Bauhaus-Universität Weimar

Assignment 3

Topic:

- Straight line detection based on Hough-voting

You may use your own photograph or the provided image (input_ex3.jpg).

A) Implement a function that detects lines in an image based on **Hough-voting**. Do **not** use the MATLAB function *hough* (you may use it for comparison only).

a. Read the input image and convert it to a grayscale image with a value range $[0, \dots, 1]$. Plot the result image

b. Apply a GoG filter (from assignment 2) in order to derive gradient images in *x*- and *y*-direction and compute the gradient magnitude

c. Find and apply an appropriate threshold on the gradient magnitude to derive representative edge pixels. Plot the binary edge mask

d. Implement a function for Hough line detection

   i. Input: Binary edge mask (from c) and gradient images (from b)

   ii. Output: Hough voting array H, index arrays for the ranges of θ and ρ

   iii. Hints:

      1. Use the polar line representation
      2. Incorporate information about the gradient direction to speedup processing

e. Plot the resulting Hough voting array H

f. Find local maxima of H. You may use the MATLAB function *houghpeaks*

g. Plot the found extrema on top of your figure in step f

h. Use the MATLAB function *houghlines* to derive the corresponding line segments

i. Plot the lines on the figure of step a

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