CS 523.V – Spring 2023

ÖZYEĞİN ÜNİVERSİTESİ

Problem Set 2

Assigned: 2 May 2023
Due: 10 May 2023

What to Submit:
Create a folder named ps<*problem set number*>_<*YourLastName*> (for example, ps2_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:

Design and implement Hough Transform method for finding lines. You can get more info about Hough Transform from the following links:
https://towardsdatascience.com/lines-detection-with-hough-transform-84020b3b1549
https://learnopencv.com/hough-transform-with-opencv-c-python/

You can use OpenCV functions to find edges, such as Canny operator, but you may not use any Hough Transform functions. Convert a color image to grayscale before applying an edge detector.

Specifically, create a Hough transform class including the following functions:

- *hough_lines_acc:* Takes an edge image as input, and two optional parameters *ThetaResolution* and *RhoResolution*, which indicates the cell size for theta and rho parameters. Returns an accumulator matrix *H*, and cell locations *theta* and *rho*.
- *hough_peaks:* Returns the peak locations (theta and rho) for a given *H*, *theta*, and *rho* arrays. The function also should take a threshold value *t* to eliminate weak peaks that are less than *t*, and another parameter *s* to return the strongest *s* peaks.
- *hough_lines_draw:* Draw color lines corresponding to the peaks found.

Finally, write a script file to get the results on some input images. Compare your results with the results obtained using OpenCV Hough transform.

Problem 2:

Write a script file to demonstrate your Hough based line detector on live video.