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ECE 332

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MP 6 Report

INTRODUCTION

In this MP, I use Hough transform to implement the algorithm for line detection. Each pixel of the image was checked to find imperfect instances of objects within a certain class of shapes. Thick lines and rendering Hough graphs are drawn to show the results.

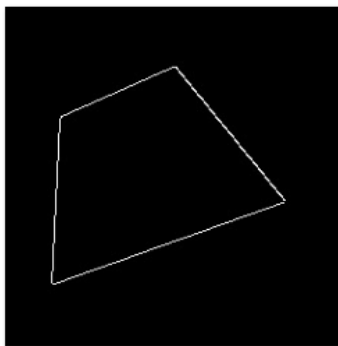
CONTENTS

Edge Extract:

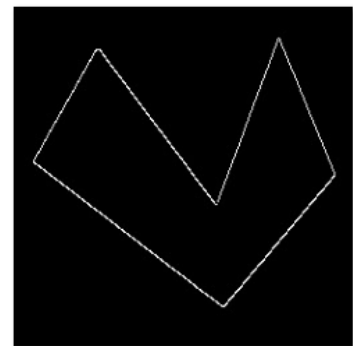
In the first beginning, we need to translate our image into grayscale and use the cv2 function (or the method we've used in the mp5) to extract the lines of the image and save it to the edge image.



edge_input



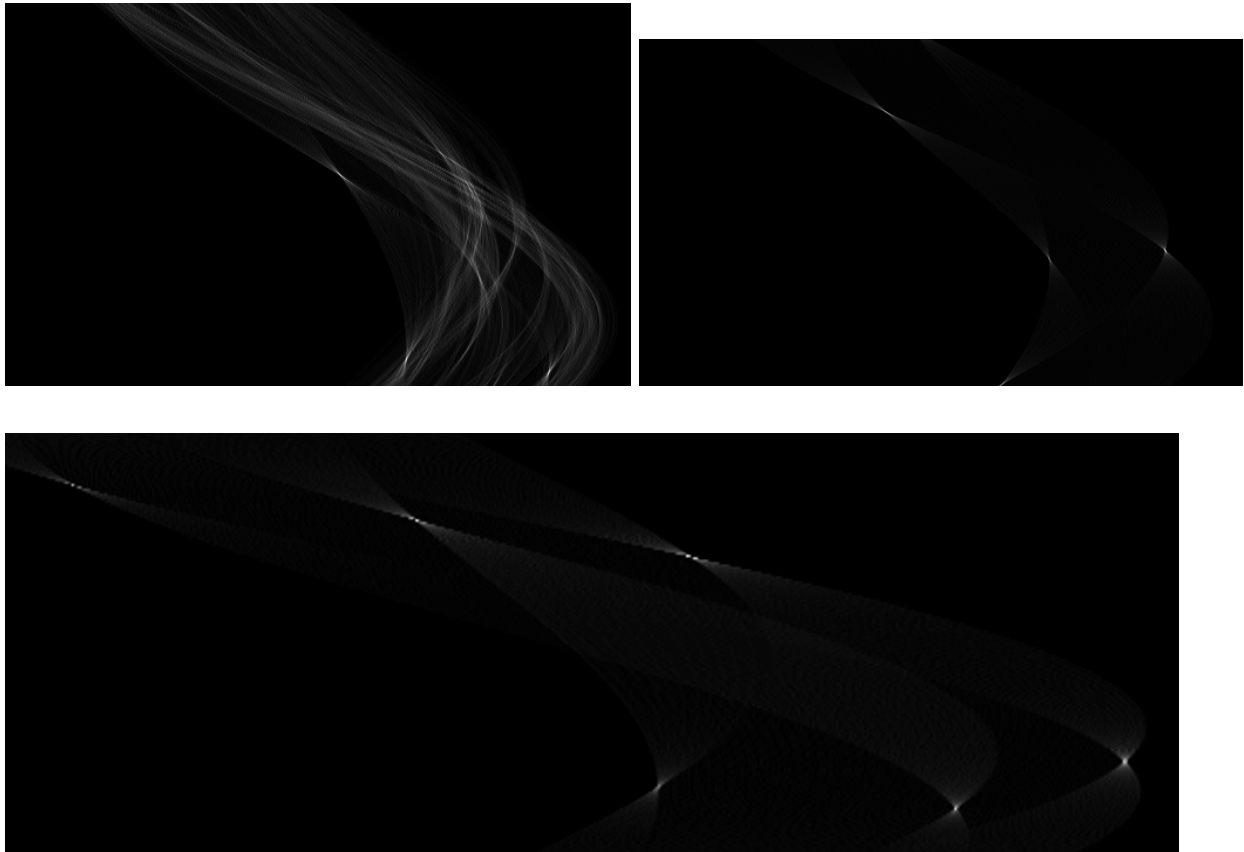
edge_test



edge_test2

Parameter Space:

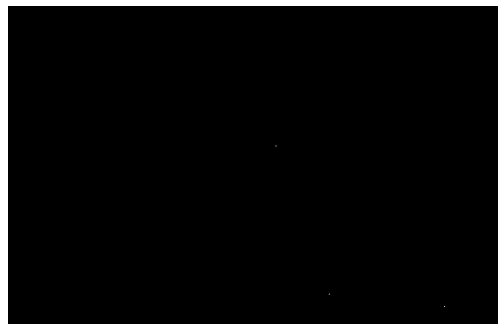
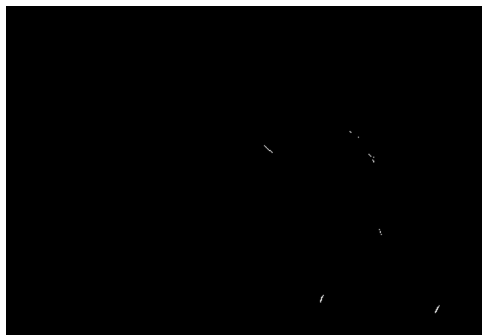
Firstly we need to use an input parameter ‘theta’ and use it to quantilize our parameter space. Since it’s polar, we need to calculate the cosine value and calculate the imperfect distance. And here is how they look in the parameter space. Each cell value represents the number of curves through any point. Higher cell values are shown brighter.



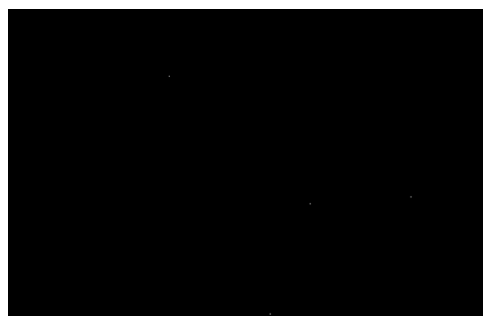
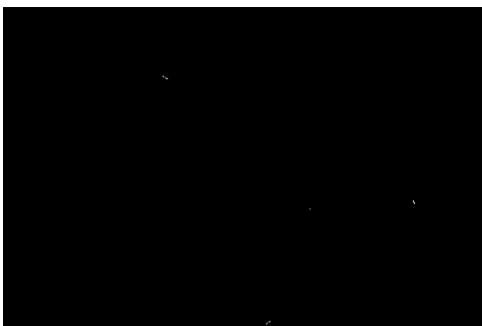
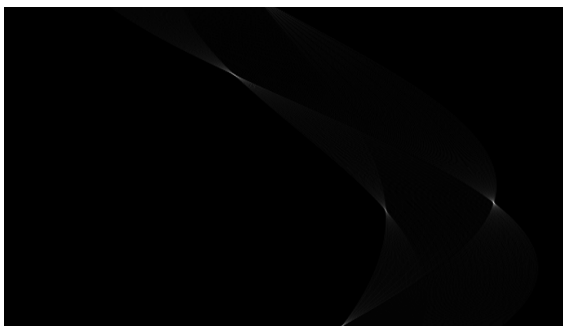
input/ test/ test2 parameter space image

Threshold Check:

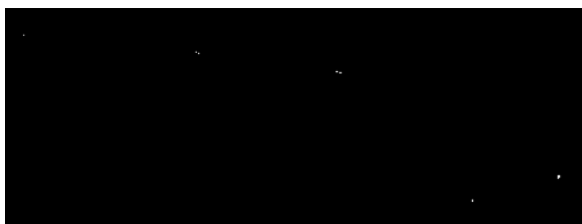
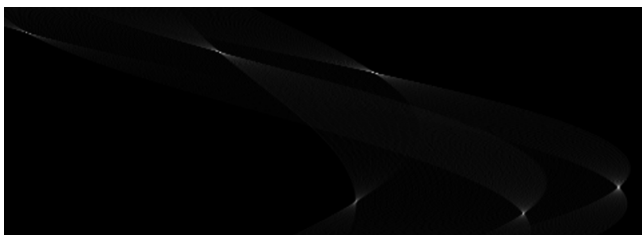
After the parameter space, we also have an input parameter ‘threshold’. And it can be combined with our parameter space to show the greatest value in pixels of the whole image (the brightest spot in the parameter space image above). And we use max suppressing to find the local max pixel point. The distinctly bright spots are the Hough parameters of the image.



Input parameter space/Threshold/ max suppressing image



Test parameter space/Threshold/ max suppressing image

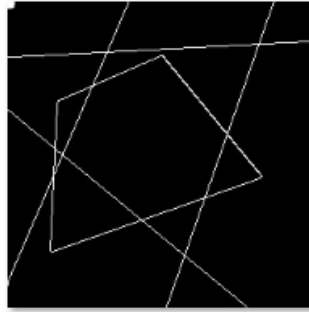


Test2 parameter space/Threshold/ max suppressing image

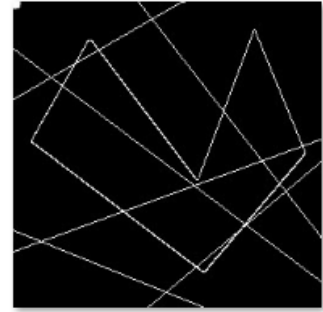
Result image:



Finalinput



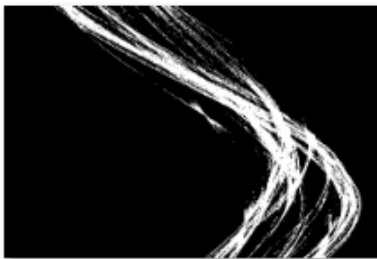
Finaltest



Finaltest2

ANALYSIS

If we change the threshold from $0.6 \rightarrow 0.1$ and remain the $\theta = 400$, the image shows below. And the lines and curves seem much brighter than before. But the max suppressing spot is the same as before.



threshold input_0.1



threshold test_0.1



threshold test2_0.1

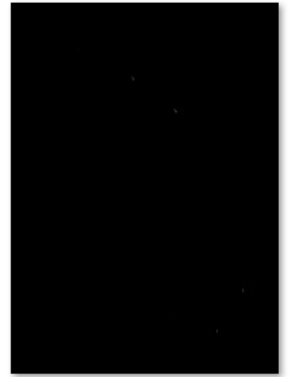
If we change the θ from $400 \rightarrow 1000$ and remain the threshold = 400, it looks below. The lines seem much less than before.



threshold input_1000



threshold test_1000



threshold test2_1000

If we change the threshold to 0.1 and theta to 1000, it looks like this.



threshold input_1000



threshold test_1000



threshold test2_1000

Each parameter plays a significant role in determining the parameter space.