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GAZI UNIVERSITY Faculty of Engineering

Computer Engineering

CENG471 - INTRODUCTION TO IMAGE PROCESSING

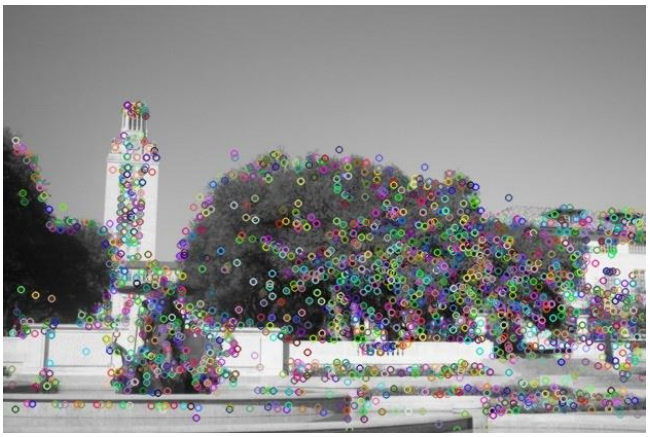
Assignment 3

Overview

Image merge or photo merge is the process of creating a panorama image with multiple photo images. Image processing is currently used to create digital maps and satellite photographs [1]. *The aim of this project is to create an automatic image stitching demo. When we input two images with overlapping areas, we hope to get a wide seamless panorama.* In this project, SIFT was used to extract features of the input images. Next, K nearest neighbor algorithms are used to match these features. RANSAC was used to calculate the homograph matrix to be used for image warping. Finally, the image was stitched.

Method

There are many different methods for feature detection: Harris Corner detector, scale invariant features transform (SIFT), speeded up robust features (SURF), Oriented fast and rotated BRIEF (ORB), etc. [2]. In this project, I used SIFT to implement feature extraction and I find keypoints and descriptors.



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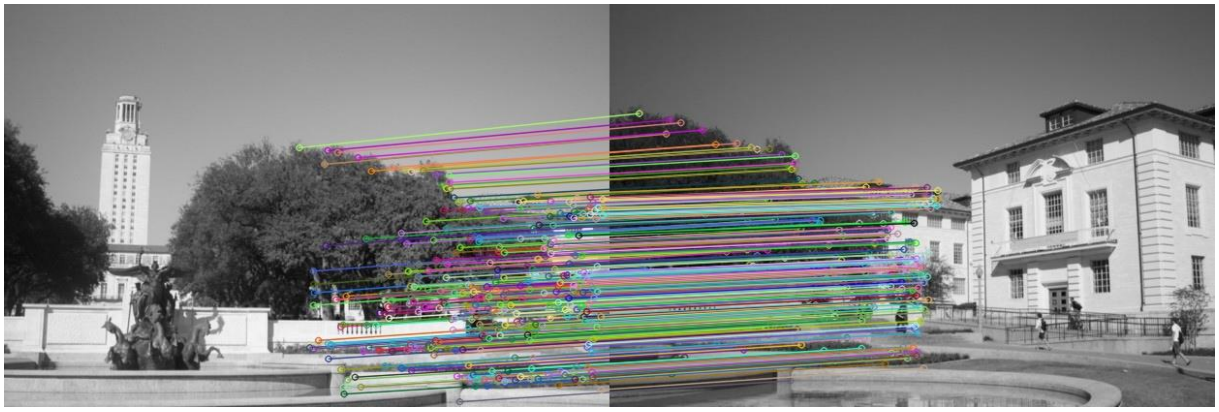
After finding descriptors and key points, I used KNN for matching. The key points between the two images were matched by identifying the nearest neighbors. Here, I set k = 2. In some cases, the distance of the second-best match may be too close to the distance of the best match due to noise. I determined the threshold value for this. When this value is 0.53, I got the best result.



Some features pairs are correct, some are not. We shouldn't take the faulty pairs into the homography calculation. So, I applied RANSAC to get rid of these. Then I used the function cv2.findHomography() to calculate the homography matrix. After I got the homography matrix, I applied the warp. For this, I used the function cv2.warpPerspective.

Result

However, I could not get a perfect and flawless panorama image like this. This may be because I am not using a mask for distortion. Also, another problem may be that the threshold value is not good enough.

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Reference

[1] https://en.wikipedia.org/wiki/Image_stitching

[2] https://medium.com/machine-learning-world/feature-extraction-and-similar-image-search-with-opencv-for-newbies-3c59796bf774