H.W ONE - 50246573

Q1.0 What properties do each of the filter functions (see Figure 3) pick up? You should group the filters into broad categories (i.e., all the Gaussians). Answer in your write-up.

Ans:

Filters calculate weighted sum of pixel values surrounding the pixels.

All the Gaussian filters smoothens the Image and removes the noise on convolution. On selection of appropriate size of gaussian filter, we can be sure that spatial frequencies are still existent in the image after filtering. Basically, gaussian filters are smoothing filters that help in picking up the edges.

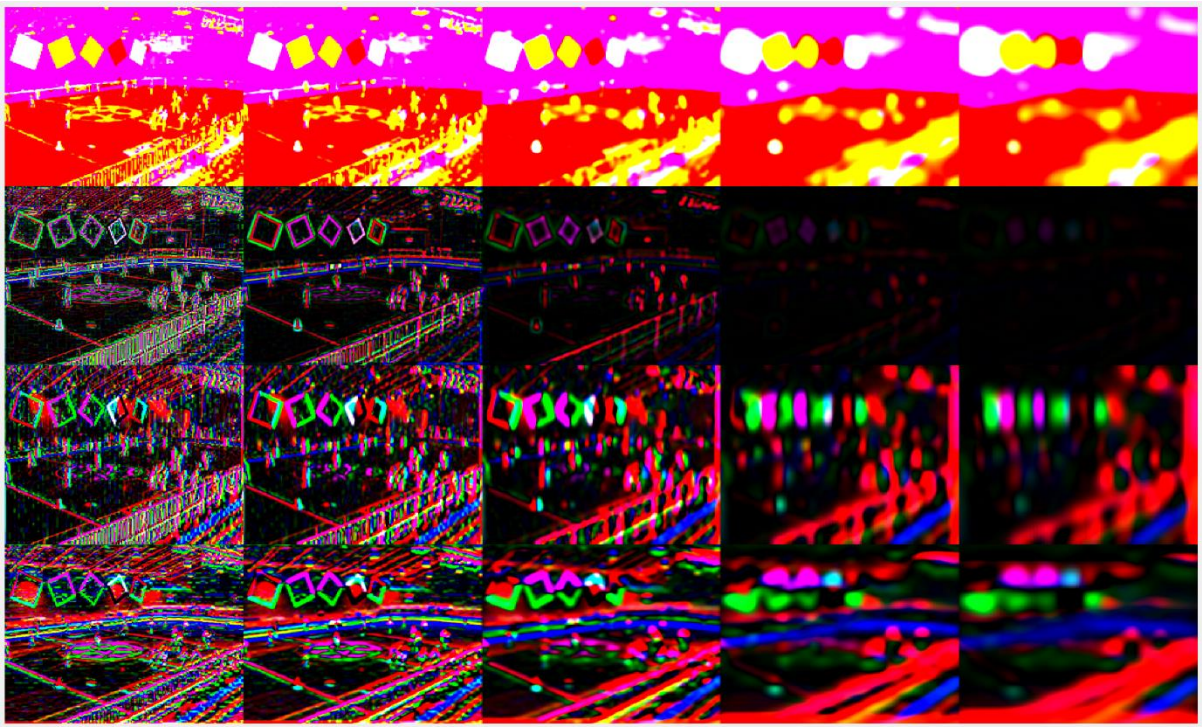
All the Laplacian of gaussian filters apply second derivation on the image. So it sharpens images and detect locations of rapid changes in the image.

Image derivative filter along x results in a gradient image to determine horizontal change in intensity in the image.

Image derivative filter along y results in a gradient image to determine vertical change in intensity in the image.

Q1.1 Apply all 20 filters on a sample image, and visualize as a image collage. Submit the collage of 20 images in the write-up.

Ans:

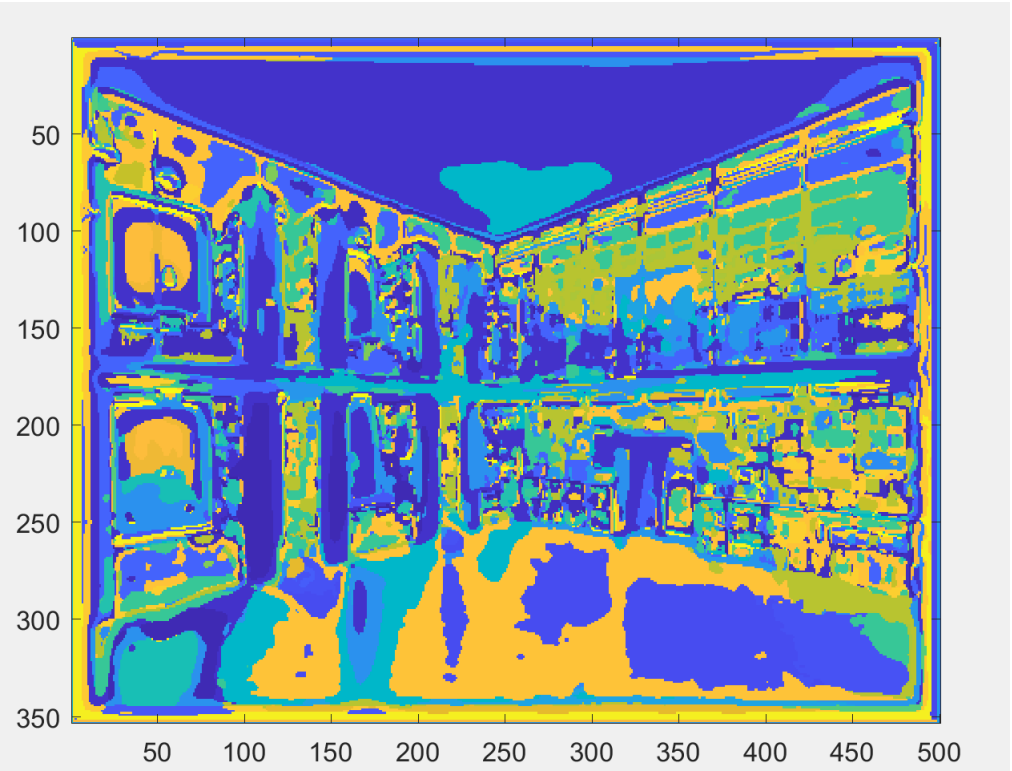


Q1.3 Visualize three word maps of three images from any one of the category and submit in the write-up along with their original RGB image. Also, provide your comments about the visualization.

Ans:

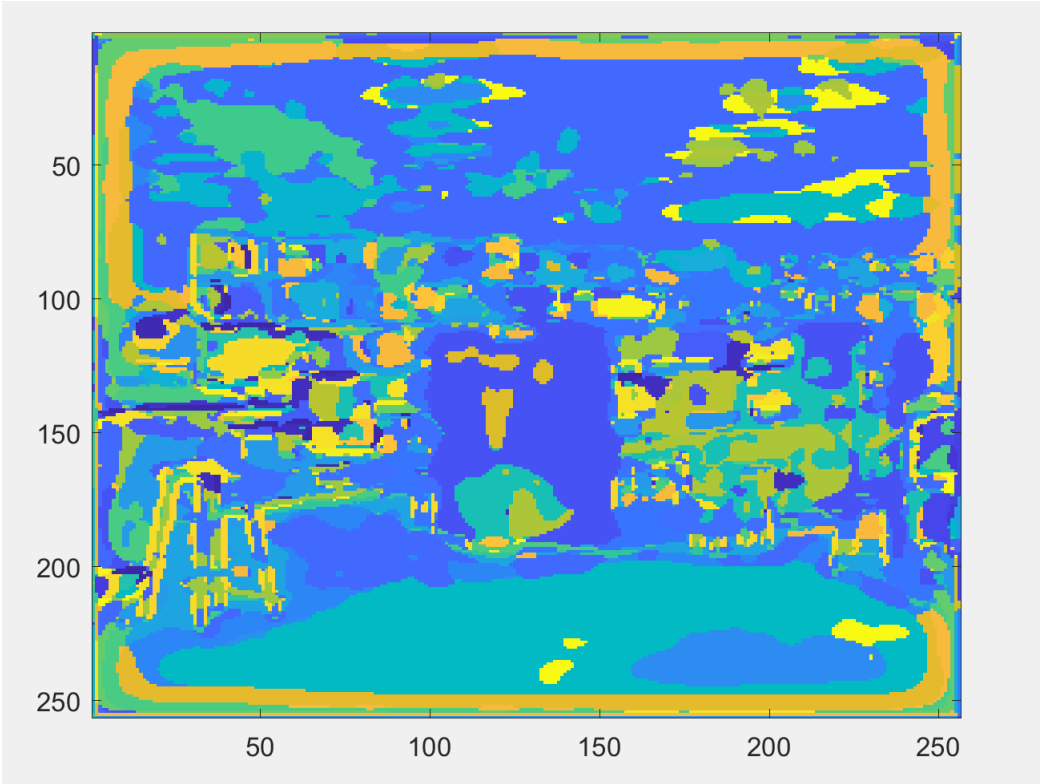
Original RGB img_1

Visualized WordMap img_1



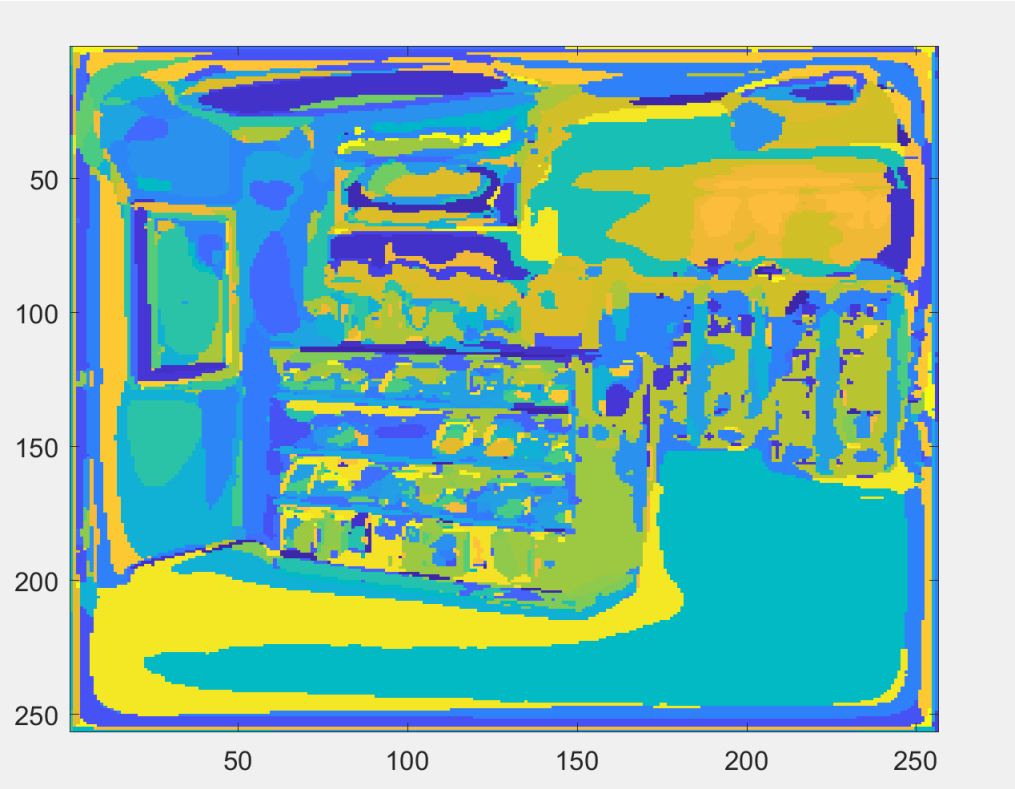
Original RGB img_2

Visualized WordMap img_2



Original RGB img_3

Visualization of WordMap img_3



Visualization:

The visualization of wordMaps clearly determine the areas where there is more light and determine sudden edge changes. The pixels having similar textures/ color patterns are grouped together in the cluster. The shadows and refection of the objects are clearly shown indicating they are separate entities. Most importantly thse visualization show intensity changes across pixels.

Q2.5 Report the confusion matrix and accuracy for your results in your write-up. This does not have to be formatted prettily.

Ans:

Confusion Matrix is:

10	**3**	**0**	**3**	**4**	**0**	**0**	**0**
4	**5**	**0**	**4**	**6**	**1**	**0**	**0**
0	**0**	**17**	**1**	**0**	**2**	**0**	**0**
1	**2**	**1**	**13**	**3**	**0**	**0**	**0**
4	**5**	**0**	**0**	**11**	**0**	**0**	**0**
0	**0**	**2**	**0**	**1**	**11**	**6**	**0**
0	**1**	**0**	**0**	**0**	**1**	**17**	**1**
0	**3**	**6**	**4**	**3**	**1**	**2**	**1**

Accuracy is:

53.13 %

Q2.6 List some of these classes/samples and discuss why they are more difficult in your write-up

Ans:

1 art gallery	5 library
2 computer room	6 mountain
3 garden	7 ocean
4 ice skating	8 tennis court

Few misclassifications:

Class 5 images were predicted as Class 1 and 2.

In this case library images were detected as art galleries and computer rooms as few all theses classes involved in rooms/halls which has elements like shelves, tables, paitings/windows and chairs.

So, the system was a bit erroneous here as there were similar object involving similar textures and properties. Ex windows and photo frames are similar and there are tables in both libraries and computer rooms.

Class 8 images were predicted as Class 3 and 4.

In this case the tennis court images were detected as garden and ice skating as there was greenery involving similar texture in both tennis courts and gardens. Both class of images are stadiums involving sport area and have lights on ceilings. Groups of audience and play area in case of tennis courts and ice skating images resulting in similar entities. Thus this error occurred.