Experiment 3:Spatial domain low pass and high pass filters

```python
#Program for implementing Prewitt Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
p_x=np.array([[1,1,1],[0,0,0],[-1,-1,-1]])
p_y=np.array([[1,0,-1],[1,0,-1],[1,0,-1]])
pre_im_x=cv2.filter2D(im,-1,p_x)
pre_im_y=cv2.filter2D(im,-1,p_y)
#cv2_imshow(pre_im_x)
#cv2_imshow(pre_im_y)
#cv2_imshow(pre_im_x+pre_im_y)
hor_stack=np.column_stack((pre_im_x,pre_im_y,pre_im_x+pre_im_y ))
cv2_imshow(hor_stack)
```



```python
#Program for implementing Sobel Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
p_x=np.array([[1, 2,1],[0,0,0],[-1,-2,-1]])
p_y=np.array([[1,0,-1],[2,0,-2],[1,0,-1]])
pre_im_x=cv2.filter2D(im,-1,p_x)
pre_im_y=cv2.filter2D(im,-1,p_y)
#cv2_imshow(pre_im_x)
#cv2_imshow(pre_im_y)
#cv2_imshow(pre_im_x+pre_im_y)
hor_stack=np.column_stack((pre_im_x,pre_im_y,pre_im_x+pre_im_y ))
cv2_imshow(hor_stack)
```
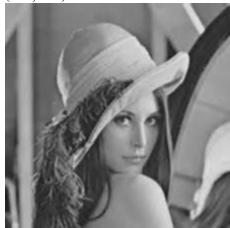
```python
##Program for implementing Laplacian Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
p_x=np.array([[-1,-1,-1],[-1,8,-1],[-1,-1,-1]])
#p_y=np.array([[1,0,-1],[1,0,-1],[1,0,-1]])
pre_im_x=cv2.filter2D(im,-1,p_x)
pre_im_y=cv2.filter2D(im,-1,p_y)
cv2_imshow(pre_im_x)
#cv2_imshow(pre_im_y)
#cv2_imshow(pre_im_x+pre_im_y)
#hor_stack=np.column_stack((pre_im_x,pre_im_y,pre_im_x+pre_im_y ))
#cv2_imshow(hor_stack)
```



```python
#Program for implementing Averaging & Weighted averaging  Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
print(im.shape)
p_x=np.array([[1,1,1],[1,1,1],[1,1,1]])
pre_im_x=1/9*p_x
p_y=np.array([[1,2,1],[2,4,2],[1,2,1]])
pre_im_x1=cv2.filter2D(im,-1,pre_im_x)
pre_im_y=1/16*p_y
pre_im_y1=cv2.filter2D(im,-1,pre_im_y)
```

```
cv2_imshow(pre_im_y1)
cv2_imshow(pre_im_y1)
hor_stack=np.column_stack((pre_im_x1,pre_im_y1 ))
cv2_imshow(hor_stack)
```

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```
cv2_imshow(pre_im_y1)
cv2_imshow(pre_im_y1)
hor_stack=np.column_stack((pre_im_x1,pre_im_y1 ))
cv2_imshow(hor_stack)
```

```python
##Program for enhancement of image implementing Laplacian Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
p_x=np.array([[-1,-1,-1],[-1,9,-1],[-1,-1,-1]])
p_y=np.array([[0,-1, 0],[-1, 5,-1],[0,-1, 0]])
pre_im_x=cv2.filter2D(im,-1,p_x)
pre_im_y=cv2.filter2D(im,-1,p_y)
cv2_imshow(pre_im_x)
cv2_imshow(pre_im_y)
hor_stack=np.column_stack((pre_im_x,pre_im_y ))
cv2_imshow(hor_stack)
```



```python
##Program for enhancement of image implementing Laplacian Filter
import cv2
import numpy as np
from google.colab.patches import cv2_imshow
im=cv2.imread('/content/Lena.jfif',0)
```