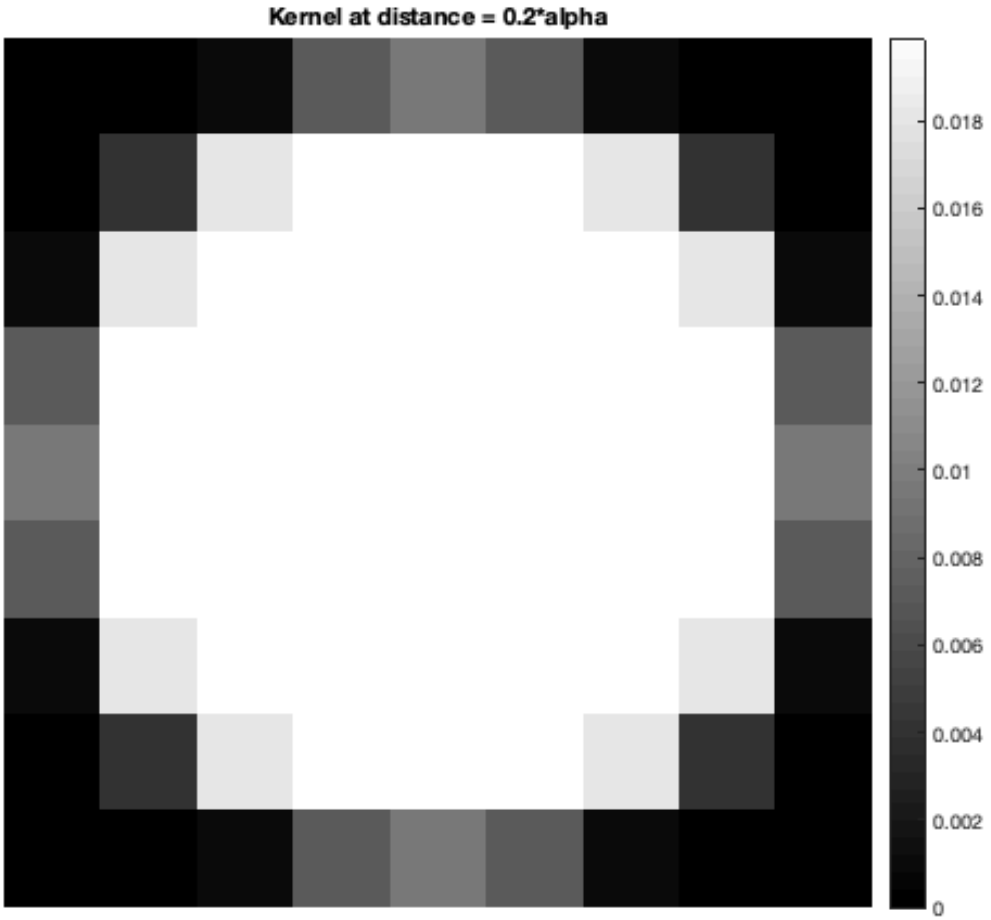
Original Image


Mask

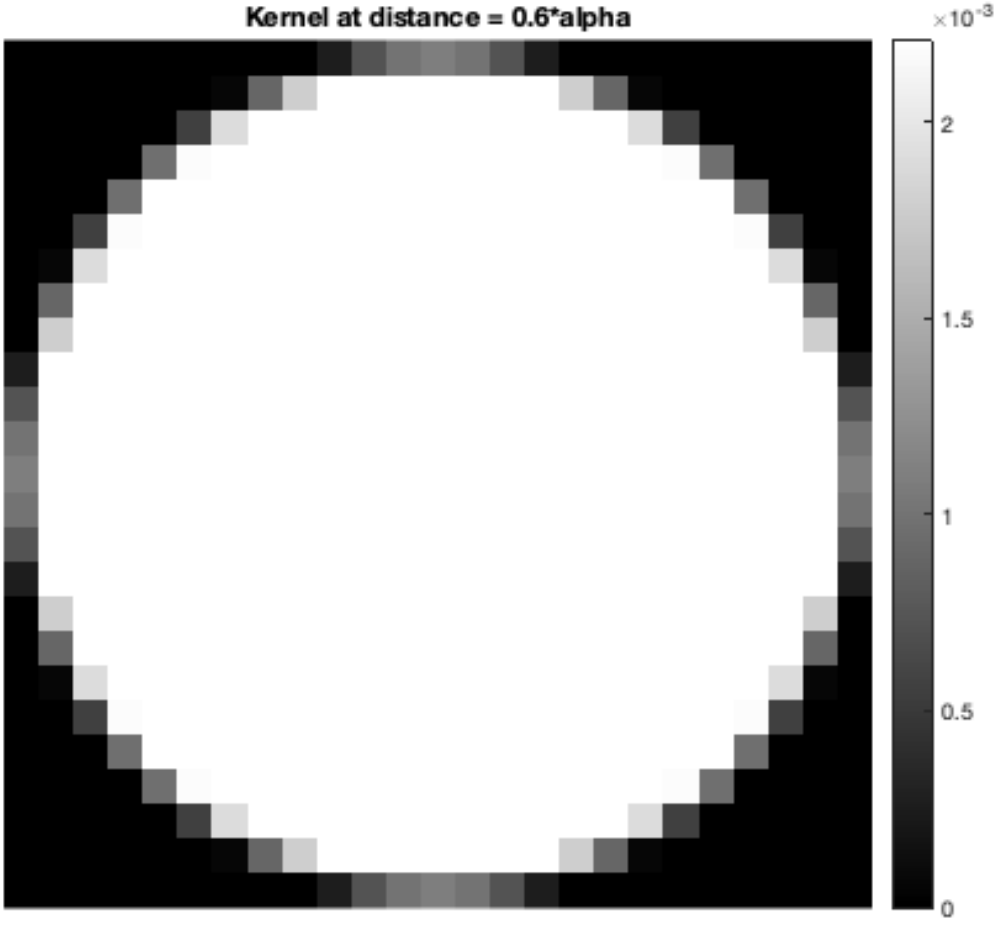
Foreground

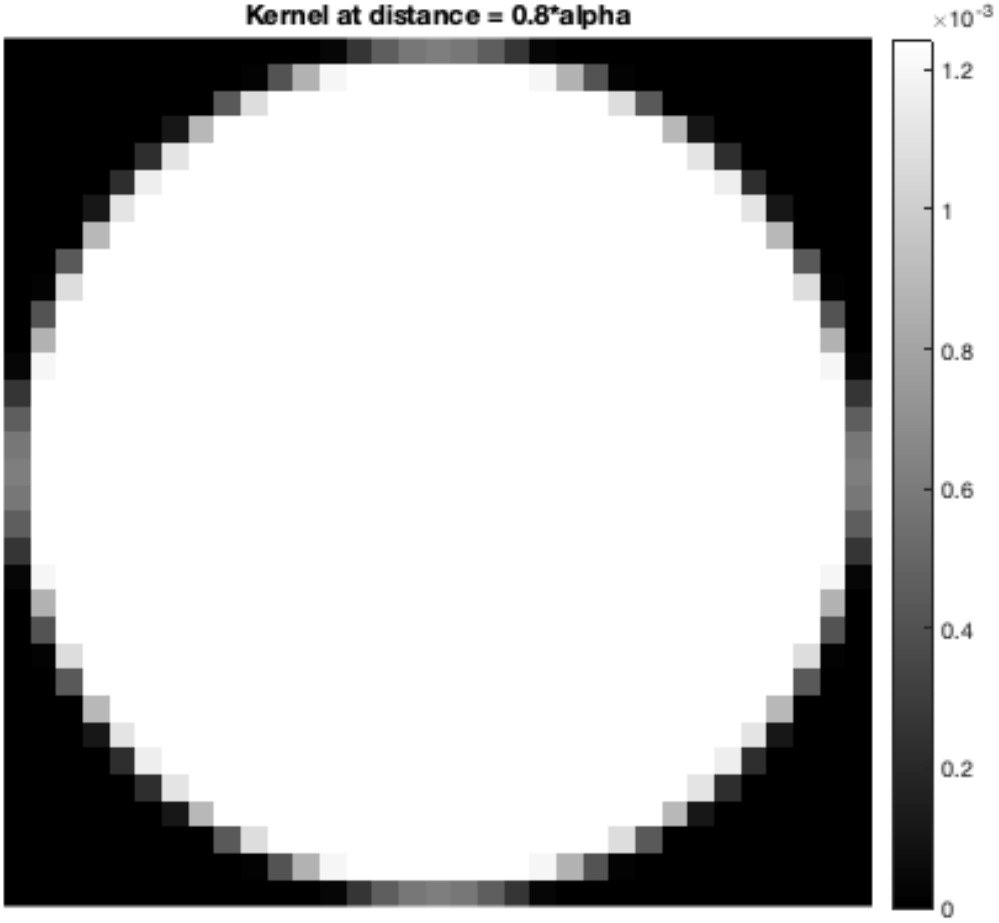
Background


Variation of r
20
18
16
14
12
10
8
6
4
2
0

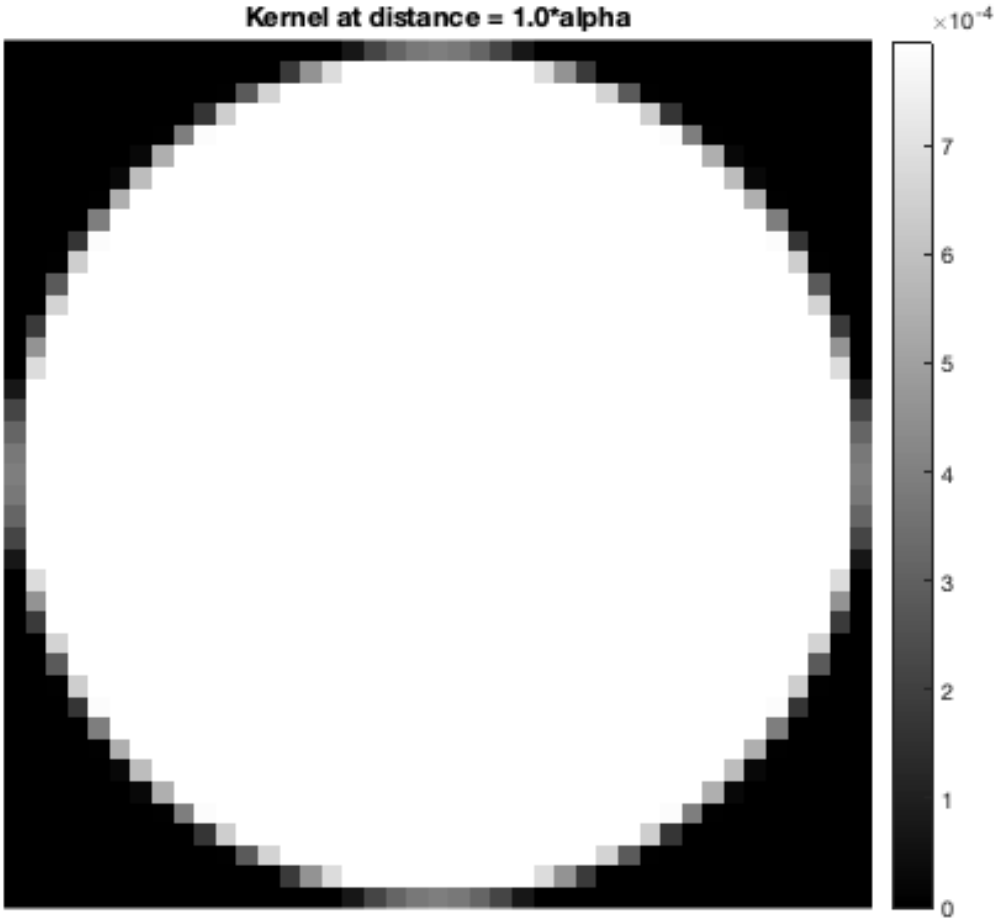

Kernel at distance = 0.2*alpha
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0

Kernel at distance = 0.4*alpha


Kernel at distance = 0.6*alpha
×10^-3
2
1.5
1
0.5
0


Kernel at distance = 0.8*alpha
×10^-3
1.2
1
0.8
0.6
0.4
0.2
0


Spatially Varying Blurred Image



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