import cv2

import numpy as np

from matplotlib import pyplot as plt

img = cv2.imread('car.jpg', cv2.IMREAD\_GRAYSCALE)

def average\_filter(img, kernel\_size):

kernel = np.ones((kernel\_size, kernel\_size), np.float32) / (kernel\_size \* kernel\_size)

return cv2.filter2D(img, -1, kernel)

average\_filtered = average\_filter(img, 5)

def weighted\_average\_filter(img, kernel):

return cv2.filter2D(img, -1, kernel)

kernel = np.array([[1, 2, 1],

[2, 4, 2],

[1, 2, 1]], np.float32) / 16.0

weighted\_average\_filtered = weighted\_average\_filter(img, kernel)

def median\_filter(img, kernel\_size):

return cv2.medianBlur(img, kernel\_size)

median\_filtered = median\_filter(img, 5)

def sobel\_operator(img):

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

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

gradient\_magnitude = np.sqrt(sobelx\*\*2 + sobely\*\*2)

return gradient\_magnitude

sobel\_filtered = sobel\_operator(img)

def laplacian\_operator(img):

return cv2.Laplacian(img, cv2.CV\_64F)

laplacian\_filtered = laplacian\_operator(img)

plt.figure(figsize=(12, 10))

plt.subplot(3, 3, 1), plt.imshow(img, cmap='gray')

plt.title('Original Image'), plt.xticks([]), plt.yticks([])

plt.subplot(3, 3, 2), plt.imshow(average\_filtered, cmap='gray')

plt.title('Average Filter'), plt.xticks([]), plt.yticks([])

plt.subplot(3, 3, 3), plt.imshow(weighted\_average\_filtered, cmap='gray')

plt.title('Weighted Average Filter'), plt.xticks([]), plt.yticks([])

plt.subplot(3, 3, 4), plt.imshow(median\_filtered, cmap='gray')

plt.title('Median Filter'), plt.xticks([]), plt.yticks([])

plt.subplot(3, 3, 5), plt.imshow(sobel\_filtered, cmap='gray')

plt.title('Sobel Operator'), plt.xticks([]), plt.yticks([])

plt.subplot(3, 3, 6), plt.imshow(laplacian\_filtered, cmap='gray')

plt.title('Laplacian Operator'), plt.xticks([]), plt.yticks([])

plt.tight\_layout()

plt.show()