浙江大学实验报告

课程名称：专题研讨 指导老师：Ping TAN

实验项目名称：Project 2: Augmented Reality with Planar Homographies

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1. Experiment Purpose and Task

1.1 Experiment Purpose

In this project, you will be implementing an AR application step by step using planar homographies. Before we step into the implementation, we will walk you through the theory of planar homographies. In the programming section, you will first learn to find point correspondences between two images and use these to estimate the homography between them. Using this homography you will then warp images and finally implement your own AR application.

1.2 Experiment Task : Computing Planar Homographies

(1) Feature Detection, Description, and Matching
- Implement function [locs1, locs2] = matchPics (I1, I2)

(2) BRIEF and Rotations
- Write a scriot briefRottest.m

(3) Homography Computation
- Implement function [H2to1] = computeH (x1, x2)

(4) Homography Normalization
- Implement function [H2to1] = computeH_norm(x1, x2)

(5) RANSAC
- Implement function [bestH2to1, inliers] = computeH_ransac (locs1, locs2)

(6) HarryPotterizing a Book
- Write a script HarryPotterize.m

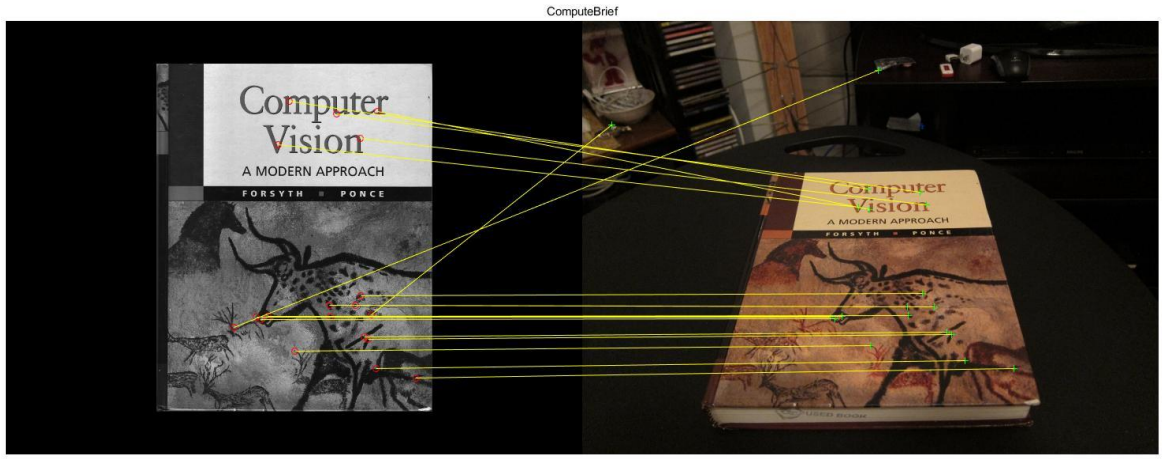
- Implement function [composite img] = compositeH (H2to1, template, img)

(7) Creating your Augmented Reality application

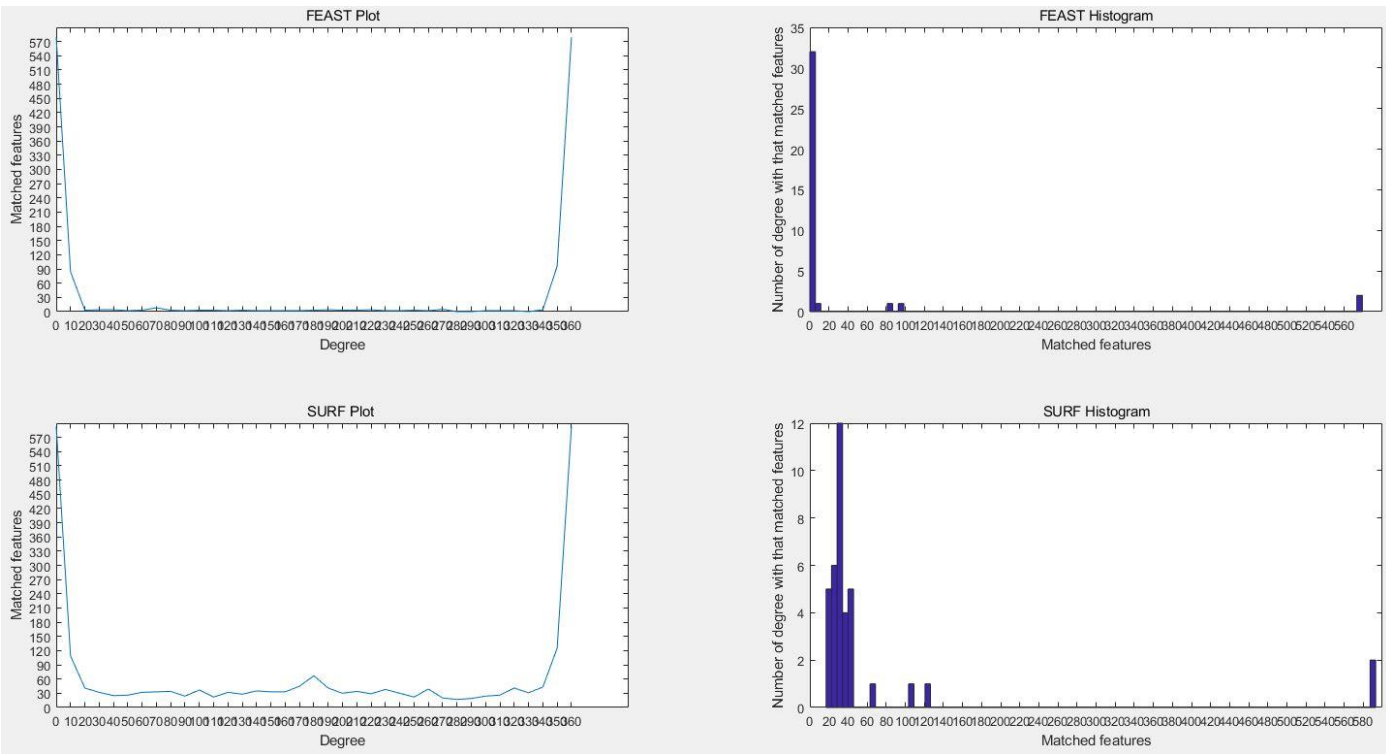
- Write a script ar.m

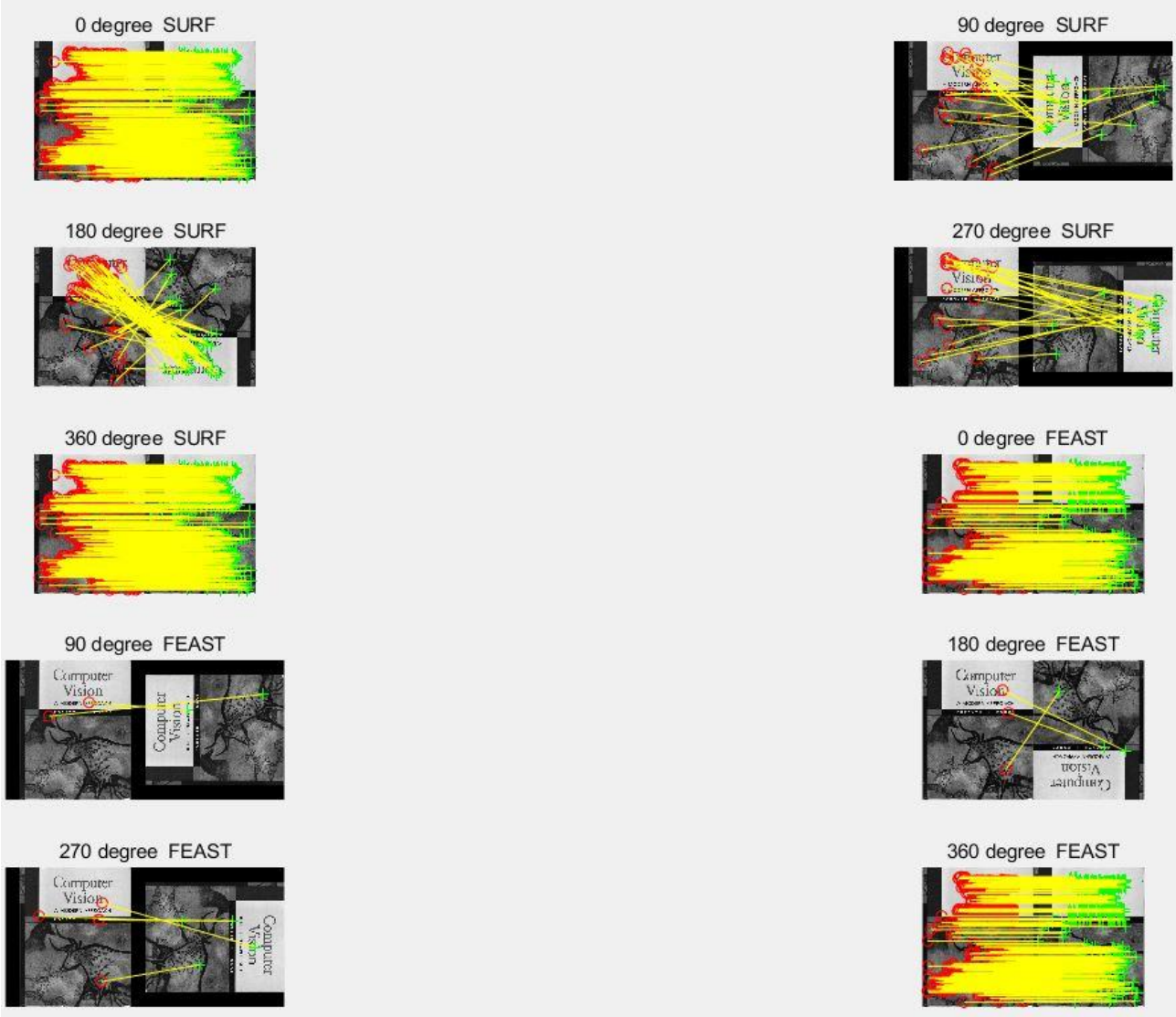
2. Experiment Result

(1) Feature Detection, Description, and Matching

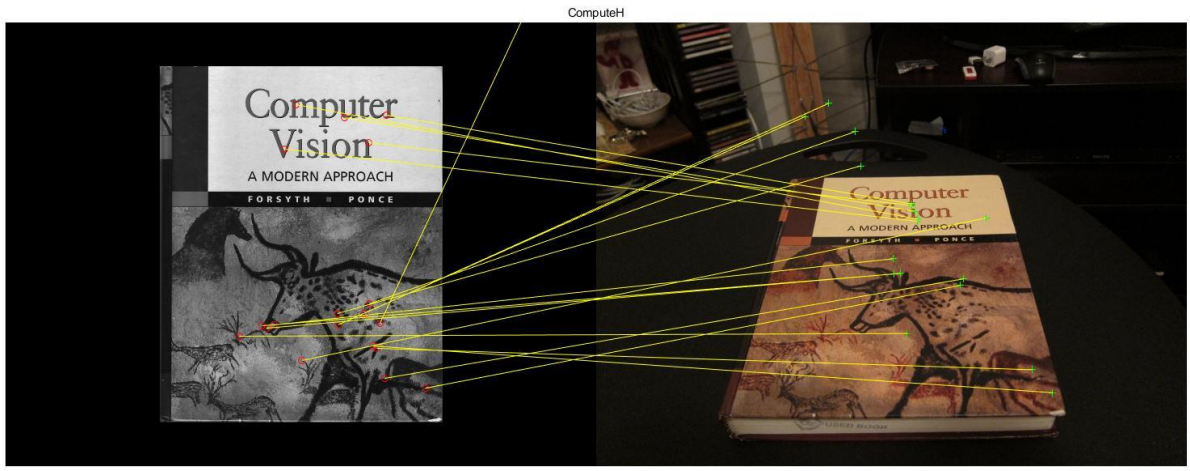


(2) BRIEF and Rotations

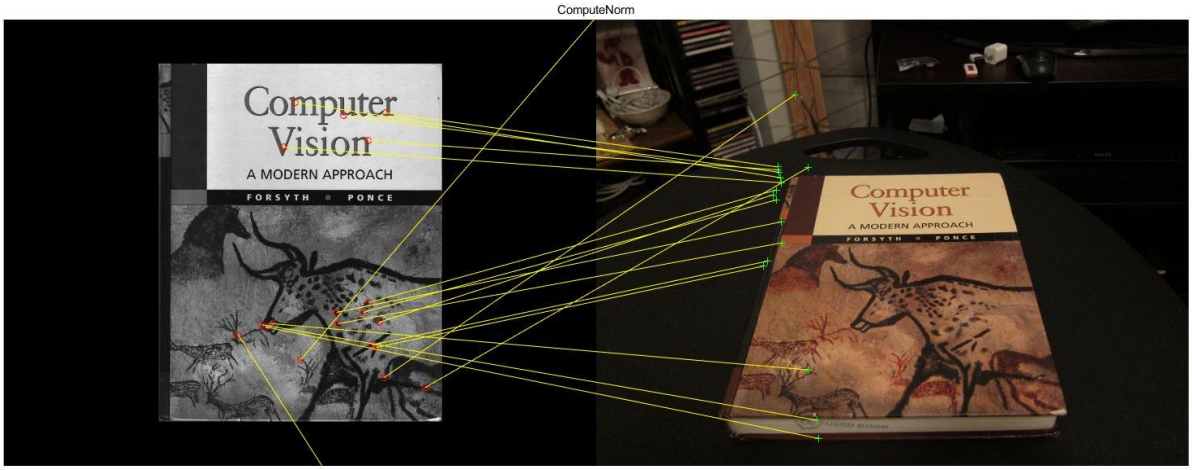




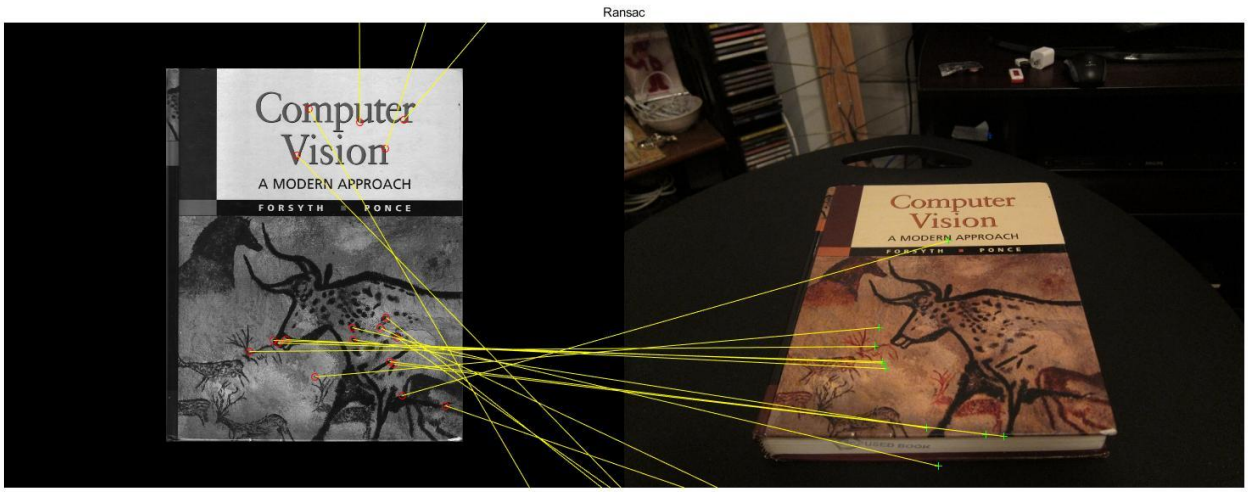
(3)Homography Computation



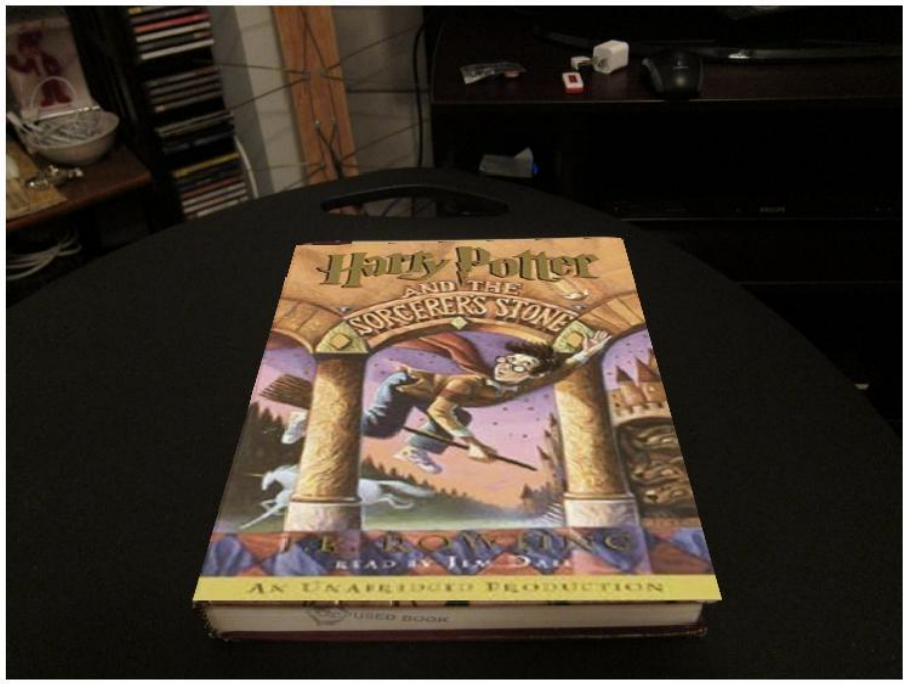
(4)Homography Normalization



(5)RANSAC



(6)HarryPotterize Book



(7) Creating your Augmented Reality application

In result file

3. Discussion and Experience

In this project, I think it is much more difficult than the previous one, and I have encountered many problems and difficulties. The first problem is about the Task 4.2.BRIEF and Rotation, I didn't really know why BRIEF descriptor behaves that way. I think some pixels are not correctly mapped to the corresponding position. And some features in the photo scene are too similar, which will cause the algorithm to cause some degree of misjudgment when performing operations and matching. This is also why the use of detectSURFFeatures to perform the test will result in a matching drop compared to BRIEF.

The second problem I encountered is that when I run HarryPotterize_auto.m and ar.m, sometimes it is successful but sometimes it will fail. I don't know if it is a matlab

configuration problem or the related code provided by the experiment is problematic because the script I think it's right, but the compilation error is all provided by the experiment or the built-in function error. I have not solved it, but all of them have successfully run a correct result and I have saved it.

Last but not least, is about the understanding of the whole experiment. In fact, for this experiment, I feel that I only know a little and have no comprehensive understanding. But overall, this time I also learn about AR and Planar Homographies. I understand how to use matrix operations to implement Homographies, Direct Linear Transform, SVD, etc. Although I encountered many errors or algorithmic disappointments in the process, I spent a lot of time to understand the problem and find a solution. In short, through this experiment, let me know more about computer vision and have a deeper understanding of matlab.