



HW2

Instructor: Dr. Hanieh Naderi

Due Date: 1402/10/08

1. Is applying two 3×3 average filter on the photo the same as applying a 9×9 filter?
2. What does Laplacian kernel do? What is the difference between $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -9 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ kernel and $\begin{bmatrix} -1 & -1 & -1 \\ -1 & 9 & -1 \\ -1 & -1 & -1 \end{bmatrix}$?
3. Name different types of noise and draw diagram of them.
4. What is the main concept behind Violet, Laplacian, and Fourier filters?
5. Explain the difference of Butterworth low pass filter in different orders.
6. What is the difference between high-pass and low-pass filters?
7. Explain ideal edge and real edge.
8. Compare ideal high-pass, Gaussian, and Butterworth filters.
9. How to match two images?
10. Name different types of edge detection and corner detection and explain them.
11. Explain Dilation and Erosion.
12. What does these kernels do? What is the different between them?

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & -1 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 & 0 \\ -1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

Coding Part

1. Apply the Median, Max, and Min filters on image1.jpg.
2. With the Laplacian filter, increase the details of image2.jpg.
3. Detect the edges of the image3.jpg and image4.jpg.
4. Apply 3×3 and 9×9 average and Gaussian filters on image5.jpg and compare them.
5. Write a code that will receive a car at the entrance (along with its license plate that is clear like image6.1.jpg and image6.2.jpg) and give the license plate of that car as an output.
6. Write a code that will receive a photo of a person's face as an input, and if it has that person's information, it will display that person's information, and if that person doesn't exist, it will save that person's information.

7. Eliminate the noises of image7.jpg. (You can use different methods)
8. Increase details of image8.1.jpg, image8.2.jpg, and image8.3.jpg.

Notes:

- This assignment should be done individually.
- Upload a zip file named "HW[No.]_[StudentID]_[Name]"
- Put your codes and the pdf report file in the mentioned zip file.
- In the event of academic misconduct, both individuals producing similar work will receive a grade of 0.