

Lab 3: Assignment is done individually

Due date: February 5, 2024

Total Marks: 20 Marks

Question 1 [15 marks]: Homography - RANSAC

The goal of this assignment is to write a panorama application for stitching together pairs of images (fig. A – fig. B).



Fig. A: Left Image



Fig. B: Right image

Below is the result of applying this assignment complete code. Show your code during the lab and if you cannot finish it in the lab then finish it at home – you have until the deadline to do so.



Fig. C: Merged panorama image

Prelab work:

- Familiarize yourself with the Matlab commands for SIFT.
- Familiarize yourself with Matlab commands `fitgeotrans`, `imwarp` and `transformPointsForward`.
- Familiarize yourself with Matlab command `imref2d`.

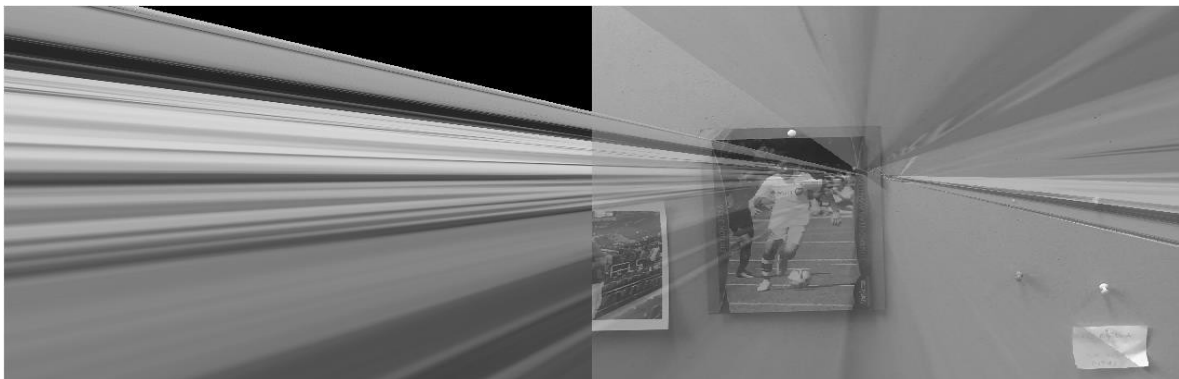
Suggested steps (Feel free to change, add, and/or remove steps as needed):

1. Load both images, convert to single and to grayscale
2. Use `vlfeat` to apply SIFT to detect feature points in both images.
3. To use RANSAC; calculate the number of iterations needed.

4. Run RANSAC to discard the outliers and estimate a homography mapping one image onto the other, grab 4 matching points at random to initialize the homography in each iteration.
5. Use the previous homography to transform all pts1 to pts2.
6. Create a new image big enough to hold the panorama and composite the two images into it. You can composite by simply averaging the pixel values where the two images overlap. Your result should look something like figure C.
7. Test your work on the other provided images or images taken by your cell phone camera.

Note

While you're debugging your code if you ever saw image such as follows



That means, the number of inliers are very limited maybe ≤ 15 with minimum score, and that is acceptable, once you keep your code running it will get much more inliers points and the result will get much better.



Question 2 [5 marks]:

Apply the same work above with the following:

- Extend the code to make a panorama of 3 or 5 images.

Submission Instructions

Solve Q1 and Q2 in one Matlab program (or in two separate programs if you prefer to do that). Submit everything as one zip file **to canvas**. Note that you can resubmit an assignment, but the new submission overwrites the old submission and receives a new timestamp.

General Guidelines for Programming Assignments:

- The marking of the implemented functions is done following this general scheme:
 - Correctness and logic 80% - the program logic and algorithm behind it is correct and it performs according to the post conditions in each function and the code do compile with no errors
 - Style 10% - code has comments and properly formatted/indented
 - Optimization and simplicity 10% - The code has reasonable optimization and is not awkward nor too complicated
- Marks can be deducted if the student does not implement any specific requests in the assignment