

CSC320 Visual Computing: Assignment 1 Report

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Image 1: Kitchen

The area of the image I would like to extract is the microwave in my home's kitchen.

1. Raw Image:



Figure 1: Kitchen's Raw Image

2. Extracted Image:



Figure 2: Kitchen's Extracted Image

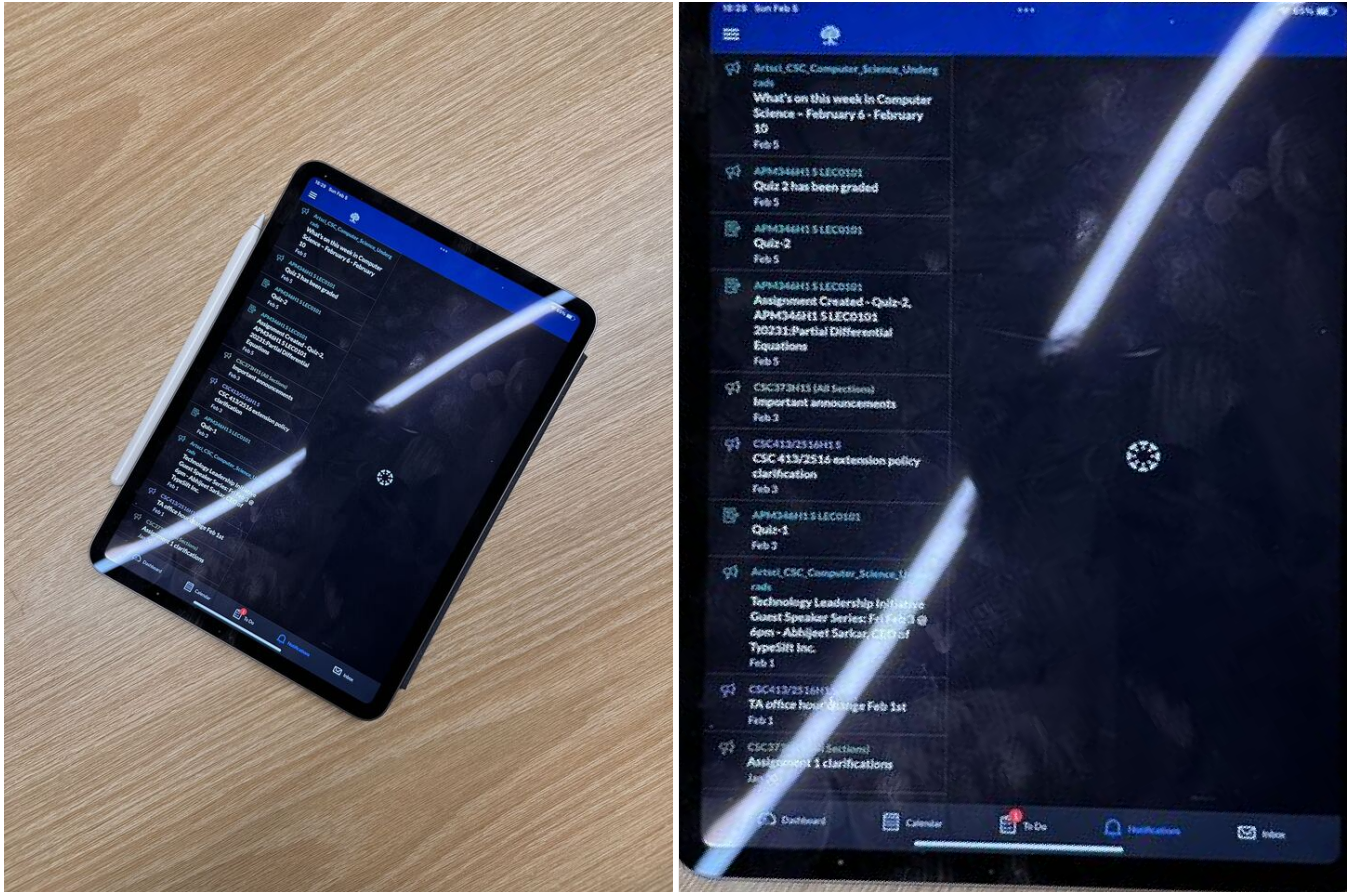
Analysis for Output

1. In my observation, the quality of the output of the extracted area is generally acceptable, which preserves the shape, color, and position well.
2. The major artifact of this output is that: the right side of the microwave is not very well extracted and part of the down-right of the microwave is missing.
3. The possible point that causes the problem is that the destination coordinate is not designed very well, which does not match the scale of the microwave well.
4. As I have experimented with several reasonable values but still failed to get a better result. The initial dimension of the image may be the root of the problem. But I still failed to find the correct dimension of the initial image.
5. I do not think the backward mapping algorithm has any disadvantage for dealing with this pretty straightforward image.
6. In my point of view, a possible way to improve the result of the image is to reduce the resolution of the image and re-consider the dimension of the image I would like to process, in a more reasonable way, which is what I failed to find.

Image 2: Screen:

The image I used is bird-view image for my iPad's Quercus screen, where I would like to extract a face-to-face view of the screen.

1. Raw Image (Left) and Extracted Image (Right):



Analysis for Output

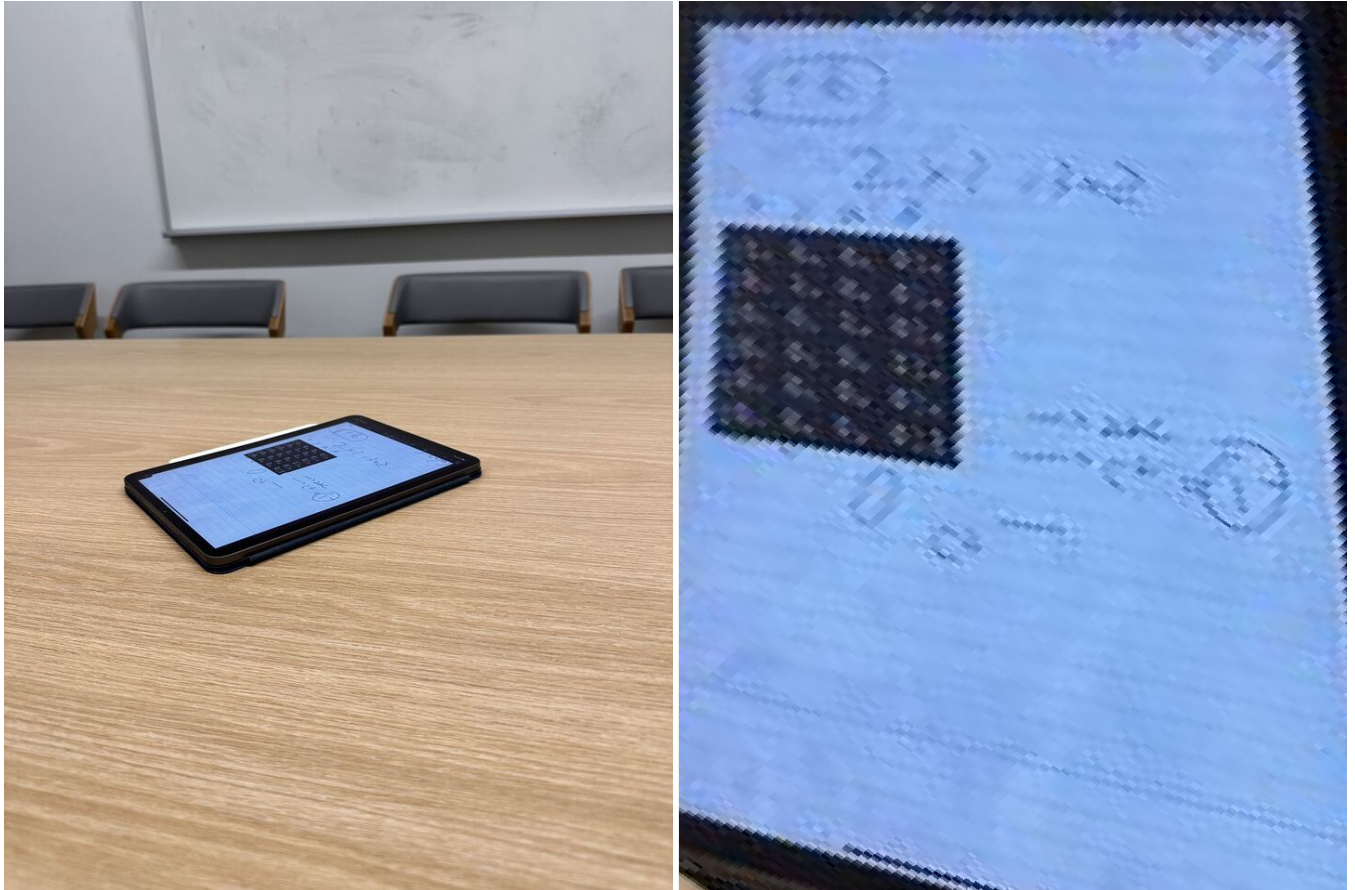
1. In my point of view, the quality of this extraction is really satisfying, from the perspective of shape-preserving and color-preserving. You might notice that: even the fingerprint on the screen are very well preserved and can be easily observed.
2. The biggest artifact of the output image is that the words of the output blurs a little bit, some of which are hard to be recognized.
3. There are few possible reasons of the phenomena. The first one is that the resolution of the initial image is pretty low, thus we cannot expect high-resolution image in the output.
4. I am not sure with the second reason, but I think it should have at least some minor influence on it, which is the light. As is shown in the input image, there are two light-badges cross the diagonal of the screen, which are the two major influencer. However, for the rest of the place, there must be other lights that comes in and affect our output.

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5. Lastly, I think backward mapping algorithm not handle this cases very well. In my point of view, the issue happens in the step: when we know the coordinate of the destination image and try to find the corresponding pixel of the source image. However, in backward mapping, in this step, it is not that possible to find the exact same position in the source image, as the size of two images may vary. Thus, the color / pixel we want for our current pixel in the destination image may not be what we want exactly, which causes the blurring in the output image.
 6. From the perspective of the image, there is no doubt that enhance the resolution and the light condition would improve the quality of the image pretty much. Also, it is also possible to find a better way that find the source pixel of the image more accurately for the destination image.

Image 3: Screen 2:

The third image I use here is still a photo of my iPad, whose screen is displaying my scratch work for CSC373. You may find this similar to my second image. However, I think I am extracting the screen in a much tougher condition. Specifically, the angle between my camera and the iPad is much smaller, which is almost parallel to the desk surface. So, I think this should be in a tougher condition.

1. Raw Image (Left) and Extracted Image (Right):



Analysis for Output

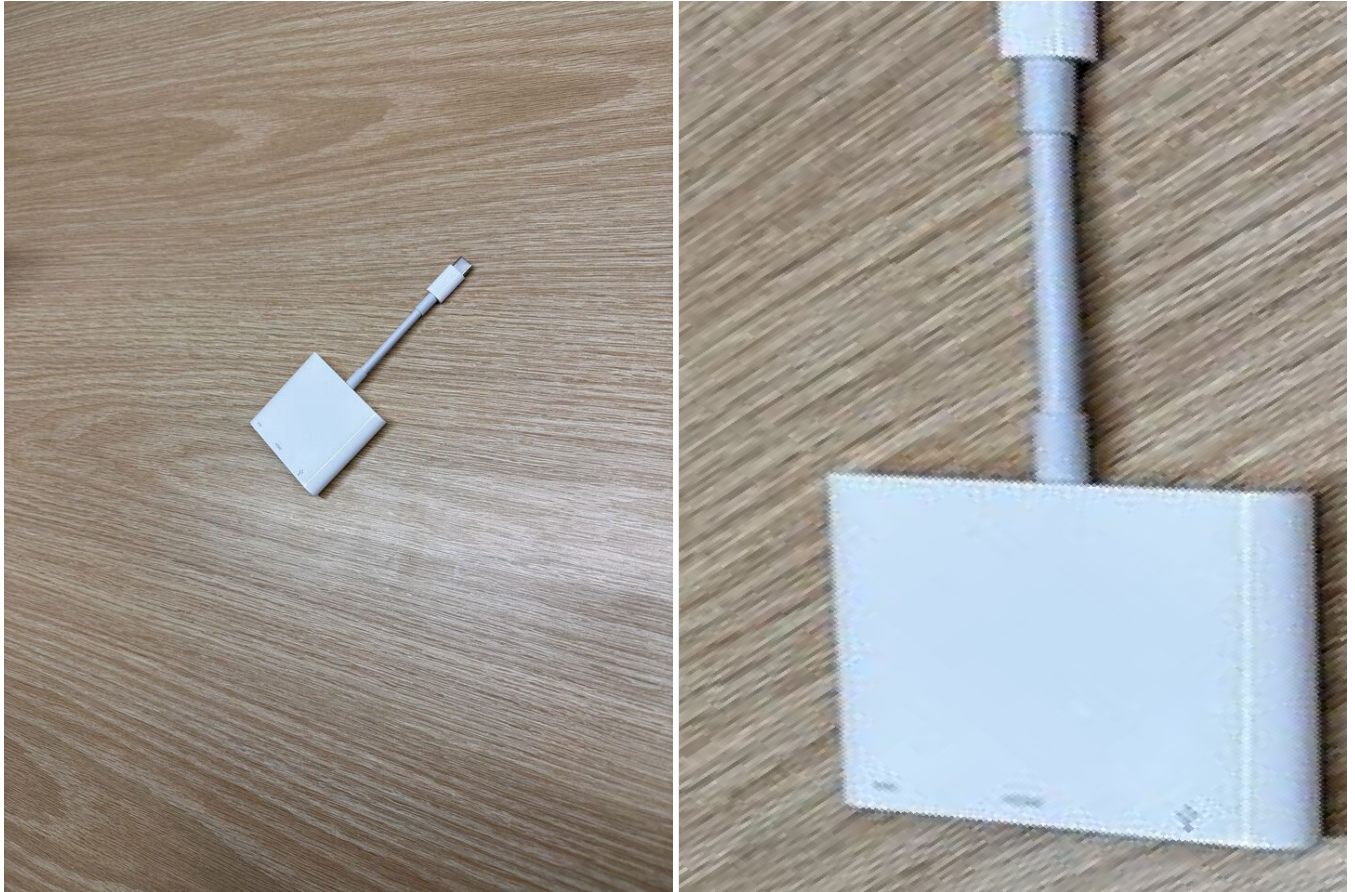
1. Generally speaking, I think my output image pretty good, which also preserves the shape well, and it is not hard to see that I am doing matrix operation in my screen. So, the general output is pretty good.
2. There are mainly two artifacts of my output here. The first one is that the bottom left corner of my image is not well preserved, it just somehow missing. Another major artifact is still that the output image blurs a lot.
3. For this missing part, I think it is possible that my destination coordinate is calculated in a not-good way, so that my output screen is not totally the same as the input one. More specifically, it is possible that my output coordinate does not obey the height-width ratio of original iPad, which makes it unable to include the entire shape.

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4. As for the reason it blurs, I think the reason is the almost the same as the previous image's analysis.
 5. As for the missing corner, I think the best solution is to find a better way to calculate the coordinate of the output image. And it may be able to solve this problem.

Image 4: My HDMI Port:

The fourth image I used is a photo for my HDMI port. I was trying to extract the entire HDMI Port (desk surface is also included for the line part of my port as the HDMI Port is not square every where). At the end, the desired image is that the bottom of my port would be parallel to the bottom of the screen.

1. Raw Image (Left) and Extracted Image (Right):



Analysis for Output

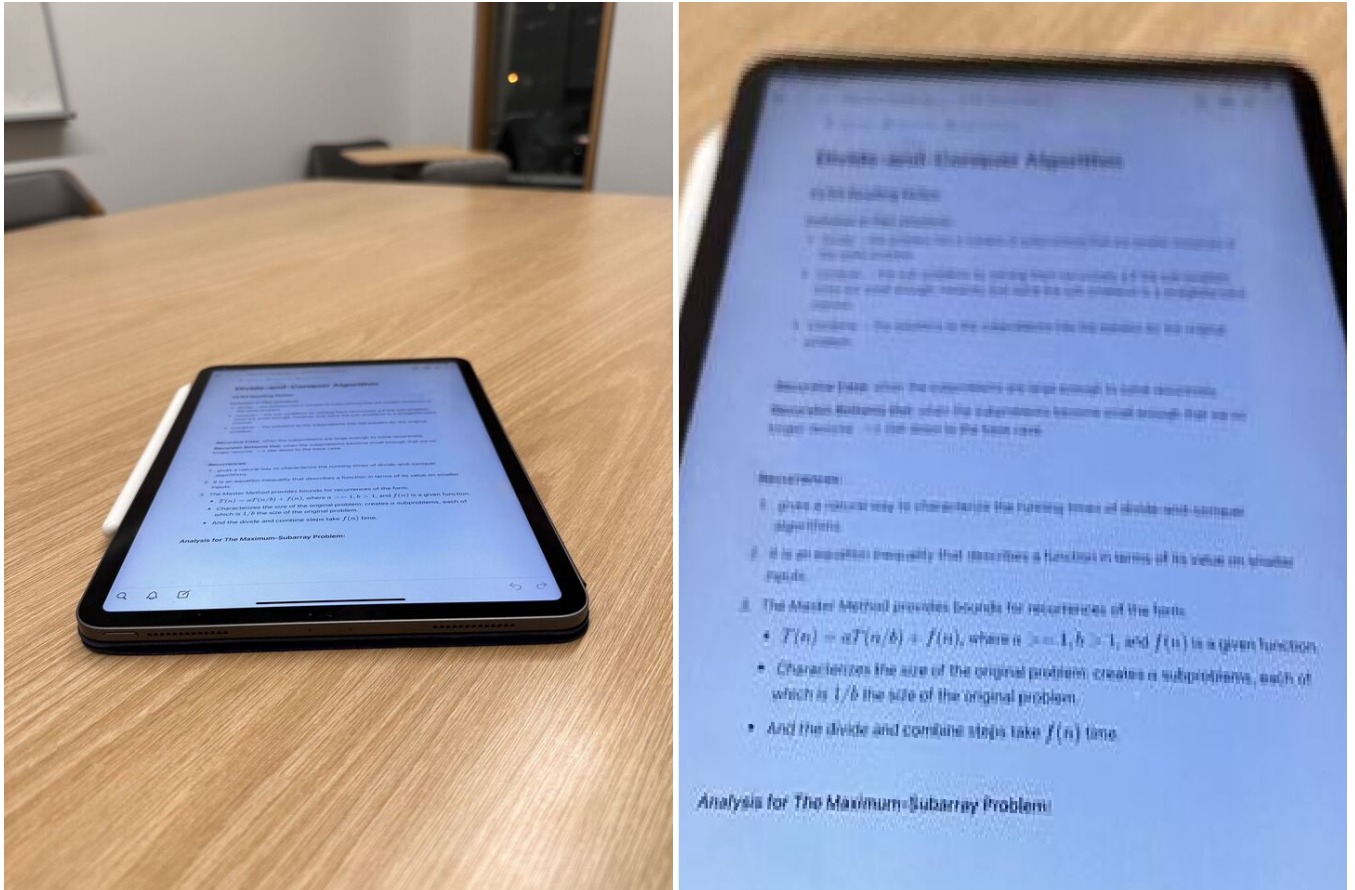
1. In my point of view, the output image is not very well. First of all, the end of the cable is not included in the output, after several times of my experiments. And another point is that the shape of the rectangle part of the port is not very well preserved, as it should be more square than the output image.
2. The reason that the cable end of the port is not included is following: as I need to choose two points on the surface of the table, it is very hard to make sure that the line (by two points) is parallel to the square-end of the port. And I think this could also be the reason for the change of the shape.
3. I do not think the backward mapping algorithm has any disadvantage for this image, as the color of my source image is pretty simple, which is just white and yellow.

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4. A feasible way to improve the output image is that we could use a ruler to make sure two points we choose on the table are parallel to the square-end of the port. And we could derive better source coordinate than now.

Image 5: Bottom-Vertical View of the Screen:

I am trying to extract the screen of my iPad, and the camera is located at the bottom of the iPad. And I think this is a very different angle comparing with previous two images.

1. Raw Image (Left) and Extracted Image (Right):



Analysis for Output

1. In my point of view, the quality of the output image is pretty good, from the aspect of extracting "text" on the screen. However, the quality is bad when it comes to how accurate the iPad screen is captured. It is obvious that, in the output image, there are a lot desk surface included and the bottom part of the image is missing.
2. Also, blurring text at the top is also an artifact of the image.
3. And the analysis for the reasons / ways of improvement are almost identical to previous two screen images, so I do not included it here.