EXPT NO: 4	LOW PASS AND HIGH PASS FILTERING MECHANISMS
DATE: 25-07-2025	

AIM:

To Implement the various low pass and high pass filtering mechanisms.

ALGORITHM:

1. Read and convert image to **grayscale.**
2. Apply low pass (Gaussian/average) filter using cv2.GaussianBlur() or **cv2.blur().**
3. Apply high pass filter using Laplacian or Sobel operator.
4. Combine results to observe **smoothing vs sharpening effects.**
5. Display **filtered images.**
6. Save **outputs.**

CODE:

```
# PROGRAM 4


import cv2
import numpy as np

# Step 2: Read the input image
image = cv2.imread('/content/SUNSET.jpg')  # Replace with your image path
from google.colab.patches import cv2_imshow

# Step 3: Convert to grayscale
gray_image = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

# Step 4: Apply Low Pass Filters
# a. Average Filter
avg_blur = cv2.blur(gray_image, (5, 5))

# b. Gaussian Filter
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gaussian_blur = cv2.GaussianBlur(gray_image, (5, 5), 0)

# c. Median Filter
median_blur = cv2.medianBlur(gray_image, 5)

# Step 5: Apply High Pass Filters
# a. Laplacian Filter
laplacian = cv2.Laplacian(gray_image, cv2.CV_64F)
laplacian_abs = cv2.convertScaleAbs(laplacian)

# b. Sobel Filter (Horizontal and Vertical)
sobelx = cv2.Sobel(gray_image, cv2.CV_64F, 1, 0, ksize=5)  # Horizontal edges
sobely = cv2.Sobel(gray_image, cv2.CV_64F, 0, 1, ksize=5)  # Vertical edges
sobelx_abs = cv2.convertScaleAbs(sobelx)
sobely_abs = cv2.convertScaleAbs(sobely)

# Step 6: Display all filtered images
cv2_imshow(gray_image)
cv2_imshow(avg_blur)
cv2_imshow(gaussian_blur)
cv2_imshow(median_blur)
cv2_imshow(laplacian_abs)
cv2_imshow(sobelx_abs)
cv2_imshow(sobely_abs)


# Step 7: Wait for key press and close all windows
# cv2.waitKey(0)
# cv2.destroyAllWindows()
```

OUTPUT:

RESULT:

Thus, the various low pass and high pass filtering mechanisms was successfully implemented.