Assignment 3

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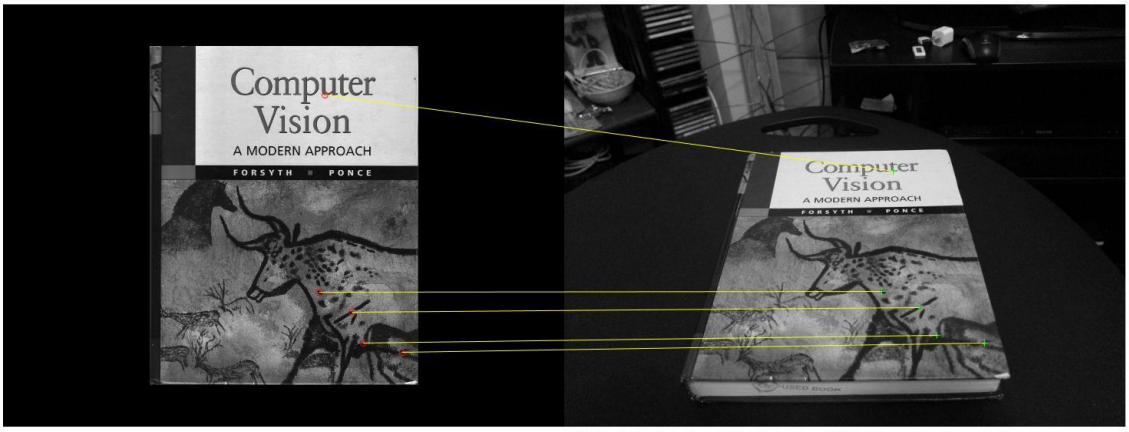
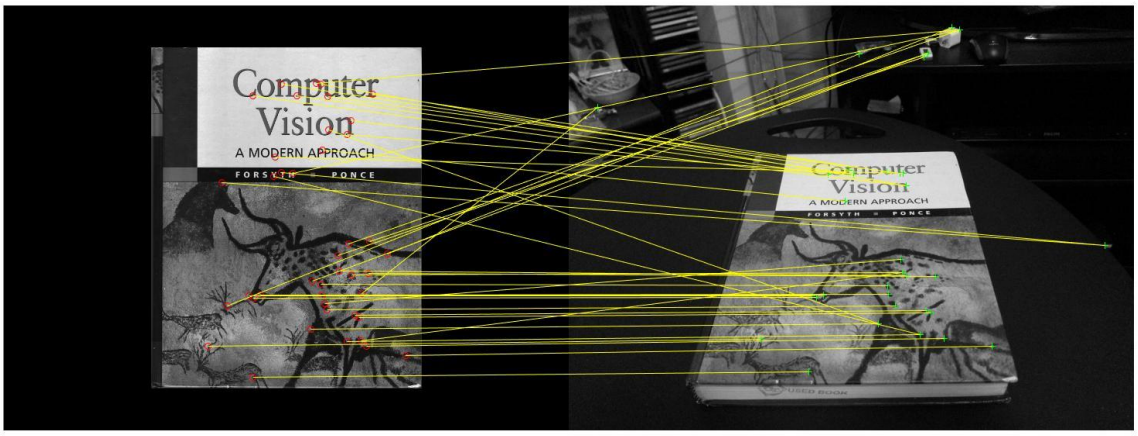
Late day: 1 late day used

Task 4.1

For this task, the initial implementation had ‘MatchThreshold’ set to 10 but didn’t specify the value for ‘MaxRatio’. The result only had 5 matching points as the image shown below.

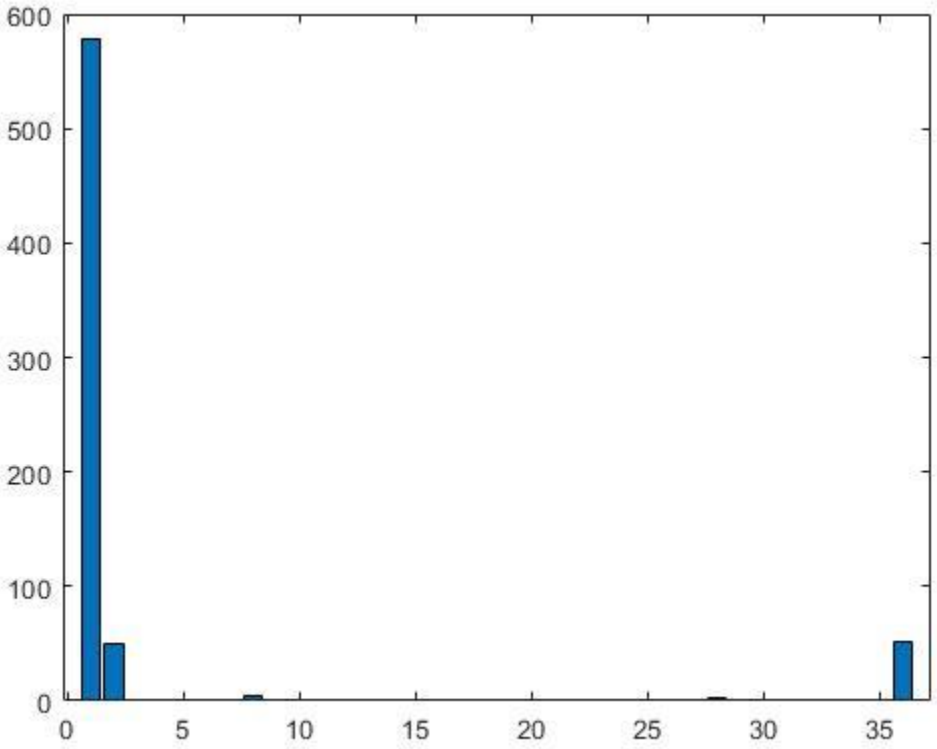


Later, ‘MaxRatio’ is specified and some points would be miss mapped to the background. The optimum value is found to be 0.78 when working with RANSAC. The image with the specified ‘MaxRatio’ is shown below.

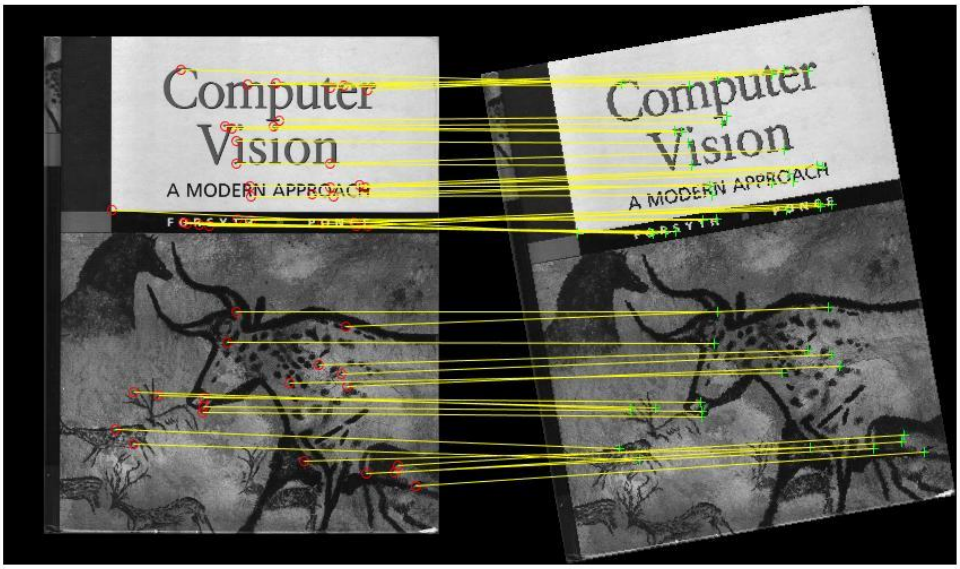


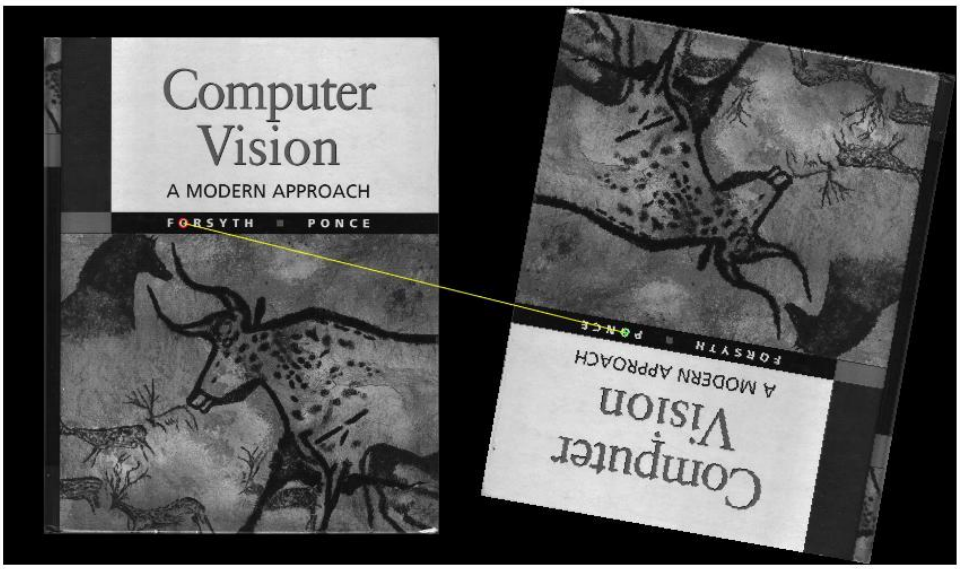
Task 4.2

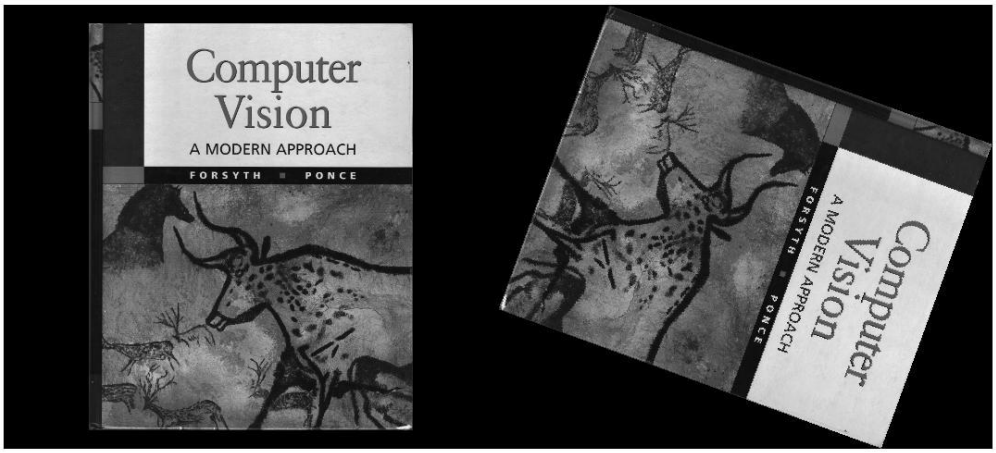
Below is the histogram generated using the BRIEF descriptor



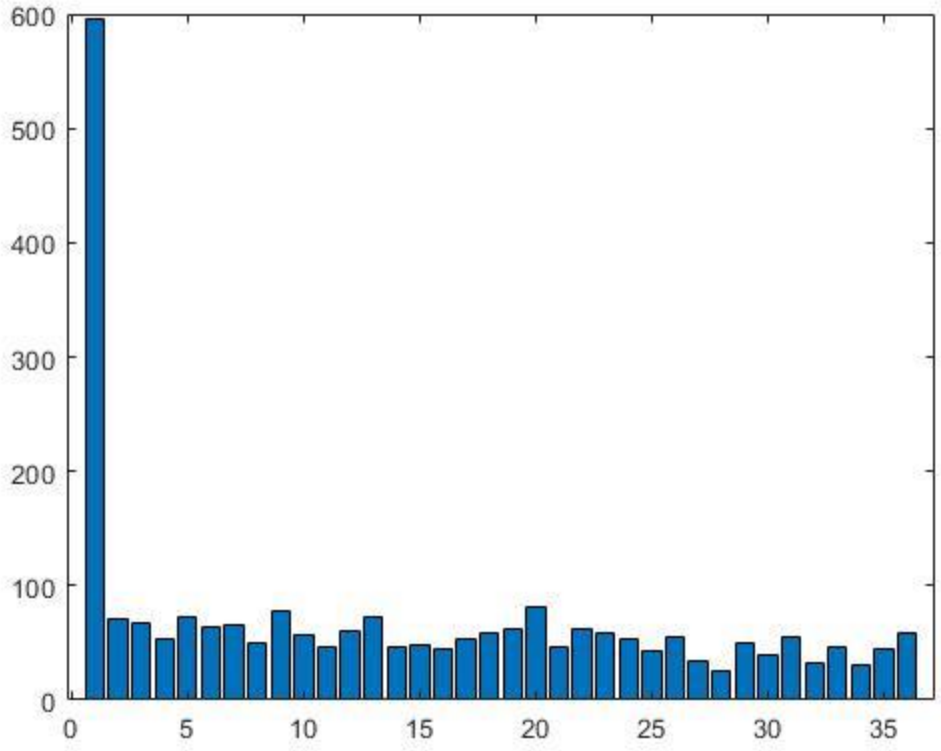
Below are the matching results at 10, 250, and 170 degree



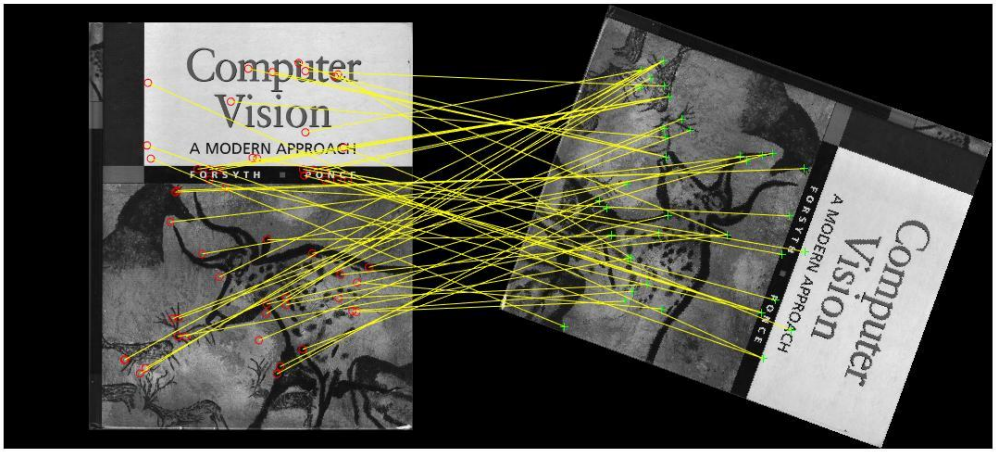


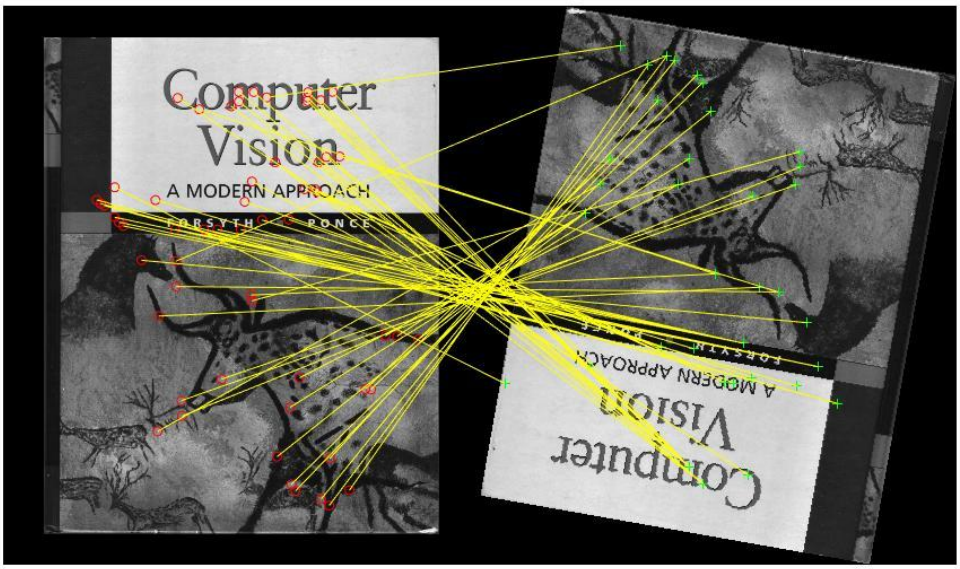


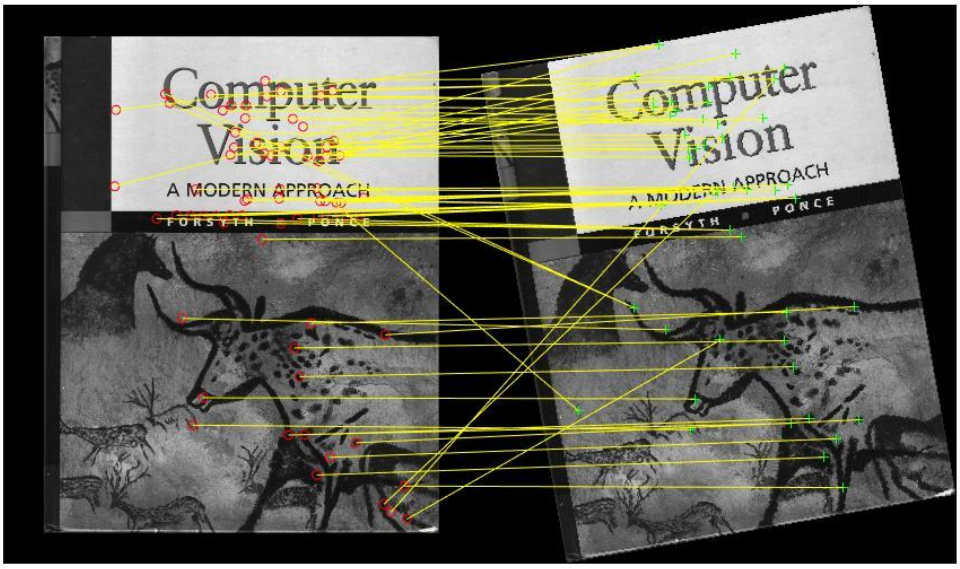
Below is the histogram generated using the SURF descriptor



Below are the matching results at 10, 250, and 170 degree



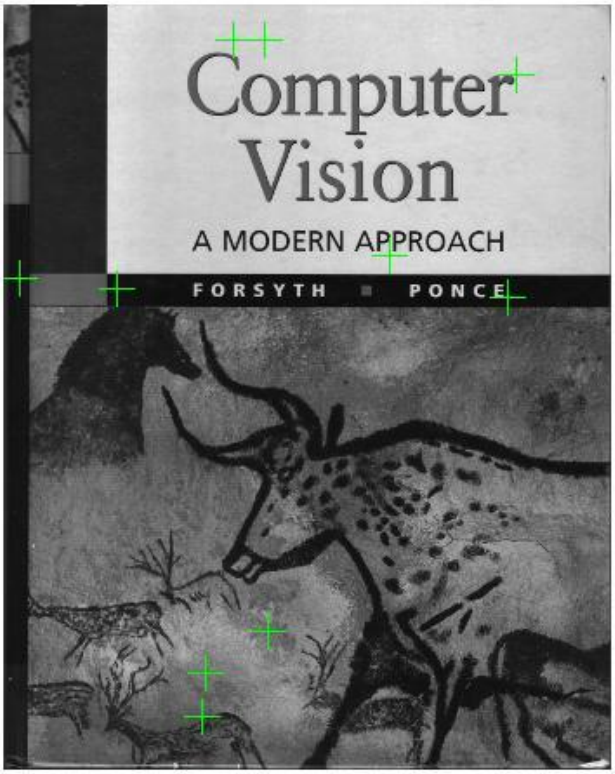


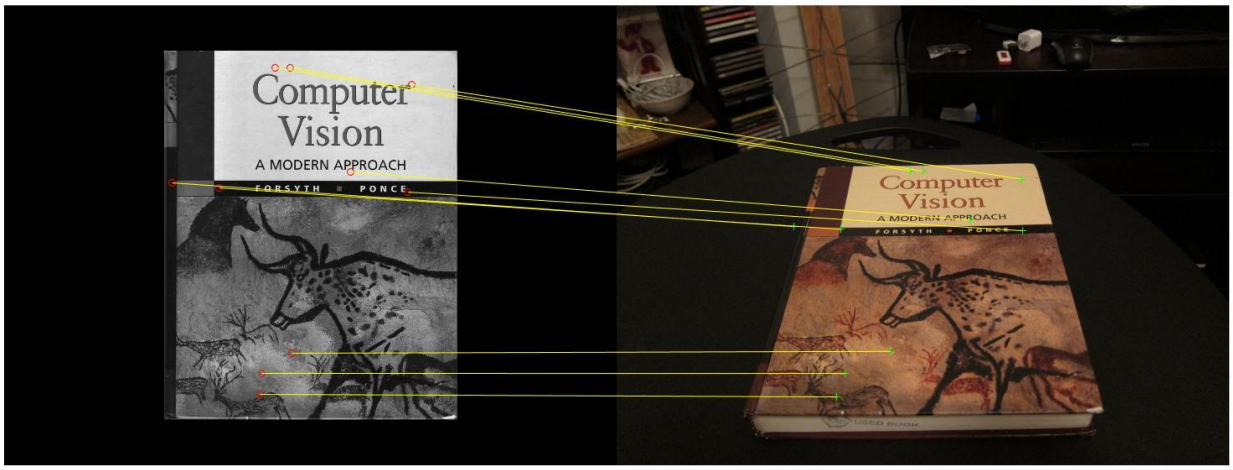


A: By comparing the result generating by these two descriptors, BRIEF has far less feature being detected when there is a rotation of any angle. One reason that BRIEF is inferior in this case is that it detects features at the pixel level, so it is very sensitive to noise. Another most likely reason would be that BRIEF was the first binary descriptor invented, so it doesn't have an orientation compensation mechanism. Since there is large in-plane rotation happening in the section, BRIEF would fail to detect features.

Task 4.3

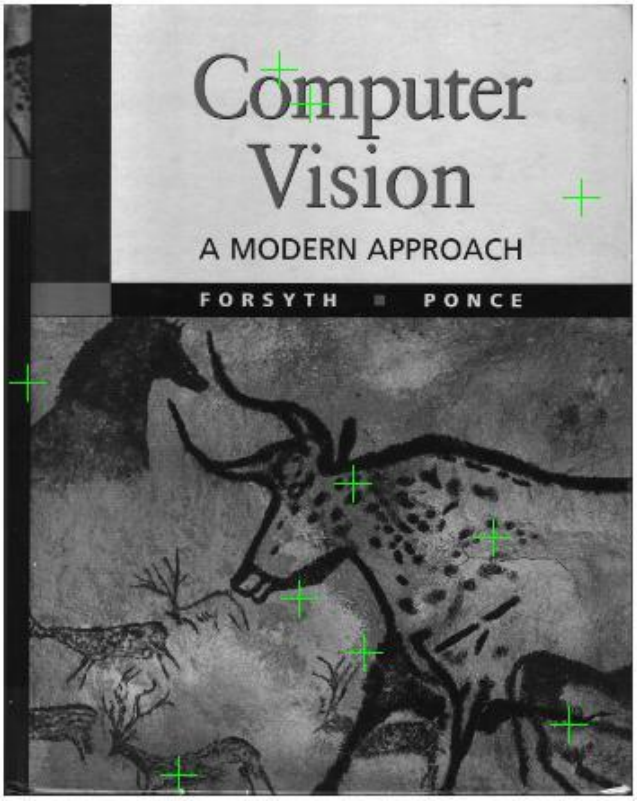
Below are the 10 randomly generated points plotted on the cover and the corresponding matching points computed using the calculated homograph.





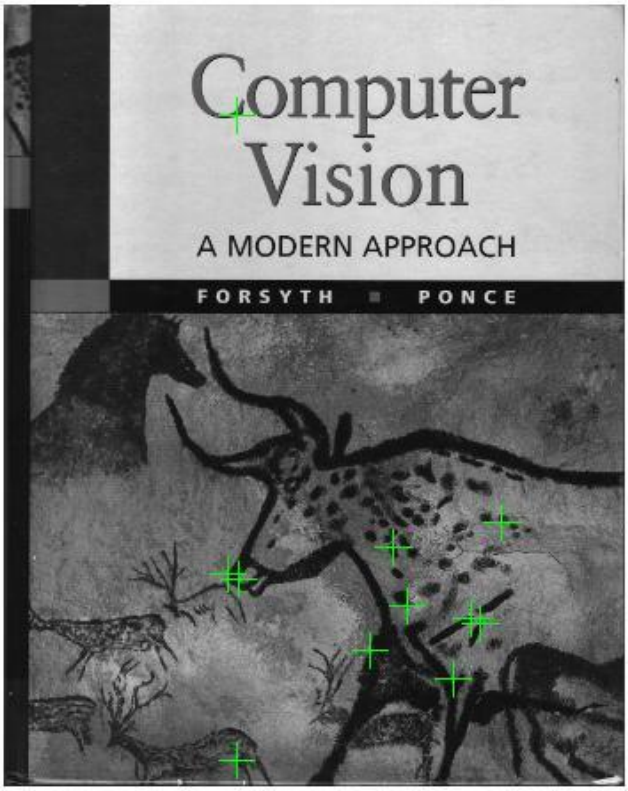
Task 4.4

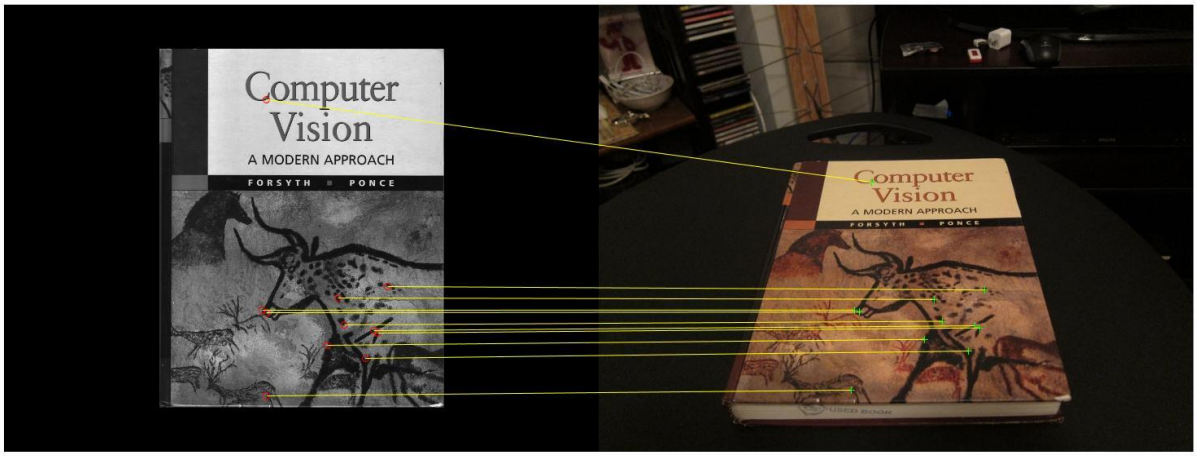
Below are the 10 randomly generated points plotted on the cover and the corresponding matching points computed using the calculated normalized homograph.



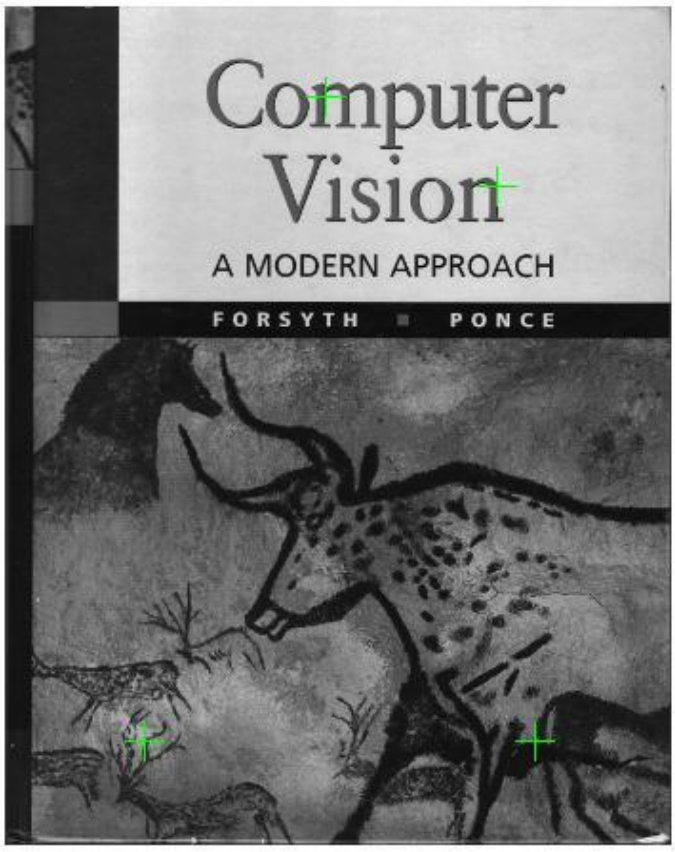
Task 4.5

Below are the inliers plotted on the cover image and their corresponding matches selected by the RANSAC algorithm.



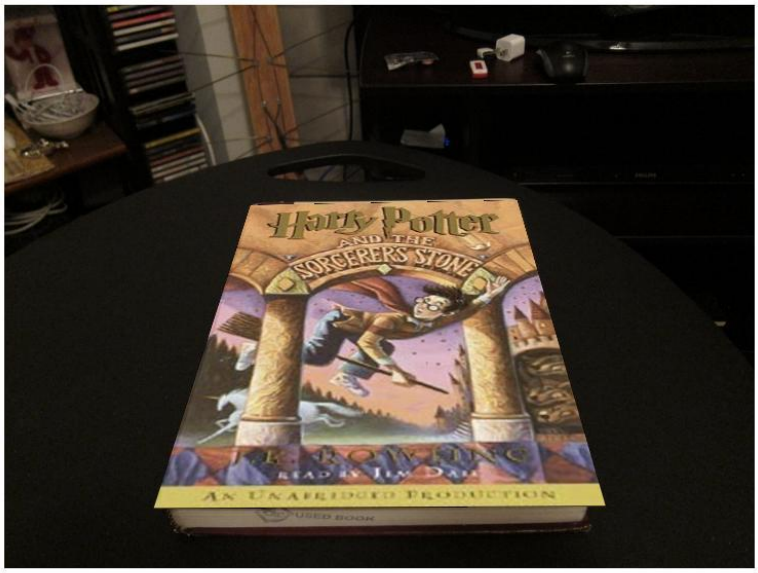


Below are the 4-point pair and their matching points

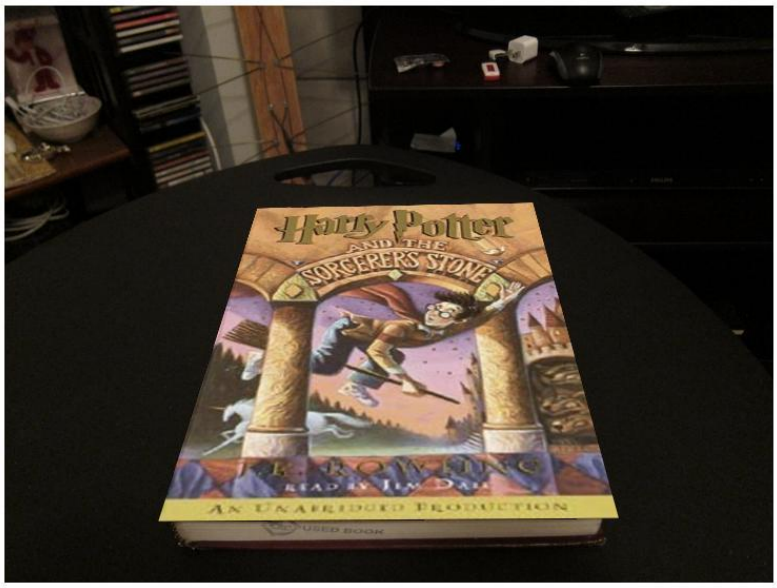


Task 4.6

Initially, I had max iteration in computeH_ransac set to 10000. However, there is about 1 out of 5 chances that the prediction would have some blurry lines on the top like the one in the image showed below.



After changing the iteration to 50000, the situation happens a lot less and the result would like the image below.



Task 5.1

See the video

Reference

[1] Gillevicv, Gillevicv, 1, C., 20, U., 15, C., 15, G., . . . 6, G. (2016, April 05). A tutorial on binary descriptors – part 2 – The BRIEF descriptor. Retrieved November 25, 2020, from https://gilscvblog.com/2013/09/19/a-tutorial-on-binary-descriptors-part-2-the-brief-descriptor/

[2] Tyagi, D. (2020, April 07). Introduction to BRIEF(Binary Robust Independent Elementary Features). Retrieved November 25, 2020, from https://medium.com/data-breach/introduction-to-brief-binary-robust-independent-elementary-features-436f4a31a0e6