Stephen Ferro

MSAI 495

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Machine Problem 6

Introduction:

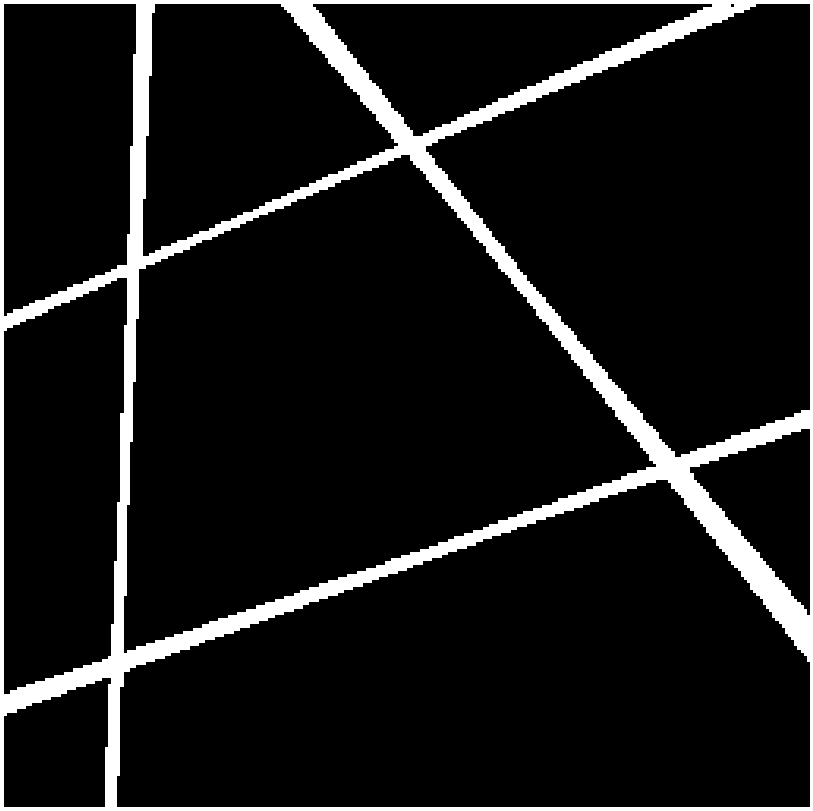
The goal of this assignment was to use the Hough Transform to detect straight lines in images.

Algorithm:

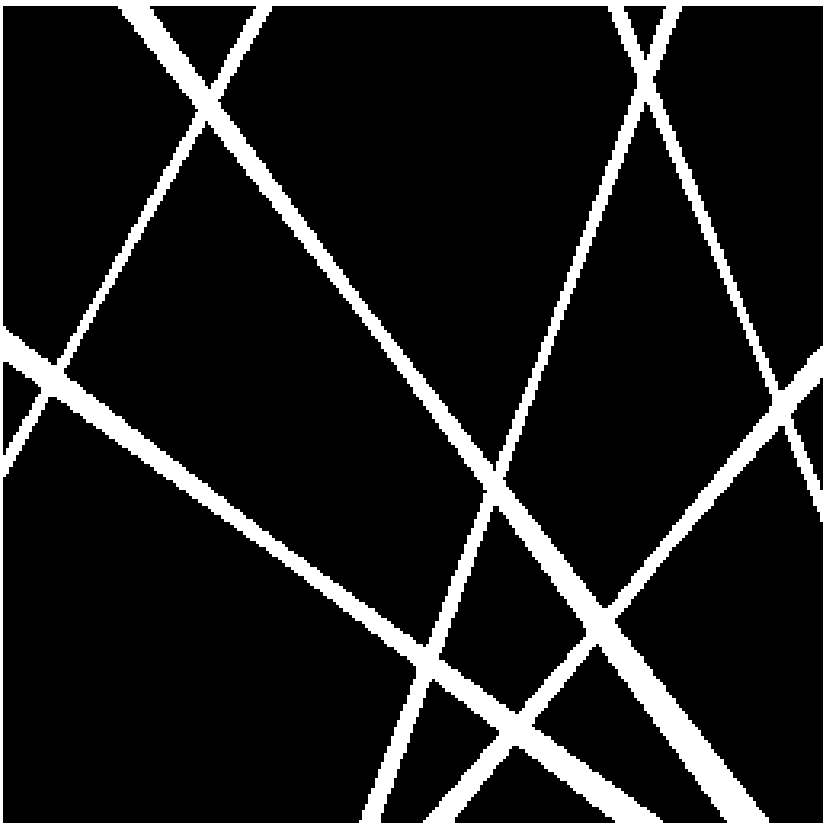
1. Initialize Parameters and Accumulator:
    a. Calculate the diagonal length of the image to determine the maximum rho value and set up an array for rho from -diagonal to +diagonal.
    b. Create an accumulator matrix to count votes for each potential line characterized by rho, theta pairs. Rho is the minimum distance from the origin to a point on the line, and theta is the angle of this minimum distance line.
2. Vote for Lines:
    a. Loop through each pixel in the edge-detected image, and for each edge pixel, compute rho for every theta.
    b. Increment the corresponding cell in the accumulator for each edge pixel that can form a line at that angle and distance.
3. Detect and Draw Lines:
    a. Identify rho, theta pairs in the accumulator that exceed a specified threshold, indicating a significant line. Here, a threshold value of 50 was used. This was determined by experimentation.
    b. Calculate endpoints for each line to extend across the image and draw these lines on a new output image using a specified line thickness and color.

Results:

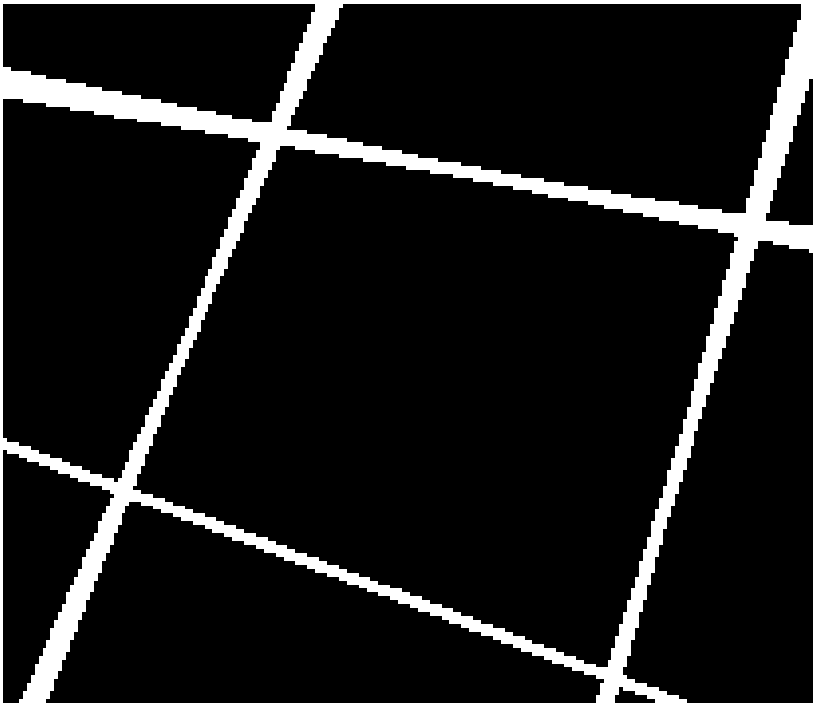
Overall, I was able to successfully detect the straight lines in all the images using the Hough Transform. A threshold value of 50 for used for selecting significant lines in the accumulator. This value was found by trial and error and could be considered a “magic number” for this algorithm.



Results for test.bmp



Results for test2.bmp



Results for input.bmp