

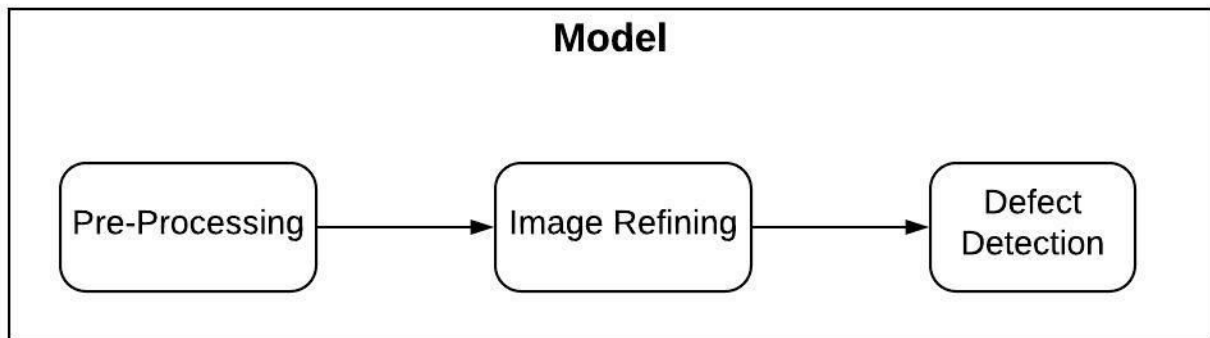
Image Processing
CSCI 547
Final Project
Fabric Defect Detection
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Introduction:

In this project we look at how image processing can be used in order to detect defects in fabrics. This is an ongoing issue because not all defects are the same and finding a dynamic solution to identifying defects has been an ongoing trouble in the industry.

I have used different operations in order to detect certain kinds of defects dynamically but there were some that were not solved with the method I designed. Some of the defects were horizontal stripes which were easier to detect, while some blended with the fabric which were harder to detect.

**Pre-Processing:**

In this step, we make the image ready for refining, I used the fourier transform to get the frequency domain of the image, then I applied either a low-pass filter or high pass filter depending on the frequency change of the defect. Then I applied histogram equalization to properly distribute the contrast of the image.

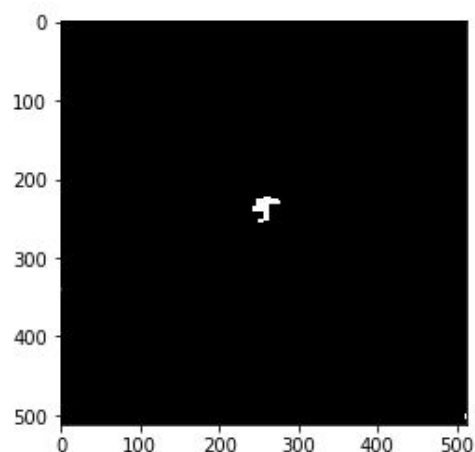
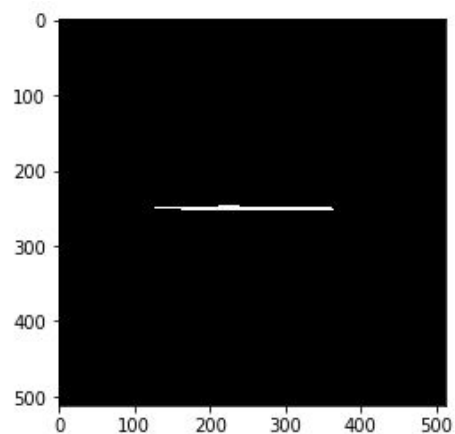
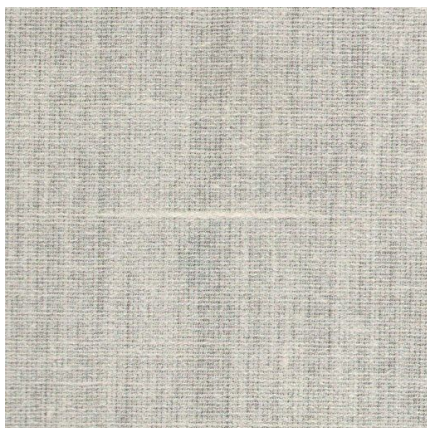
Image Refining:

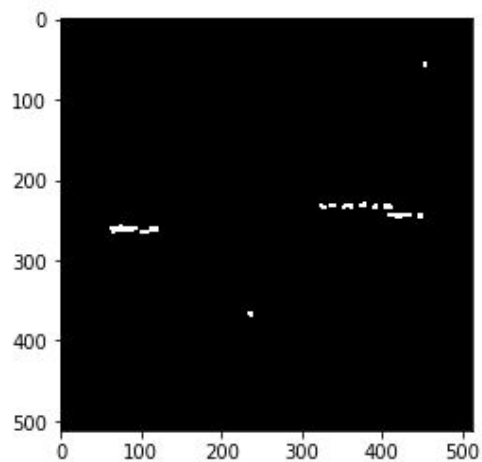
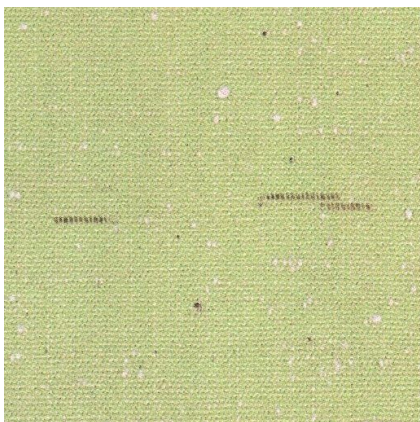
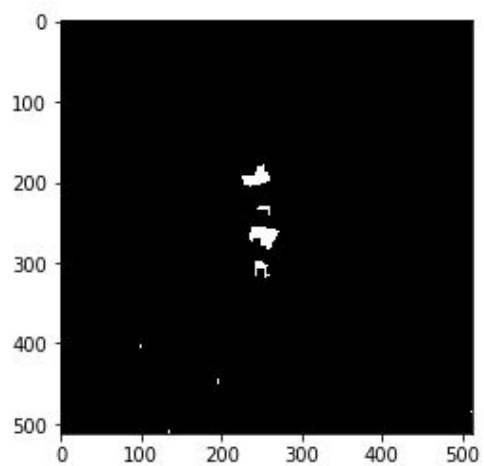
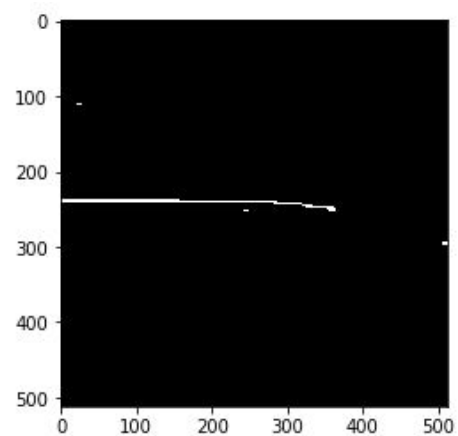
In this step, we try to define the defect better for extraction. I have applied the morphological operations: Opening followed by Closing for this. Here Opening removes noise from the background, in our case this separates the defect, cleaning out the noises, then Closing closes any gaps that have opened in the previous step in the foreground or the defect. In this step, I have used a 3x3 structuring matrix for most of the images.

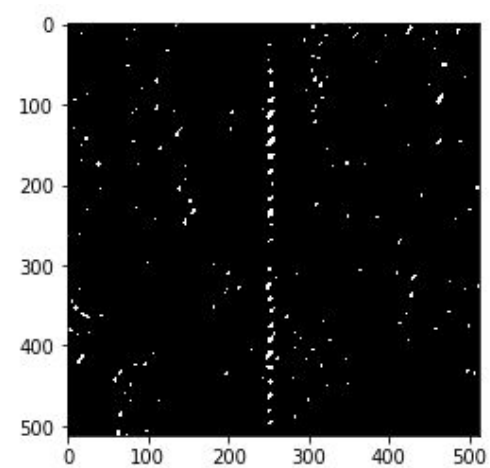
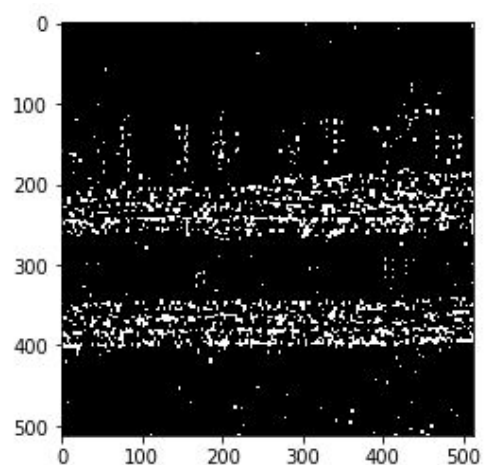
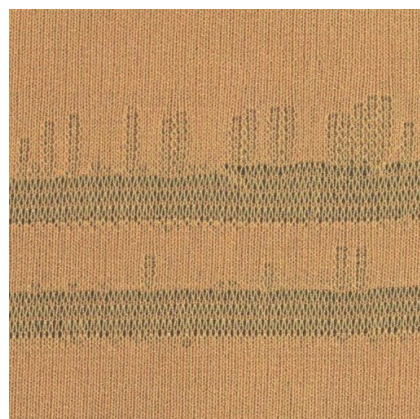
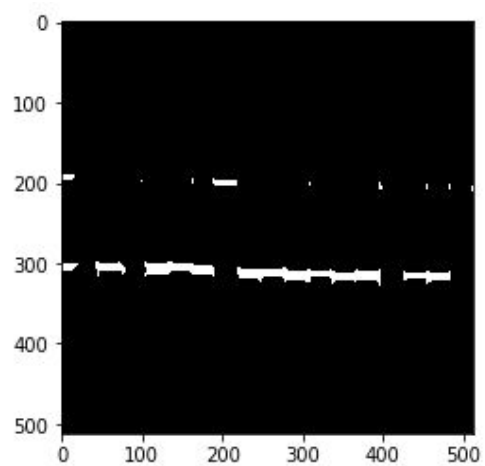
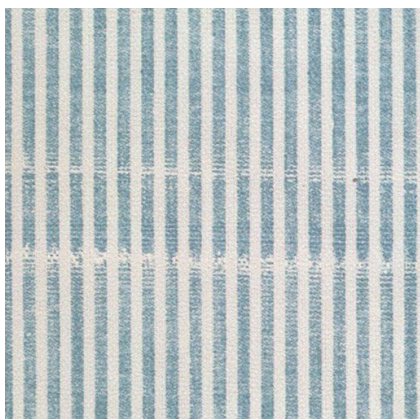
Defect Extraction:

In this final step, I used Erosion to clear out remaining background noises with a suiting structuring matrix for different defects to finally get the defect of the fabric.

Here are the defects that were detected:







Conclusion:

This was a wonderful project to revisit all the things we learned over the semester and use it in one project. This class was very interesting, and I have learned a few things which I will take with me from here. Thank you.