

Assignment 1

Due on Friday 25th October, 2024 at 11:59 pm

Objective:

In this assignment, you are required to apply edge detection on a given grayscale image, introduce various types of noise to the image, and then perform noise reduction using average filtering. You will analyze the effects of different types of noise and filters on the image and submit a report along with your code.

Tasks:

1. Edge Detection:

- Use any of the edge detection methods covered in the lecture (e.g., Sobel, Canny, Prewitt, etc.) to detect edges in the provided grayscale image.
- Display and discuss the results of edge detection on the original image (without noise).

2. Add Noise to the Image:

- Add the following types of noise to the grayscale image:
 1. Salt and Pepper Noise
 2. Gaussian Noise
 3. Poisson Noise
 4. Random Noise
- Display the image with each type of noise.

3. Apply Average Filtering:

- For each noisy image, apply average filtering using filter sizes of:
 1. 3x3
 2. 5x5
 3. 9x9
- Display the filtered images for each filter size and each type of noise.

- Compare and comment on the results for each combination of noise and filter size (e.g., how the image quality changes, how effective the filter was in reducing noise, etc.).

4. Report:

- Prepare a detailed report including:
 - The method you used for edge detection and why you chose it.
 - A visual comparison of the original image with the noisy and filter versions.
 - An analysis of the effects of the different noises and filter sizes on the image quality.
 - Screenshots of the outputs for each type of noise and filter size.
 - Your overall conclusions on the impact of different noise types and filtering techniques.

5. Code Submission:

- Include your code in the report as an appendix.
- Submit a separate .py file containing all the code used in the assignment.

Deliverables:

1. Report: A PDF report detailing your approach, results, and analysis.
2. Code: A .py file with your edge detection and filtering code.
3. Outputs: Include the outputs (images) from your edge detection and filtering process in the report.

Evaluation Criteria:

- Correct implementation of edge detection.
- Successful addition of all four noise types.
- Proper application of average filtering for each noise and filter size.
- Clarity of analysis and comparison in the report.
- Clean, well-documented code.

Deadline: Friday 25th October, 2024, at 11:59 pm.

Submission Method: Upload your report, output images and .py file as a **single .zip file** on Google Drive and submit a shareable link to youssef.abdel-rahman@guc.edu.eg.