COMP 558 Assignment 3
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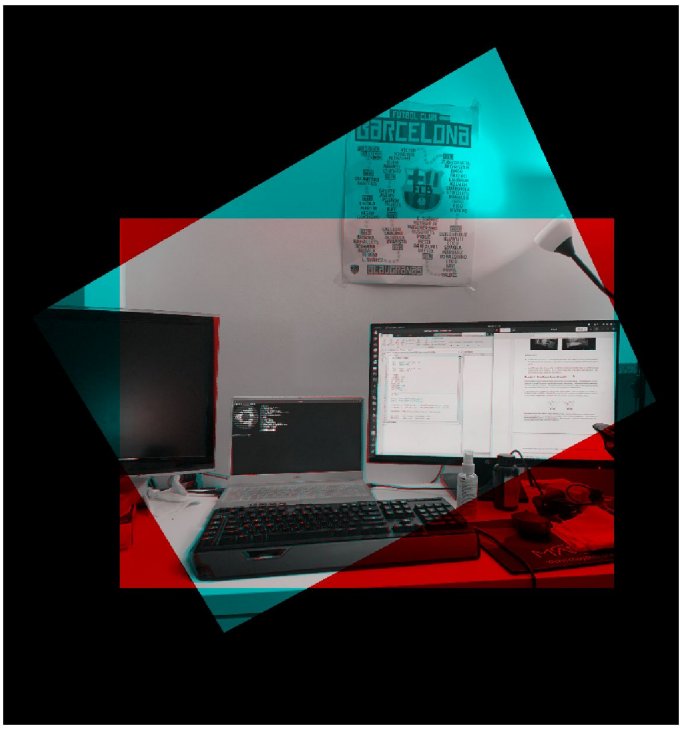
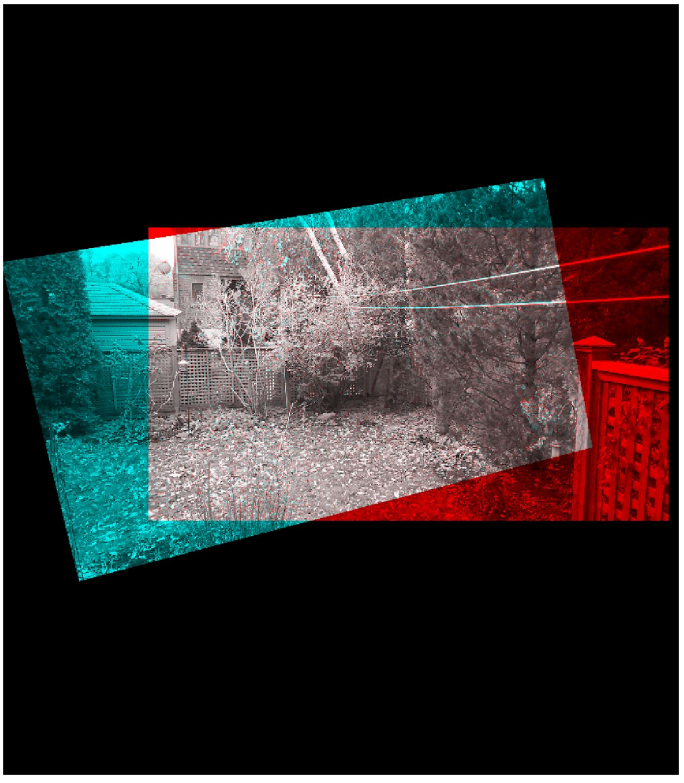
Exercise 1: Homographies & RANSAC

1. ubuntu1.jpeg and ubuntu2.jpeg

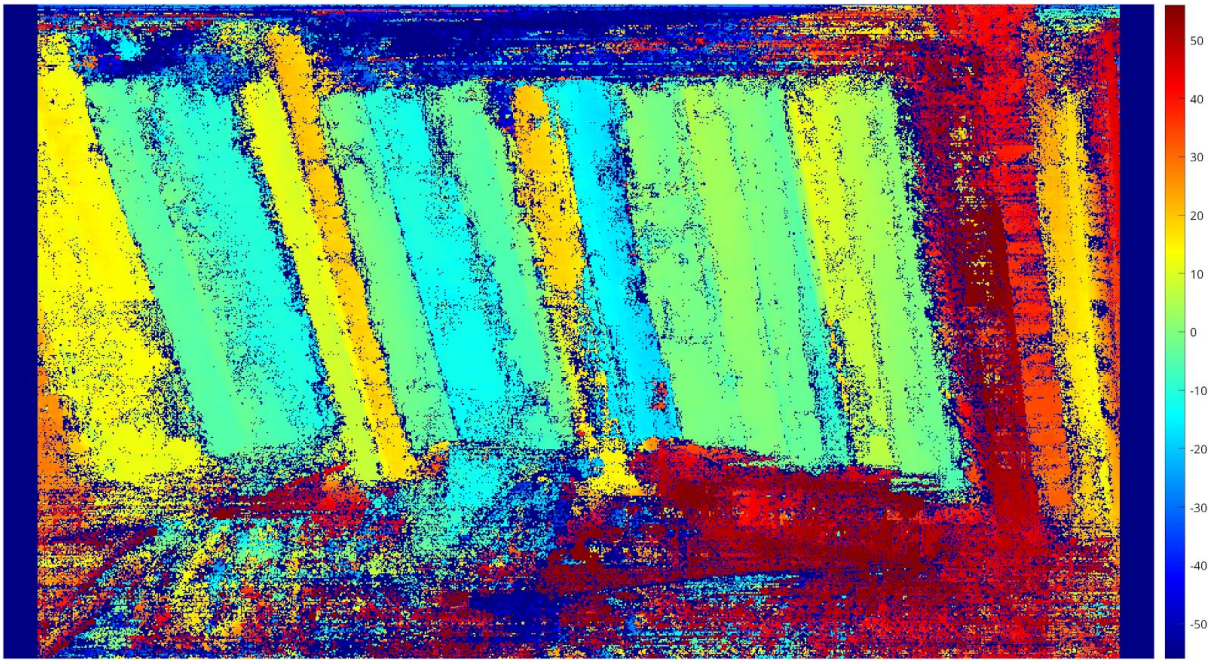


2. yard1.jpg and yard2.jpg



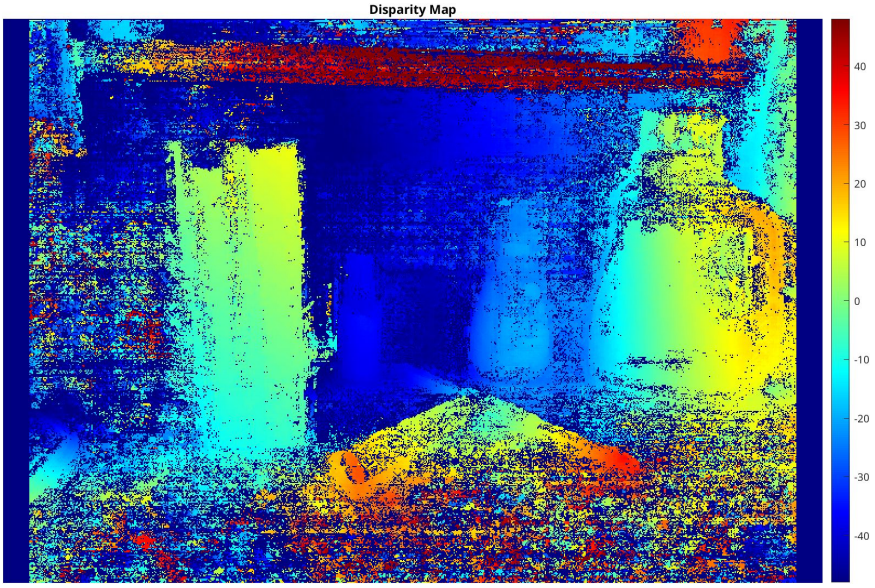
Exercise 2: Uncalibrated Stereo

1. Disparity Map

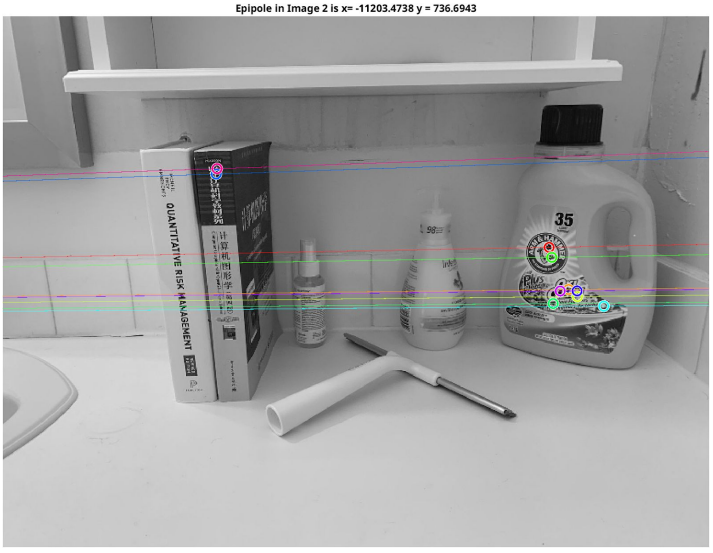


2. Epipolar lines

3. Custom image - Disparity Map



4. Custom image - Epipolar lines



5. Custom image - Original Left / Right

Discussion:

First, notice that the x coordinate of both example image `bookshelf1.jpg` and `bookshelf2.jpg`, along with the picture taken `custom.jpeg` and `custom2.jpeg` are extremely large. This means that the rotation of the camera is not strong enough to produce an accurate result. In other words, the FOV of both cameras are almost parallel. This also explains why with each random number generated in the RANSAC process, we can get a fundamentally different result - with some having epipoles on the right side of the image, while others on the left side of the image. When the epipolar lines are exactly parallel to each other, then we know they never intersect, unfortunately, in practice, it is unlikely that we're gonna get all the epipolar lines to be exactly parallel to each other, resulting in some parallel line converging on the left while others on the right.

Looking at the disparity map, I expect that objects closer to the camera should have a positive disparity while objects further away from the camera should have a negative disparity, since elements closer to the camera will change a lot more than elements further away from the camera.

Inspecting the bookshelf images provided by Prof. Langer. The books on the right side, closer to the camera have positive disparities, same goes for the shelf board and the documents on it. Interestingly, the mobile phones laying on the shelf board did not give out positive disparities, even though the mobile phone is supposedly closer to the camera. I think it could be because it's mostly laying flat on the ground, so it does not create significant enough change against objects of its surroundings. If the phone was standing upright, the disparity between the images could be much greater.

Inspecting the scene I constructed, the results are mostly expected as well. The farthest elements in the scene are all on the negative side (hand sanitizer, soap), while the shelf presents a positive disparity value, which is to be expected, since the shelf is closer to the camera than the hand sanitizer and the soap. Looking at the T shaped wiper, we can clearly see that the closer it is to the camera, the color turns increasingly red.