CS 523.V – Spring 2023

ÖZYEĞİN ÜNİVERSİTESİ

Problem Set 1

Assigned: 24 March 2023
Due: 14 April 2023 (midnight)

What to Submit:

Create a folder named ps1_<*YourLastName*> (for example, ps1_Ates), with the following structure and contents:

ps<*problem set number*>_<*problem number*>.py → The main script to run.

/input/ → Directory containing input images, videos or other data used

/output/ → Directory containing output image, videos or other data generated

ps<*problem set number*>_report.pdf → A PDF report file. (Include figures, discussions, methods, etc., but do not include any code.)

Zip your folder and submit on **LMS.** Submissions that do not obey the guideline above will **NOT** be evaluated.

Problem 1: (Basic image operations)

Download a color image to your computer.

(a) Write a Python script to crop out a region from the center; the region size should be half the size of the input image. Save the image as a *png* file.
(b) Extract the red channel of the image and display it.
(c) Convert the image to grayscale and display it.
(d) Define the Sobel filters in x and y directions in your code. Apply these filters to the grayscale image and display the results. Using these gradients, obtain the gradient magnitude and gradient orientation. Find out a way to display the gradient orientation; display the gradient magnitude and gradient orientation.
(e) Obtain Laplacian of Gaussian image for different sigma values, and display the results.

Problem 2: (Basic video operations)

(a) Write a Python script to take live video stream from the webcam of your computer, compute the gradient magnitude on the grayscale version of the image, and display the input and the gradient magnitude on the screen. (The video stream should stop when you hit “q” on your keyboard. You should also display the fps [frame per second] on the video frames.)
(b) Modify the previous code so that it concatenates the input frame and gradient magnitude image side by side, and records 15 seconds of the video.