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Computer Vision and Image Processing (CSE 531) Assignment 1

1.0:

There are 4 types of filtering used for figure 3.

- Gaussian Filtering
- Laplacian of Gaussian Filtering
- Dx scaling of Gaussian Filtering
- Dy scaling of Gaussian Filtering

Gaussian Filtering:

The Gaussian smoothing operator is a 2-D convolution operator that is used to `blur' images and remove detail and noise. The idea of Gaussian smoothing is to use this 2-D distribution as a `point-spread' function, and this is achieved by convolution.

The degree of smoothing is determined by the standard deviation of the Gaussian. (Larger standard deviation Gaussians, of course, require larger convolution kernels in order to be accurately represented.)

The Gaussian outputs a `weighted average' of each pixel's neighborhood, with the average weighted more towards the value of the central pixels.

Laplacian of Gaussian:

The Laplacian is a 2-D isotropic measure of the 2nd spatial derivative of an image. The Laplacian of an image highlights regions of rapid intensity change and is therefore often used for edge detection. The Laplacian is often applied to an image that has first been smoothed with something approximating a Gaussian smoothing filter in order to reduce its sensitivity to noise, and hence the two variants will be described together here.

The LoG operator calculates the second spatial derivative of an image. This means that in areas where the image has a constant intensity (i.e. where the intensity gradient is zero), the LoG response will be zero. In the vicinity of a change in intensity, however, the LoG response will be positive on the darker side, and negative on the lighter side.

Dx filtering of Gaussian :

It takes the x component of 2-D isotropic Gaussian. And it is performed by convolving with a 1-D Gaussian in the x direction.

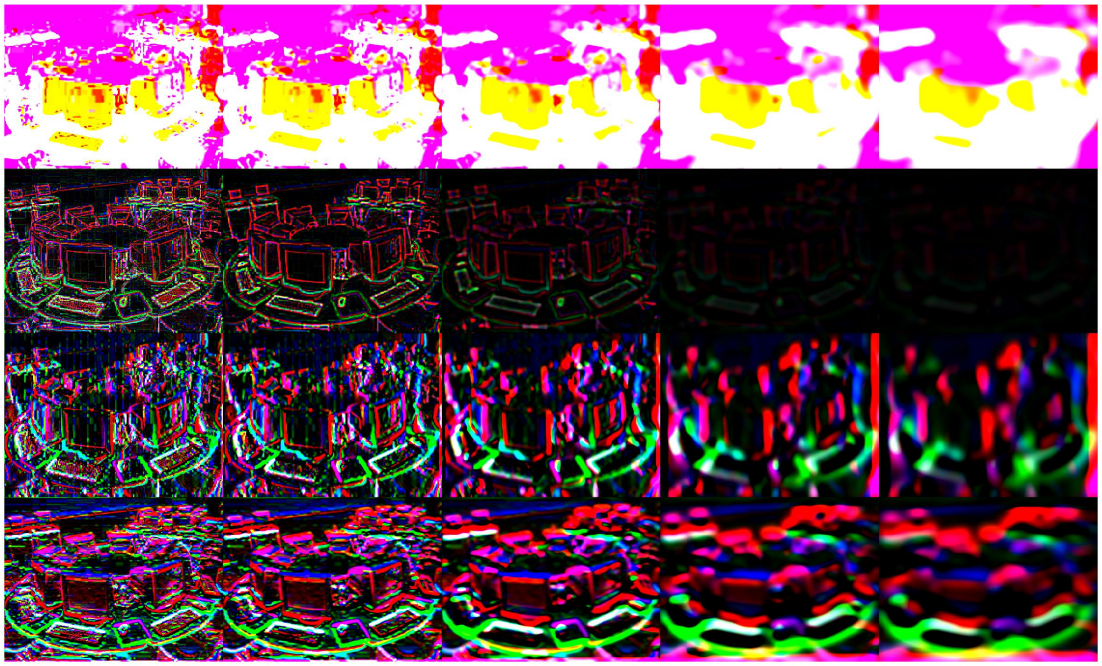
Dy filtering of Gaussian:

It takes the y component of 2-D isotropic Gaussian. And it is performed by convolving with a 1-D Gaussian in the y direction.

1.1.

img =

Montage:



1.3.

Image 1:

Original Image: 

wordMap:

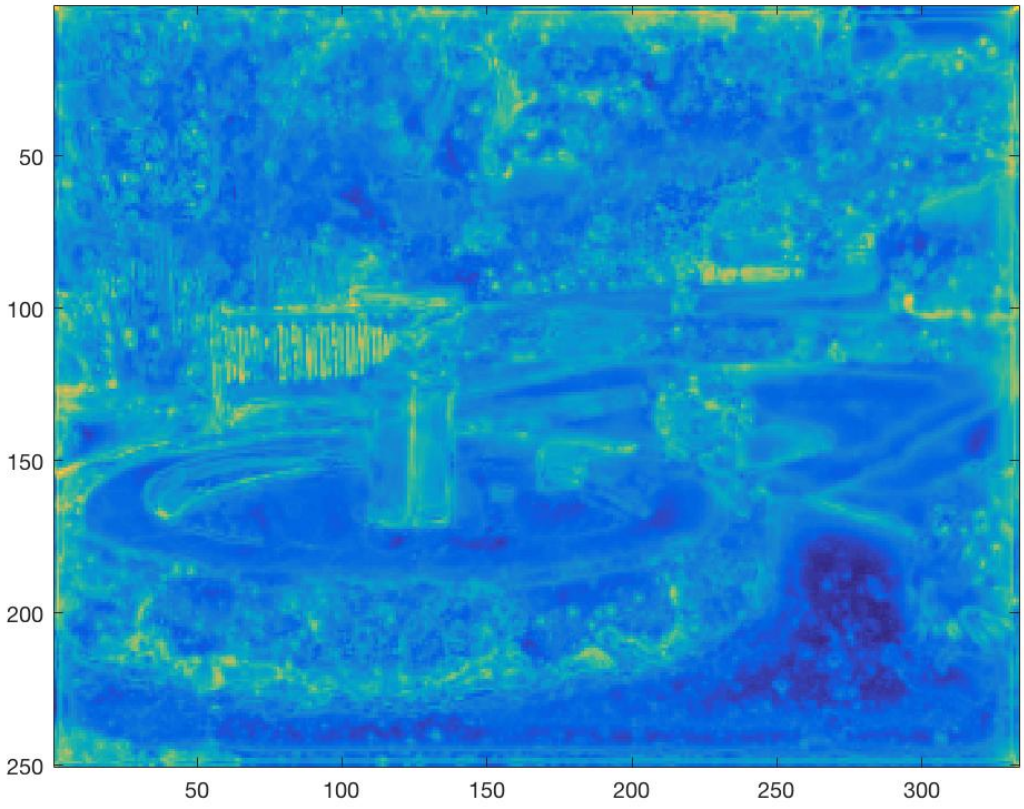


Image 2:

Original Image: 

wordMap Image:

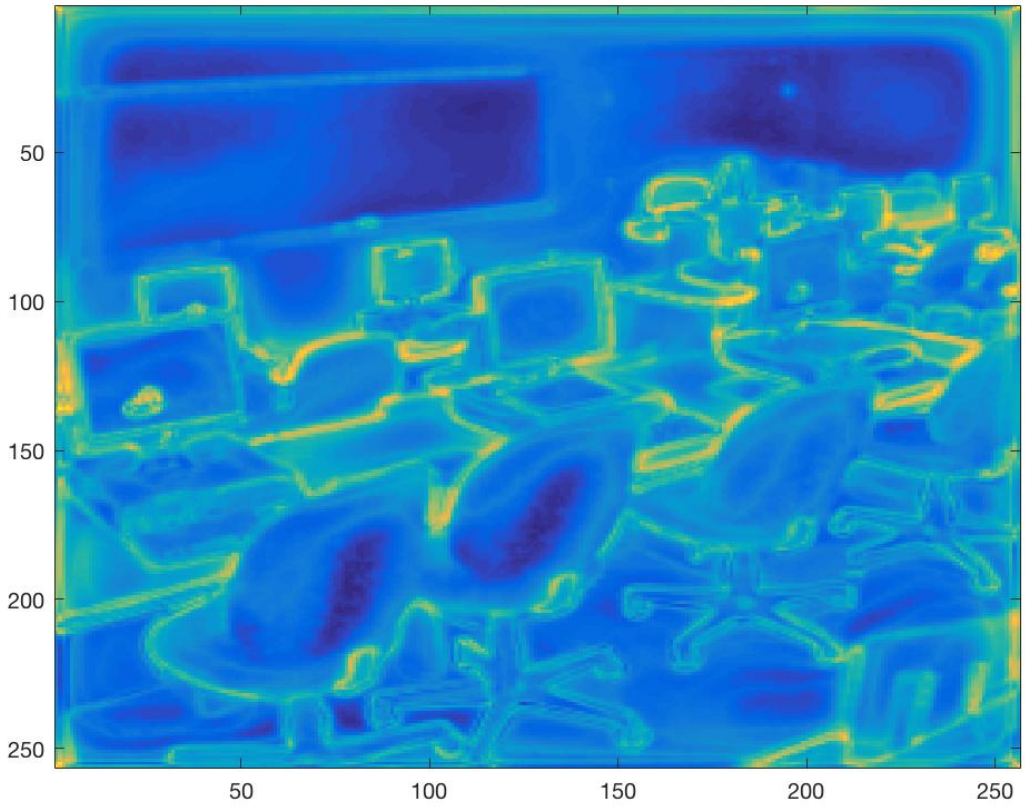
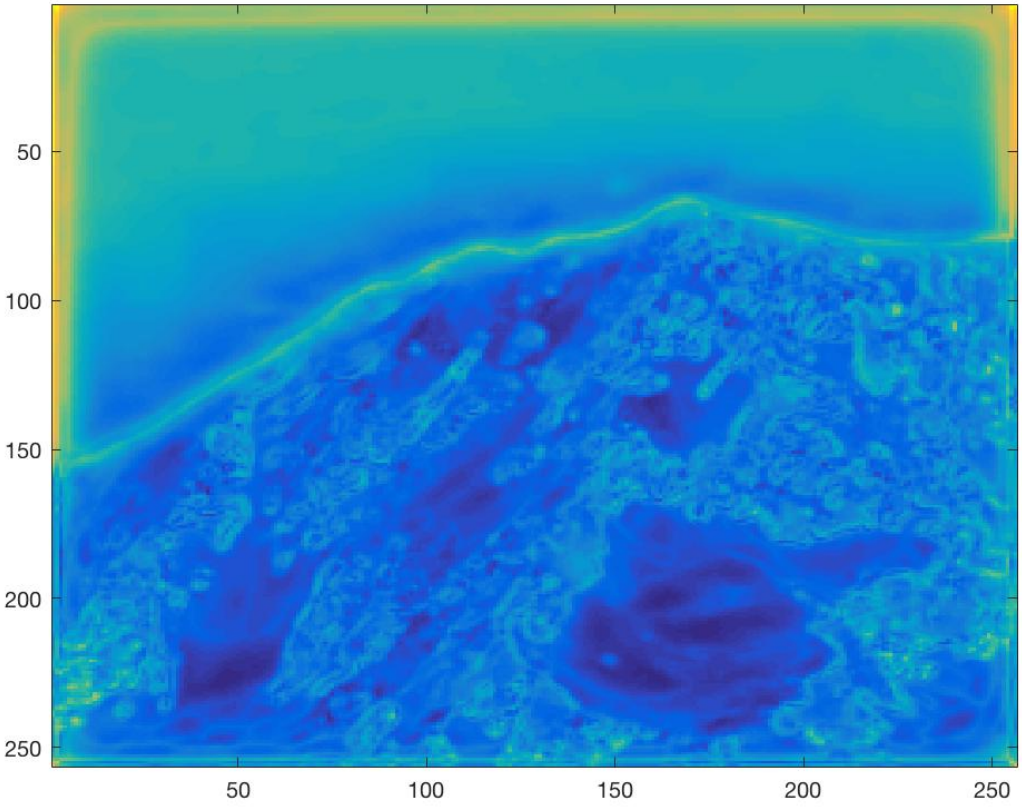


Image 3:

Original Image: 

wordMap:



2.5:

Confusion Matrix:

6	3	1	2	5	0	0	3
1	6	1	1	8	1	0	2
1	2	12	1	4	0	0	0
1	2	2	11	3	0	0	1
2	1	6	0	11	0	0	0
0	1	3	0	1	11	4	0
3	3	1	0	2	5	6	0
6	4	4	1	3	0	0	2

Accuracy:

40.63%.

2.6:

Some classes are identified incorrectly into different categories because:

- The K and alpha value were too small to make finer granules.
- The levels of spatial pyramid should have been increased for clearer histograms.

Since the level of spatial pyramid, K and alpha were taken small, the script was not able to distinguish minute images