CS484 INTRODUCTION TO COMPUTER VISION
HOMEWORK 2

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3.1 Preparing data

I read all the images from the folders that contained the images and pushed inside an image for both golden gate and fish bowl images. To read them, their names should also be inside the related txt files. Otherwise the images will go empty and the programs will automatically exit.

3.2 Detecting local features

I prefered OpenCV's SIFT detector functions to run the detector of the Scale-Invariant Feature Transform (SIFT) on each image to obtain a set of interest points. Then, it gave me the keypoints and the descriptor for each image. I stored all of them inside an array to use later. These are the interest points of all the images. An example of keypoints on a given image can be seen on Figure 1.

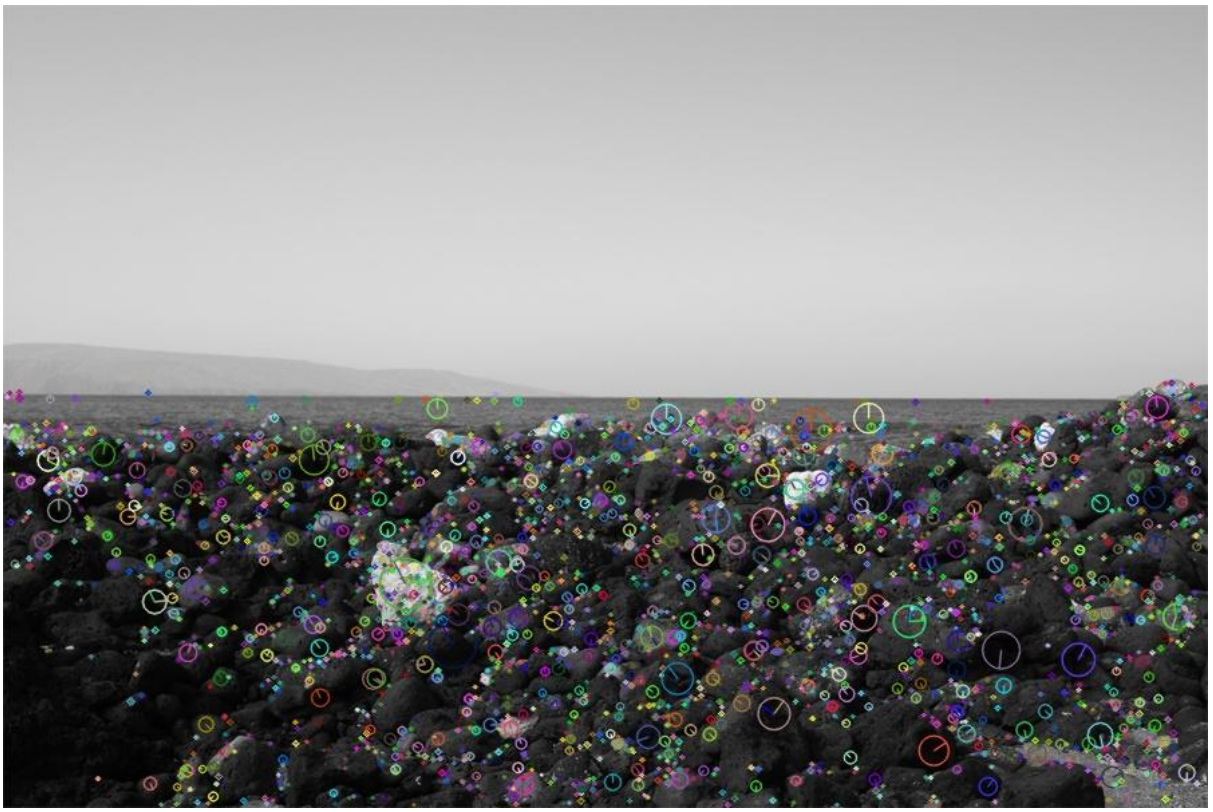

Figure 1: An example image for kepoints

3.3 Describing local features

The descriptor function of the OpenCV gives a descriptor for each point in length 128. I used the descriptors of OpenCV as the first part of the 3.3

3.4 Feature matching

For the first part of the feature matching I preferred Euclidean distance. I calculated all the distance measures between feature vectors to complete the matching under feature_matching function. A matching example can be seen from Figure 2. Furthermore, I used 0.5 as a ratio to handle the part 2 of Feature matching which contains thresholding.

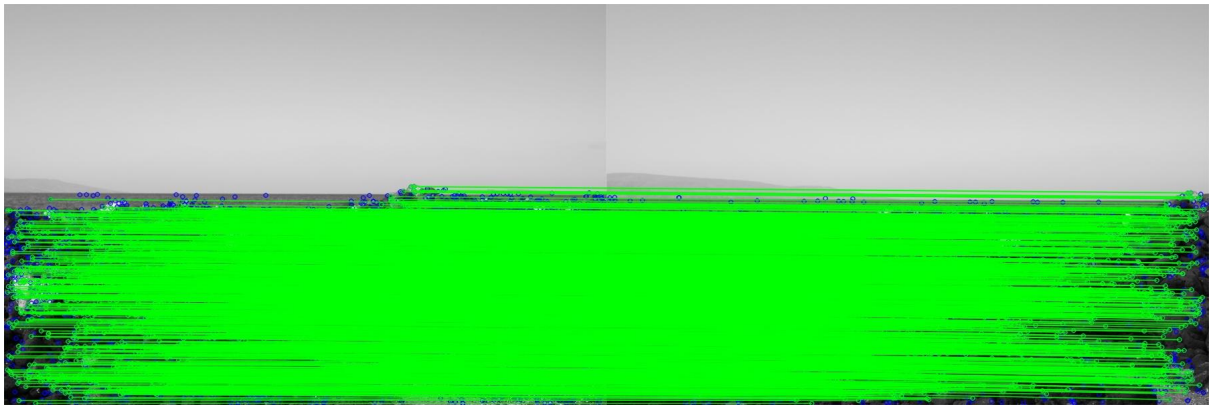

Figure 2: Example of figure matching between two images

I stored the matching keypoints under an array to use them later. key points can be seen on the Figure 3 on the completed stitching.

Figure 3: Key Points on complete goldengate image

3.5 Image registration

I used the RANSAC algorithm to find a transformation. The RANSAC algorithm is embedded in the findHomograpy function. I prefered warpPerfective function after the RANSAC algorithm.This part of the code handles the alignment of the image then I used the aligned image to combine the next image and arrange the alignment. An example of alignment can be seen from Figure 4.

Figure 4: An example of alignment over at the last step of the GoldenGate İmage Combination

Figure 5: An example of alignment over a middle step of the fishbowl image combination

3.6 Blending

For blending I implemented the averaging pixels at the end of the code. To do that I got the overlapped portion of the images and averaged the pixels at that point. and the black places are changed with the second original image.

3.7 Discussion

When the number of the images increases the image becomes more blurry on one side. To fix it, the image can be divided into some parts and that part can be combined again. This problem does not occur on the GoldenGate images however, it becomes a problem on fishbowl images. The completed image can be seen from Figure 6. I put the Golden Gate images on report more than the other one because the fishbowl takes more time to run.

Figure 6: Completed version of the goldengate images