**Practical No. 9**

**Aim:** Write a program for Image Filtering(low pass filter) 1)Average filter 2)Weighted Average filter 3)Median filter High pass filters using 1)Sobel operator 2) Laplacian operator.

**Program Code:**

import cv2

image = cv2.imread('photo.jpg')

average\_filtered\_image = cv2.blur(image, (5, 5))

import numpy as np

kernel = np.array([[1, 2, 1], [2, 4, 2], [1, 2, 1]], dtype=np.float32) / 16

weighted\_average\_filtered\_image = cv2.filter2D(image, -1, kernel)

gray\_image = cv2.cvtColor(image, cv2.COLOR\_BGR2GRAY)

sobelx = cv2.Sobel(gray\_image, cv2.CV\_64F, 1, 0, ksize=5)

sobely = cv2.Sobel(gray\_image, cv2.CV\_64F, 0, 1, ksize=5)

sobel\_magnitude = cv2.magnitude(sobelx, sobely)

sobel\_filtered\_image = cv2.convertScaleAbs(sobel\_magnitude)

gray\_image\_laplacian = cv2.cvtColor(image, cv2.COLOR\_BGR2GRAY)

laplacian = cv2.Laplacian(gray\_image\_laplacian, cv2.CV\_64F)

laplacian\_filtered\_image = cv2.convertScaleAbs(laplacian)

import matplotlib.pyplot as plt

fig, axes = plt.subplots(nrows=2, ncols=3, figsize=(15, 10))

axes[0, 0].imshow(cv2.cvtColor(image, cv2.COLOR\_BGR2RGB))

axes[0, 0].set\_title("Original Image")

axes[0, 0].axis('off')

axes[0, 1].imshow(cv2.cvtColor(average\_filtered\_image, cv2.COLOR\_BGR2RGB))

axes[0, 1].set\_title("Average Filter")

axes[0, 1].axis('off')

axes[0, 2].imshow(cv2.cvtColor(weighted\_average\_filtered\_image, cv2.COLOR\_BGR2RGB))

axes[0, 2].set\_title("Weighted Average Filter")

axes[0, 2].axis('off')

axes[1, 0].imshow(cv2.cvtColor(median\_filtered\_image, cv2.COLOR\_BGR2RGB))

axes[1, 0].set\_title("Median Filter")

axes[1, 0].axis('off')

axes[1, 1].imshow(sobel\_filtered\_image, cmap='gray')

axes[1, 1].set\_title("Sobel Operator")

axes[1, 1].axis('off')

axes[1, 2].imshow(laplacian\_filtered\_image, cmap='gray')

axes[1, 2].set\_title("Laplacian Operator")

axes[1, 2].axis('off')

plt.tight\_layout()

plt.show()

**Output:**

****