Homework 3 Automatic Panoramic Image Stitching

Due date: 2024/11/08 23:59

In this assignment, you need to finish the Automatic Panoramic Image Stitching process from scratch, excluding the first step. You also need to show the results of your own data in the report. Following is the steps:

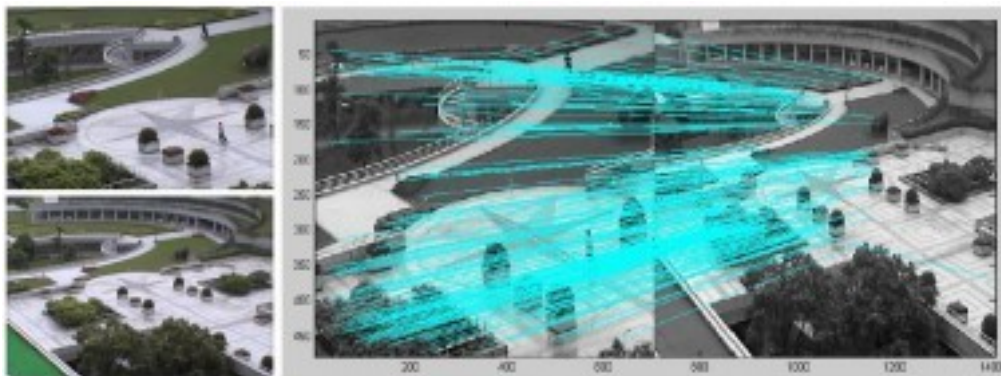## 1. Interest points detection & feature description by SIFT

You can use OpenCV function in this part.

2. Feature matching by SIFT features

You can try ratio distance(last lecture) in this part:

$$\frac{||f_1 - f_2||}{||f_1 - f_2'||}$$

It is also good for you to try different features, e.g. MSER The result of this part need to be shown like

You can have better visualization, for example more colorful:)

3. RANSAC to find homography matrix *H*

You need a function:

H = homomat(points_in_img1, points_in_img2)

In this part you have to write a RANSAC algorithm to find out the best homography matrix between two images.

*RANSAC hints:

I. sample S correspondences from the feature matching results

II. compute the homography matrix based on these sampled correspondences

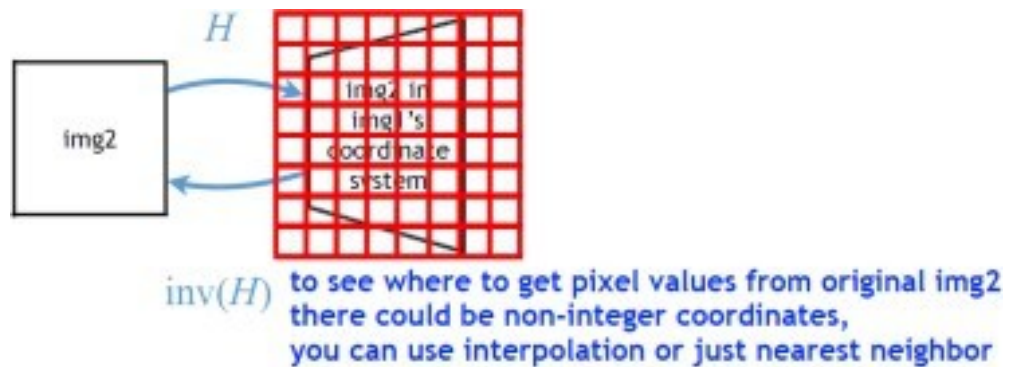III. check the number of inliers/outliers by a threshold

IV. iterate for N times

V. get the best homography matrix with smallest number of outliers

4. Warp image to create panoramic image

You need to write a function *warp(img1, img2, H)* which warps one image onto the other using homography and provide examples.

*Warp hints:

In this part you are also encouraged to use a blending function to enhance the result.

5. Report

Your report should be as detailed as possible, including:

➔ your introduction

➔ implementation procedure

➔ experimental results (of course you should also try your own images)

➔ discussion (what difficulties you have met? how you resolve them?)

➔ conclusion

➔ work assignment plan between team members.

Important notice:

- Everyone is supposed to upload their own zip file and report pdf. You should follow the file name form: Group[group]_HW[3]_{code or report}
  (for example, Group[4]_HW[3]_code.zip, Group[4]_HW[3]_report.pdf)

- The report should be written in English.

- The zip file should include:
  1. All the content of the original zip file, excluding the data folder
  2. Any additional code you may have
  3. The images using in the experiments (put under my_data/)
  4. Any output file you may have (put under output/)
  Note: please give a short description about the filenames in the report.

- Only one member in your team needs to upload the zip and report file. If there are multiple submissions, the last submission will be considered your final submission.
- Please submit your homework before the deadline!!!