

EECS101: HOMEWORK #5

Due: February 17, 2017

In this assignment you will detect straight line edges in the image provided by your TA using the Hough transform. You can start with your program from Homework #4.

Perform the following tasks on the image

- 1) Compute $\frac{\partial E}{\partial x}$ and $\frac{\partial E}{\partial y}$ at each pixel using the Sobel mask.
- 2) Compute the squared gradient magnitude (SGM) at each pixel.
- 3) Determine a threshold that isolates the edges using the SGM.
- 4) Estimate the edge orientation for pixels having a squared gradient magnitude above your threshold and convert this orientation and the edge position to a corresponding (ρ, θ) for the line that the edge may be on.
- 5) Use the Hough Transform to find linear edges by applying a simple threshold to a (ρ, θ) voting array. Assume that the (x, y) coordinate system origin is at the bottom left corner of the image. Assume that x increases going to the right and that y increases going up.

What to Turn In

Your program should generate a binary thresholded SGM image. Print out the values computed for ρ and θ for each linear edge found along with the number of edge pixels (votes) for the linear edge. Also generate a binary image that is black except that white lines are drawn corresponding to the linear edges found by the Hough transform. The lines can be drawn across the whole image so that you don't have to determine the proper end-points for the lines in your program. Demonstrate the program to your TA and submit the two generated binary images and the values described above that are printed out by your program.