# CSC320H1, Winter 2019
# Assignment 2

Name: JingXi, Hao
Student Number: 1000654188

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## Part 1. Experimental Evaluation For Given Test Image Pairs

In this section, the given test image pairs along with their results after applying the inpainting algorithm for 100 iterations are shown below.

1. Show the results for the test image pair, *input-color.jpg* and *input-alpha.bmp* after 100 iterations.

Figure 1: input.confidence.png

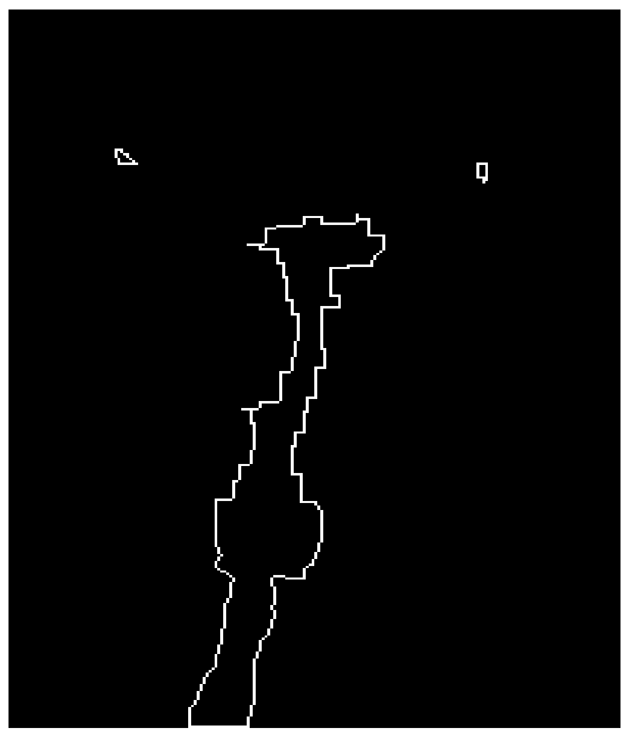

Figure 2: input.fillFront.png

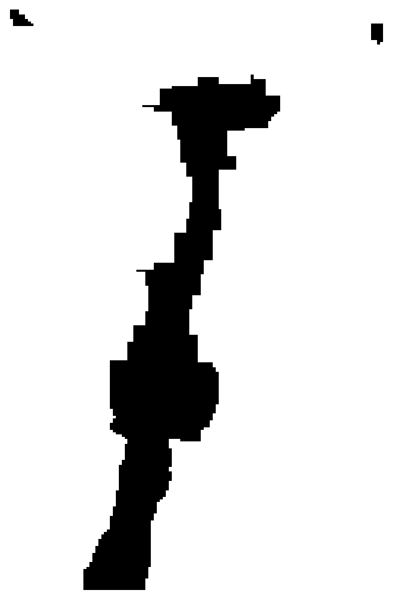

Figure 3: input.filled.png

Figure 4: input.inpainted.png

2. Show the results for the test image pair, *Kanizsa-triangle-tiny.png* and *Kanizsa-triangle-mask-tiny.png* after 100 iterations.

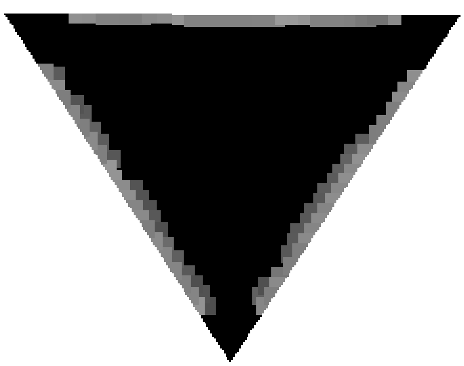

Figure 5: Kanizsa-triangle.confidence.png

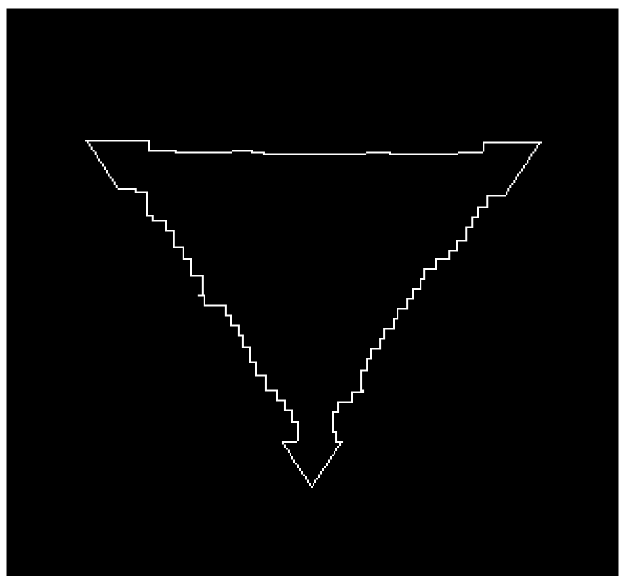

Figure 6: Kanizsa-triangle.fillFront.png

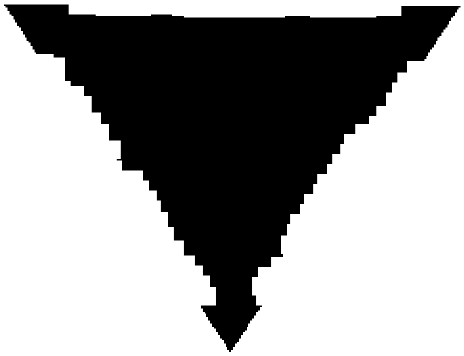

Figure 7: Kanizsa-triangle.filled.png

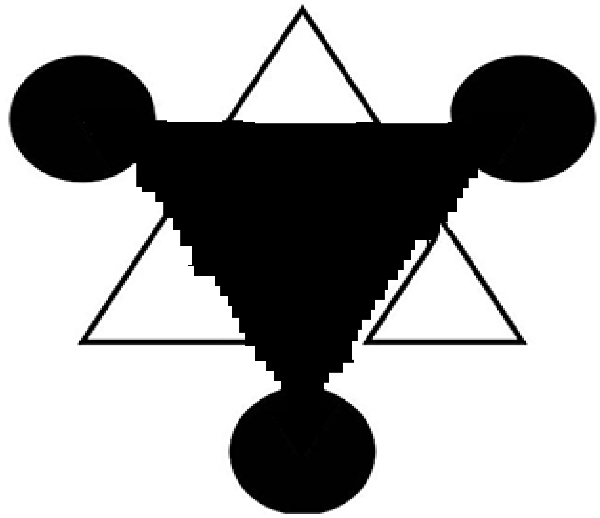

Figure 8: Kanizsa-triangle.inpainted.png

## Part 2. Experimental Evaluation For My Test Image Pairs & Report

In this section, two experiments along with their results are displayed, where one experiment corresponds to a "good" case for inpainting while the other experiment fails the inpainting algorithm. Note that the reference inpainting algorithm is employed in this section to produce the experimental outputs.

1. **Good Case**

   First, we show the pair of test images, *Source1* and *Mask1*, below. Based on the requirements, both target and source regions are not just with constant intensities.

Figure 9: Source1

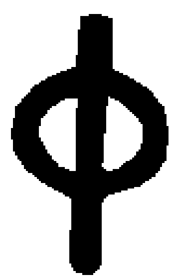

Figure 10: Mask1

As you can see in the source image, *Figure 9*, the image can be divided into four main regions, such as bushes region, soil region, snow region, and road region, and for each region, its color and pattern are quite consistent with their own but very different with other regions. Thus, the gradients for each section are very similar, which helps to attain a better priority order. Also, the characteristics of the color of the source region helps to find a more accurate match for each patch. Hence, it is fair to predict that this pair of test images would be a "good" case for inpainting. Then, we show the fully inpainted image obtained by running the inpainted algorithm.

Figure 11: Source1.inpainted.png

The fully inpainted image is shown by *Figure 11* and there is almost no obvious artifacts occurred in the "removal" area (target area), which indicates that this is a successful case for our inpainting algorithm as expected. Even though the artifacts are not obvious, they still exist. By running the inpainting algorithm step by step, I noticed that some patches containing snow are replaced by the match found in the road section. This is reasonable since the color are quite similar, which causes smaller sum-squared difference of the filled pixels in the two patches.

2. **Bad Case**

   First, show the pair of test images, *Source2* and *Mask2* below. Based on the requirements, both target and source regions are not just with constant intensities.


Figure 12: Source2

Figure 13: Mask2

Based on the source image, *Figure 12*, the color and pattern of the source region are quite complicated, which would cause random filling order and very different SSD. Therefore, I would expect this as a "bad" case for the inpainting algorithm. Then, show the fully inpainted image below.

Figure 14: Source2.inpainted.png

As you can see in *Figure 14*, the result image is not quite well, especially for the bottom "removal" area (target area) where many obvious artifacts are shown. Therefore, this pair of test images fails the inpainting algorithm. For the whole target region, the patch replacements done by the inpainting algorithm seems very unnatural. First of all, the pattern and the color of the source region is very complicated, which implies that the gradient and normal for each patch in the target region may be very distinct. Thus, the priority order would be random. Secondly, the way to find the best match for a patch would cause issue as well. If most of the filled pixels in the two patches have similar intensities, then that patch would have the minimum SSD and it would be chosen as the best match. Thus, any other characteristics (i.e. pattern like window frame, roof edge) would not be taken into considerations. Hence, these issues result in the failure of the inpainting algorithm, especially the region start at the joint section of the roof top and the target and all the way to the bottom of the target where all patches in that area are replaced by a match found on the building.