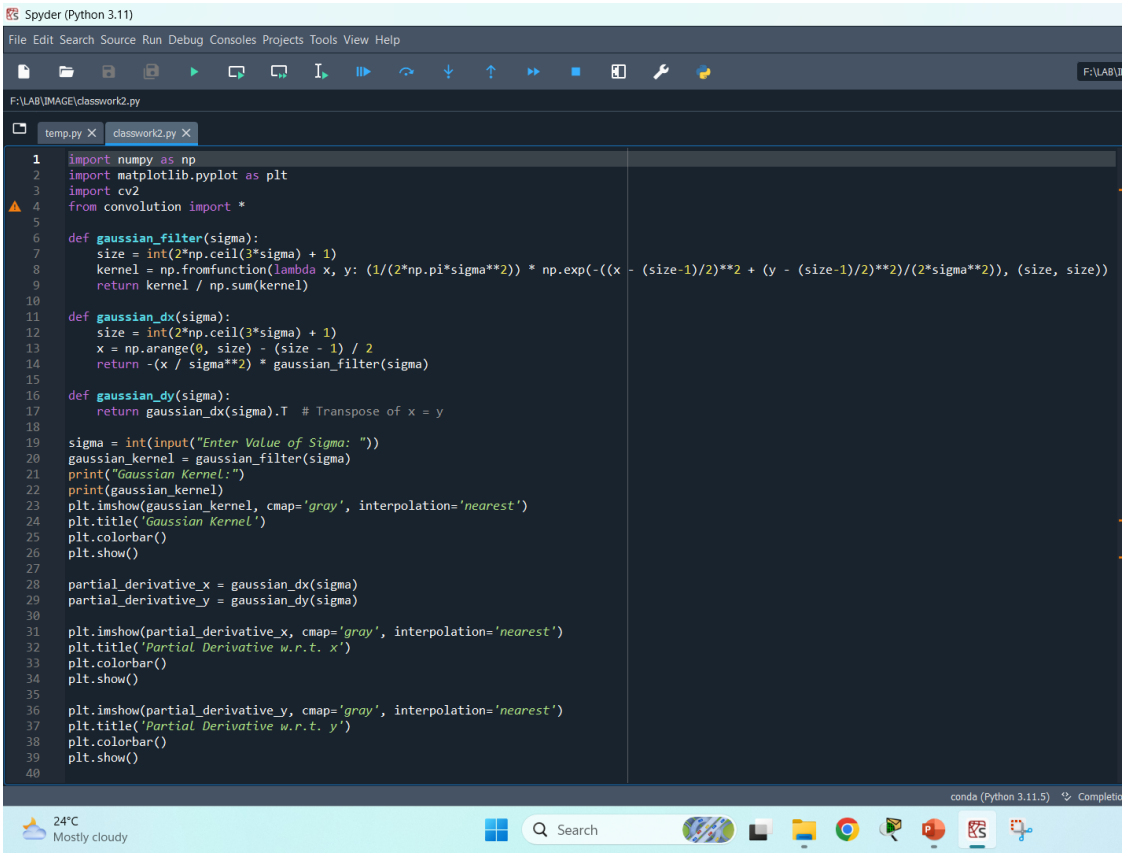
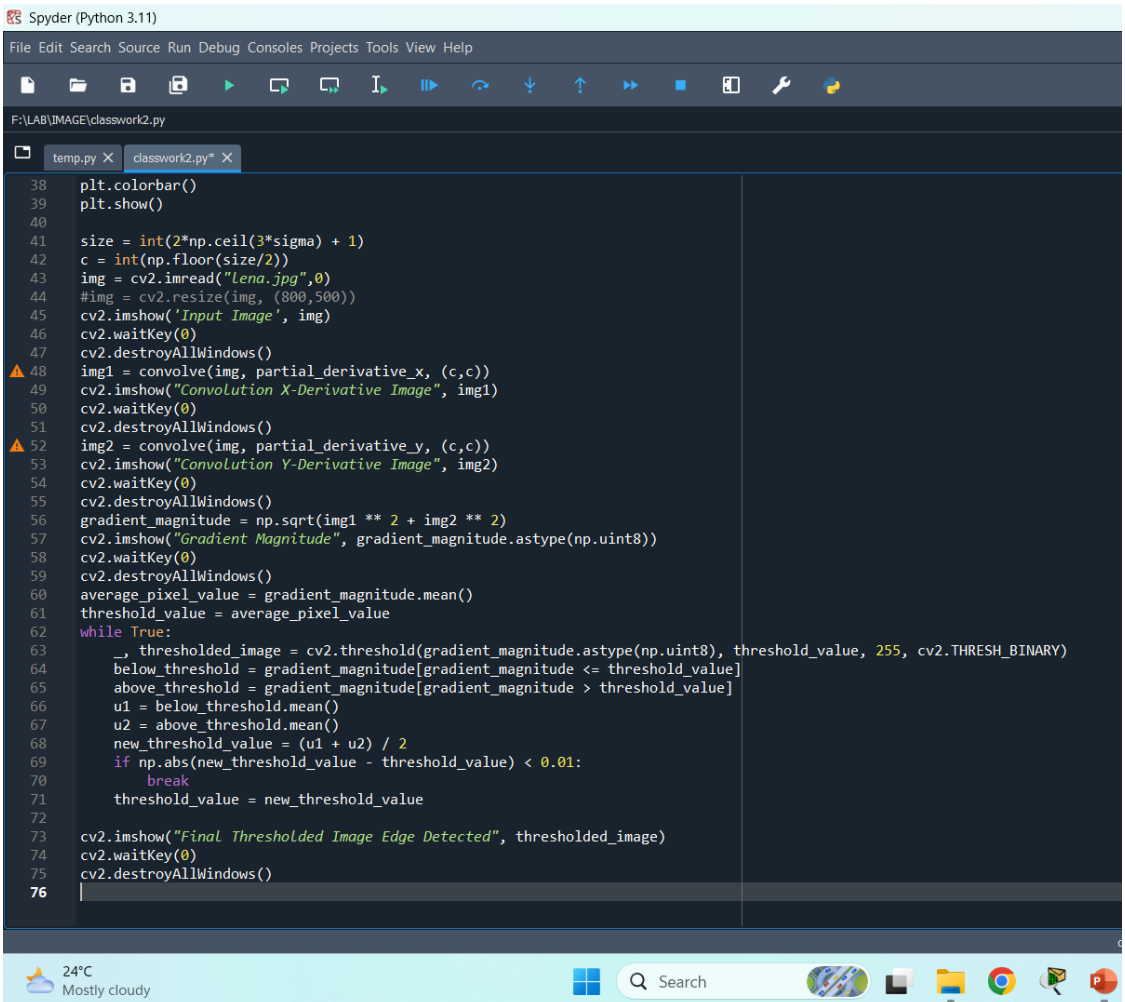
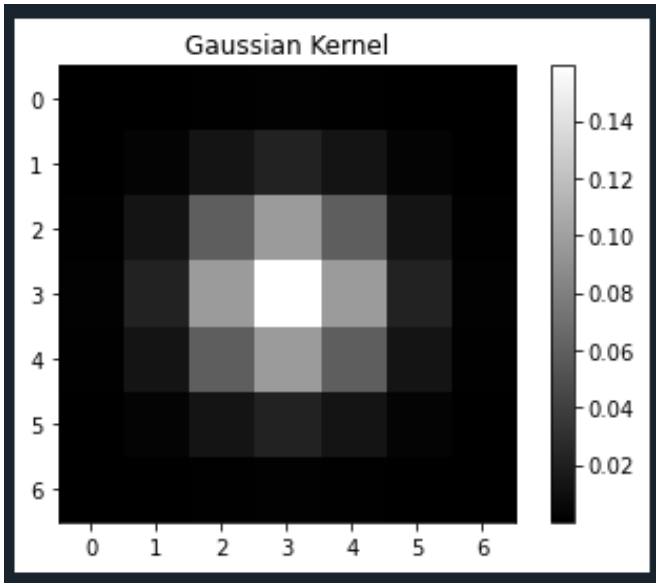
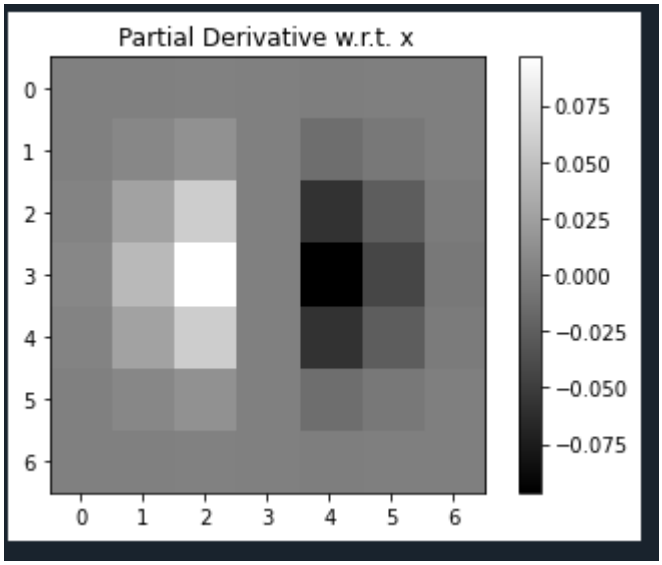

Spyder (Python 3.11)
File Edit Search Source Run Debug Consoles Projects Tools View Help
F:\LAB\IMAGE\classwork2.py
temp.py
classwork2.py
import numpy as np
import matplotlib.pyplot as plt
import cv2
from convolution import *
def gaussian_filter(sigma):
size = int(2*np.ceil(3*sigma) + 1)
kernel = np.fromfunction(lambda x, y: (1/(2*np.pi*sigma**2)) * np.exp(-((x - (size-1)/2)**2 + (y - (size-1)/2)**2)/(2*sigma**2)), (size, size))
return kernel / np.sum(kernel)
def gaussian_dx(sigma):
size = int(2*np.ceil(3*sigma) + 1)
x = np.arange(0, size) - (size - 1) / 2
return -(x / sigma**2) * gaussian_filter(sigma)
def gaussian_dy(sigma):
return gaussian_dx(sigma).T # Transpose of x = y
sigma = int(input("Enter Value of Sigma: "))
gaussian_kernel = gaussian_filter(sigma)
print("Gaussian Kernel:")
print(gaussian_kernel)
plt.imshow(gaussian_kernel, cmap='gray', interpolation='nearest')
plt.title('Gaussian Kernel')
plt.colorbar()
plt.show()
partial_derivative_x = gaussian_dx(sigma)
partial_derivative_y = gaussian_dy(sigma)
plt.imshow(partial_derivative_x, cmap='gray', interpolation='nearest')
plt.title('Partial Derivative w.r.t. x')
plt.colorbar()
plt.show()
plt.imshow(partial_derivative_y, cmap='gray', interpolation='nearest')
plt.title('Partial Derivative w.r.t. y')
plt.colorbar()
plt.show()
conda (Python 3.11.5)
24°C
Mostly cloudy
Search

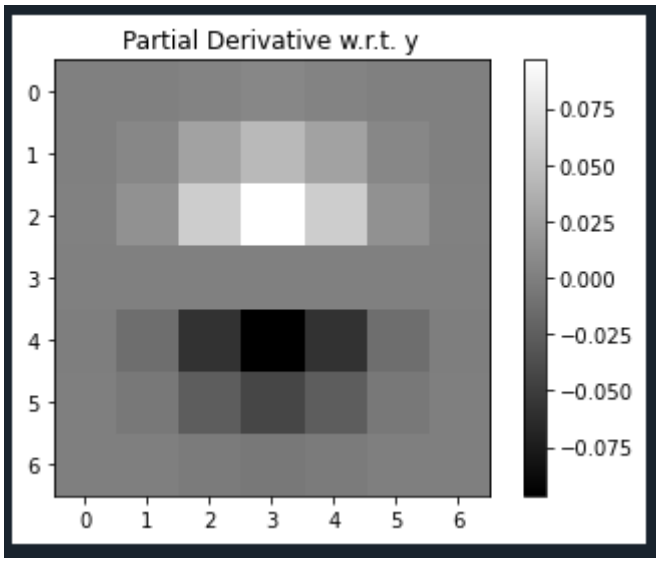

Spyder (Python 3.11)
File Edit Search Source Run Debug Consoles Projects Tools View Help
F:\LAB\IMAGE\classwork2.py
temp.py
classwork2.py*
plt.colorbar()
plt.show()
size = int(2*np.ceil(3*sigma) + 1)
c = int(np.floor(size/2))
img = cv2.imread("Lena.jpg",0)
#img = cv2.resize(img, (800,500))
cv2.imshow('Input Image', img)
cv2.waitKey(0)
cv2.destroyAllWindows()
img1 = convolve(img, partial_derivative_x, (c,c))
cv2.imshow("Convolution X-Derivative Image", img1)
cv2.waitKey(0)
cv2.destroyAllWindows()
img2 = convolve(img, partial_derivative_y, (c,c))
cv2.imshow("Convolution Y-Derivative Image", img2)
cv2.waitKey(0)
cv2.destroyAllWindows()
gradient_magnitude = np.sqrt(img1 ** 2 + img2 ** 2)
cv2.imshow("Gradient Magnitude", gradient_magnitude.astype(np.uint8))
cv2.waitKey(0)
cv2.destroyAllWindows()
average_pixel_value = gradient_magnitude.mean()
threshold_value = average_pixel_value
while True:
_, thresholded_image = cv2.threshold(gradient_magnitude.astype(np.uint8), threshold_value, 255, cv2.THRESH_BINARY)
below_threshold = gradient_magnitude[gradient_magnitude <= threshold_value]
above_threshold = gradient_magnitude[gradient_magnitude > threshold_value]
u1 = below_threshold.mean()
u2 = above_threshold.mean()
new_threshold_value = (u1 + u2) / 2
if np.abs(new_threshold_value - threshold_value) < 0.01:
break
threshold_value = new_threshold_value
cv2.imshow("Final Thresholded Image Edge Detected", thresholded_image)
cv2.waitKey(0)
cv2.destroyAllWindows()
24°C
Mostly cloudy
Search

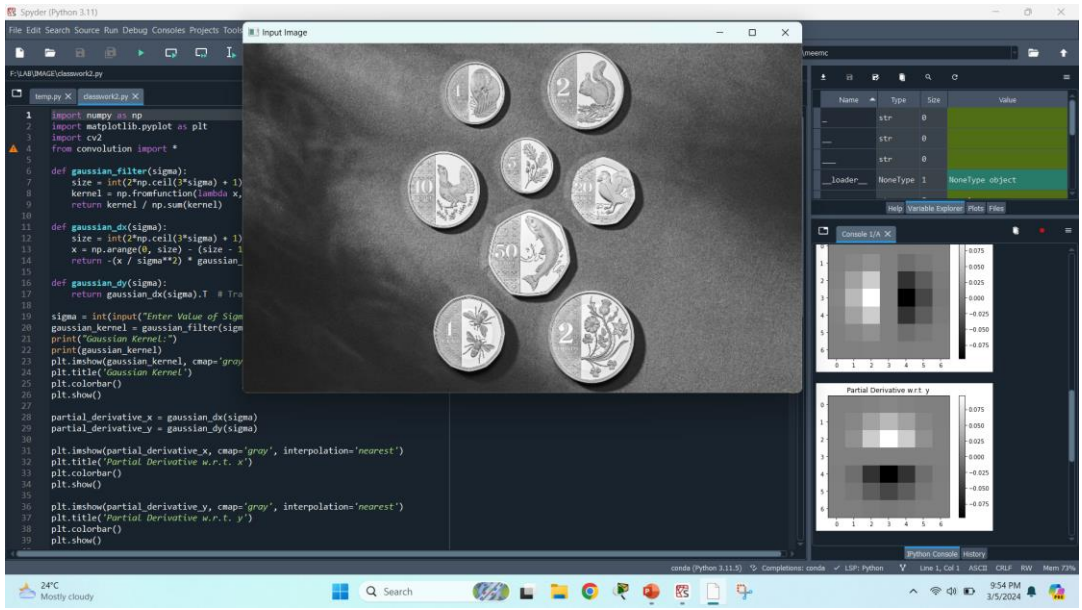
```
In [1]: runfile('F:/LAB/IMAGE/classwork2.py',
wdir='F:/LAB/IMAGE')
Enter Value of Sigma: 1
Gaussian Kernel:
[[1.96519161e-05 2.39409349e-04 1.07295826e-03
1.76900911e-03
  1.07295826e-03 2.39409349e-04 1.96519161e-05]
 [2.39409349e-04 2.91660295e-03 1.30713076e-02
2.15509428e-02
  1.30713076e-02 2.91660295e-03 2.39409349e-04]
 [1.07295826e-03 1.30713076e-02 5.85815363e-02
9.65846250e-02
  5.85815363e-02 1.30713076e-02 1.07295826e-03]
 [1.76900911e-03 2.15509428e-02 9.65846250e-02
1.59241126e-01
  9.65846250e-02 2.15509428e-02 1.76900911e-03]
 [1.07295826e-03 1.30713076e-02 5.85815363e-02
9.65846250e-02
  5.85815363e-02 1.30713076e-02 1.07295826e-03]
 [2.39409349e-04 2.91660295e-03 1.30713076e-02
2.15509428e-02
  1.30713076e-02 2.91660295e-03 2.39409349e-04]
 [1.96519161e-05 2.39409349e-04 1.07295826e-03
1.76900911e-03
  1.07295826e-03 2.39409349e-04 1.96519161e-05]]
```

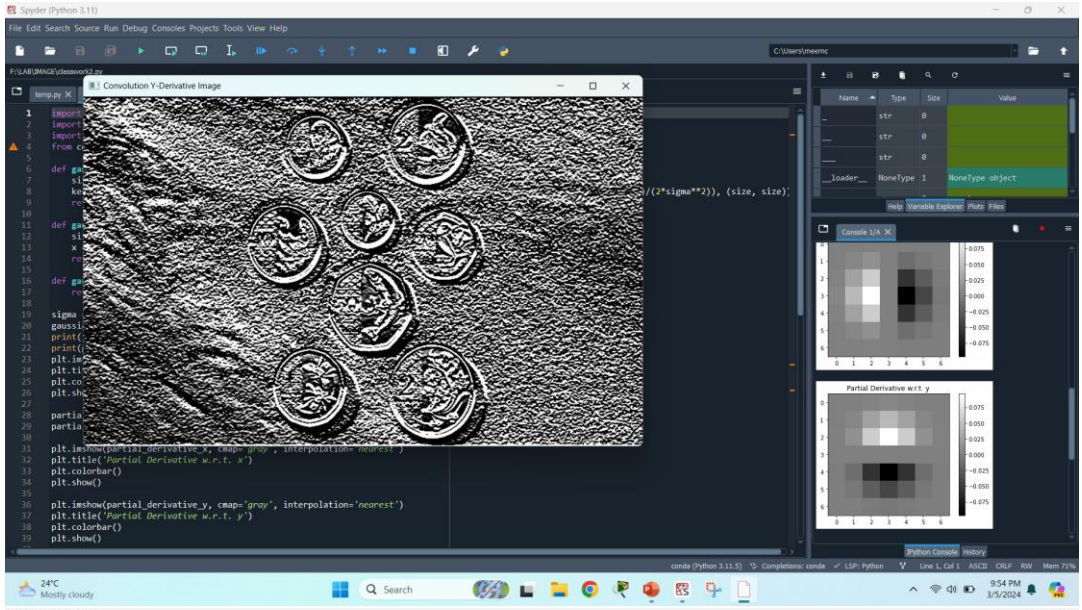
IPython Console History

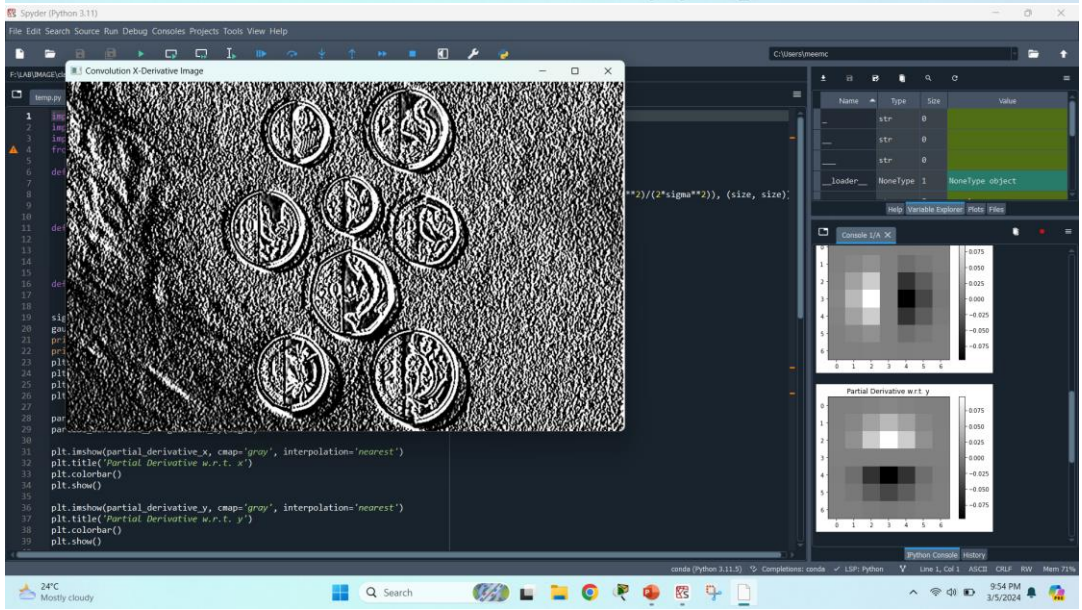


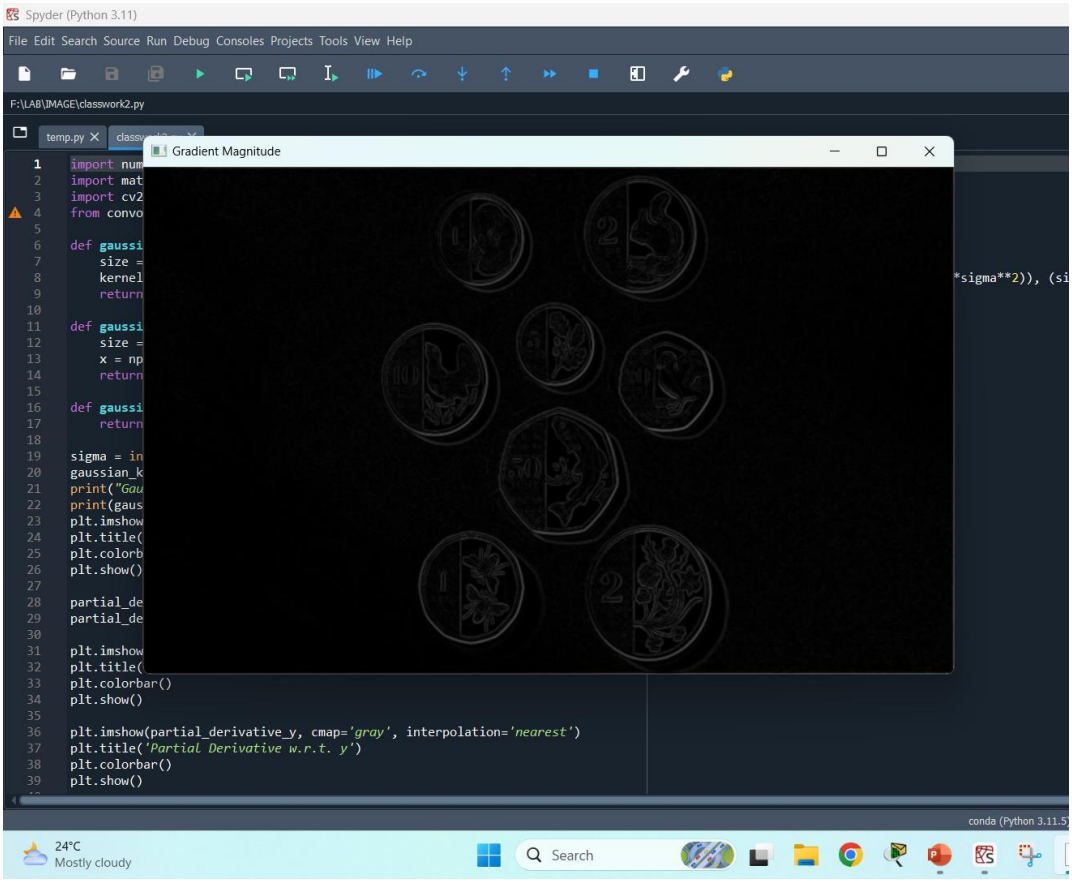


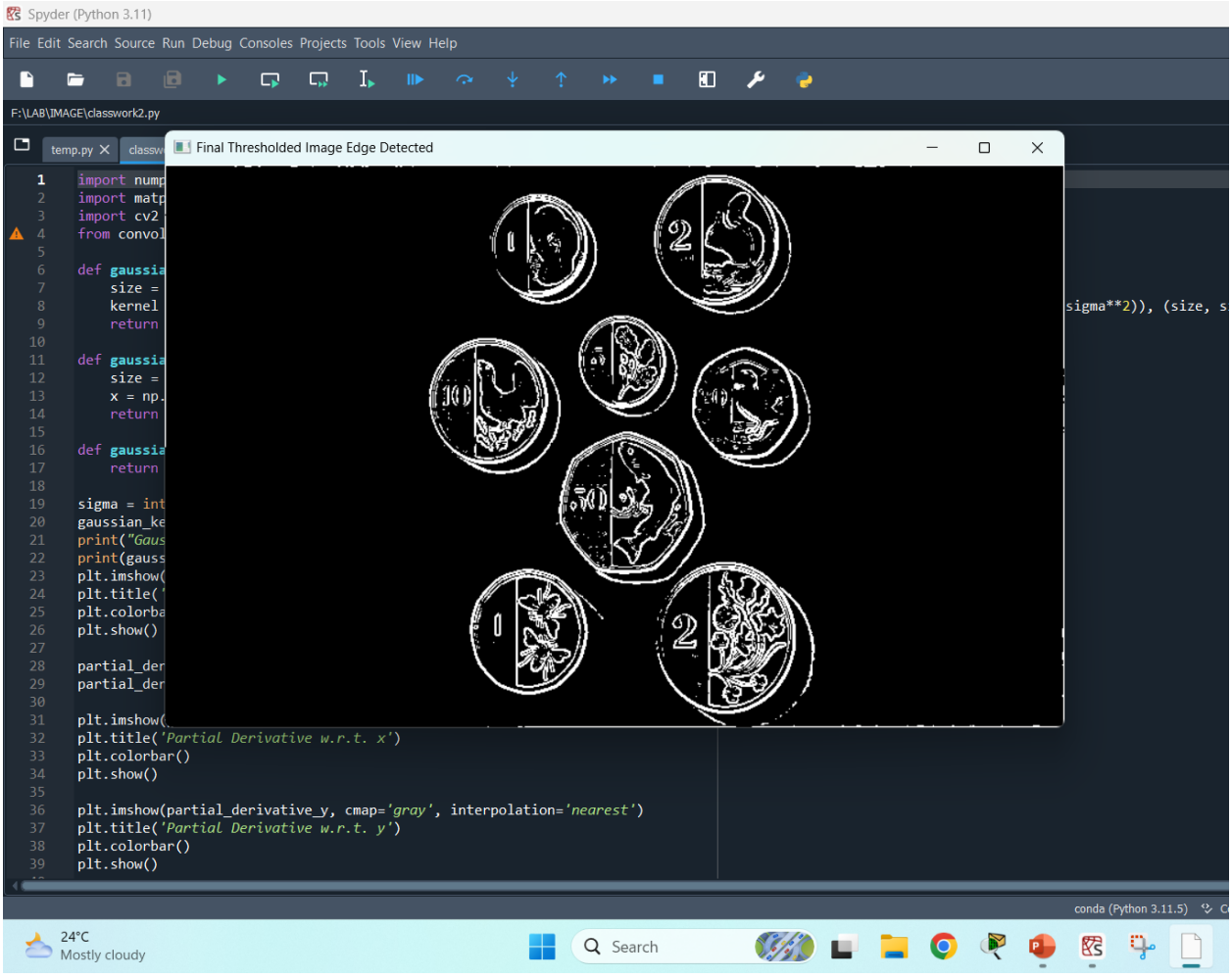


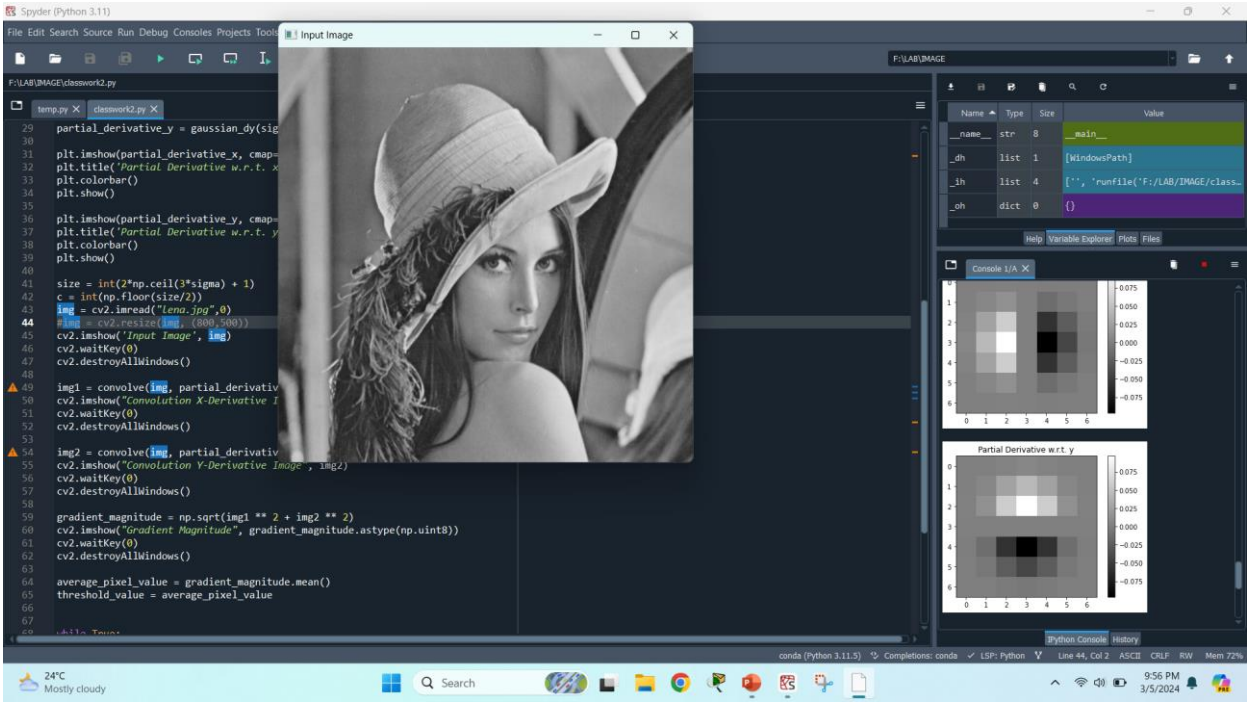

Input Image
Partial Derivative w.r.t. y

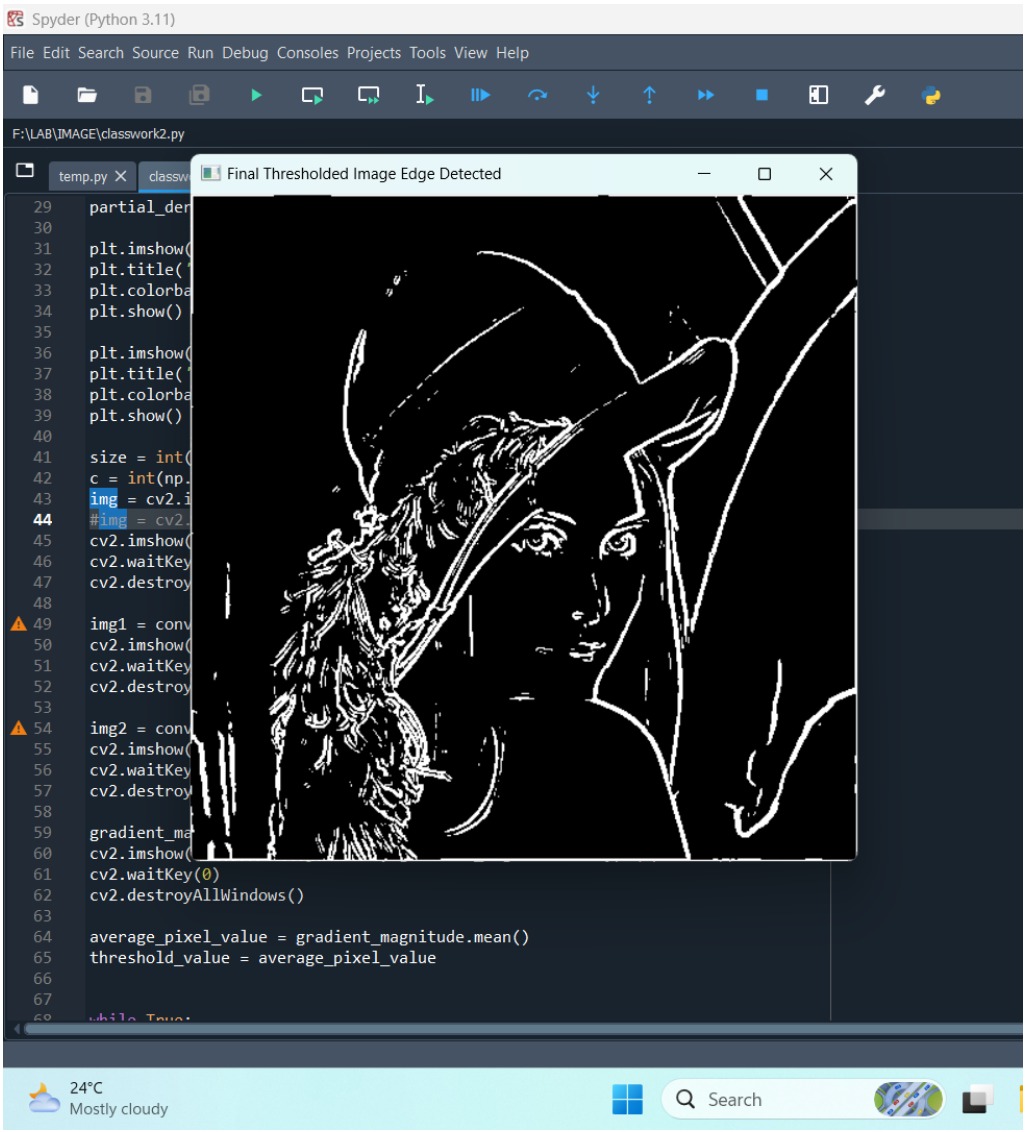

Convolution Y-Derivative Image
Partial Derivative w.r.t. y


Convolution X-Derivative Image
Partial Derivative w.r.t. y


Spyder (Python 3.11)
File Edit Search Source Run Debug Consoles Projects Tools View Help
F:\LAB\IMAGE\classwork2.py
temp.py
Gradient Magnitude
plt.imshow(partial_derivative_y, cmap='gray', interpolation='nearest')
plt.title('Partial Derivative w.r.t. y')
plt.colorbar()
plt.show()
conda (Python 3.11.5)
24°C
Mostly cloudy
Search


Spyder (Python 3.11)
File Edit Search Source Run Debug Consoles Projects Tools View Help
F:\LAB\IMAGE\classwork2.py
temp.py
Final Thresholded Image Edge Detected
plt.title('Partial Derivative w.r.t. x')
plt.colorbar()
plt.show()
plt.imshow(partial_derivative_y, cmap='gray', interpolation='nearest')
plt.title('Partial Derivative w.r.t. y')
plt.colorbar()
plt.show()
conda (Python 3.11.5)
24°C
Mostly cloudy
Search


Input Image
Partial Derivative w.r.t. y


Spyder (Python 3.11)
File Edit Search Source Run Debug Consoles Projects Tools View Help
F:\LAB\IMAGE\classwork2.py
Final Thresholded Image Edge Detected
24°C
Mostly cloudy
Search