

Assignment 3:

Submission Instructions: Please submit a .zip file named <your name>.zip containing 1) report named report.pdf including your answers to all required questions with images and/or plots showing your results, and 2) the python notebook, with the cells run and the relevant source code (or MATLAB m-files).

Problem 1. Edge Detection (50%)

Please download attached Image 1.

- Implement convolution process of smoothing Image 1 with a 5 x 5 Gaussian Filter with $\sigma = 1$ and 2 , plot the corresponding output images (10%).
- Implement convolution process of convolving a 3 x 3 Sobel filters (S_x and S_y) with the output images you obtained in step a. Plot the outputs of each step and the final edge map which combines edges in x and y directions (10%).
- Implement convolution process of convolving Image 1 with $\frac{\partial G}{\partial x}$ and $\frac{\partial G}{\partial y}$ filters (5 x5 filters and for $\sigma = 1$ and 2 , and plot the outputs of each step and the final edge map which combines edges in x and y directions (20%)

Please explain what do you observe comparing the final output of b and c (10%).

Problem 2. Corner Detection (50%)

Implement Harris Corner Detection algorithm step by step as explained in the class. Apply your script to detect corners in image 1. Plot the corner response map, and the non-maximum suppression output.