Assignment 4

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Late day: 0

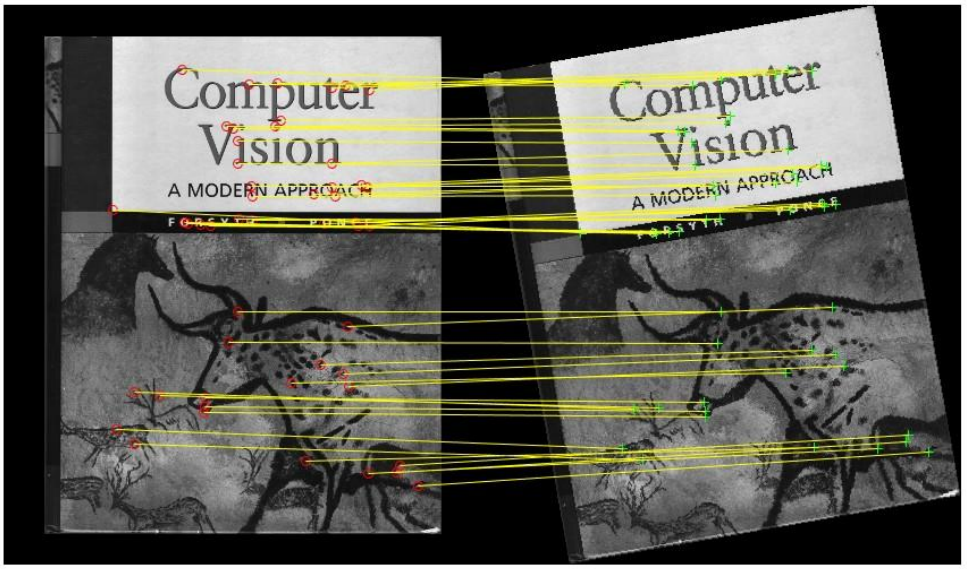
Part 1:

4.1

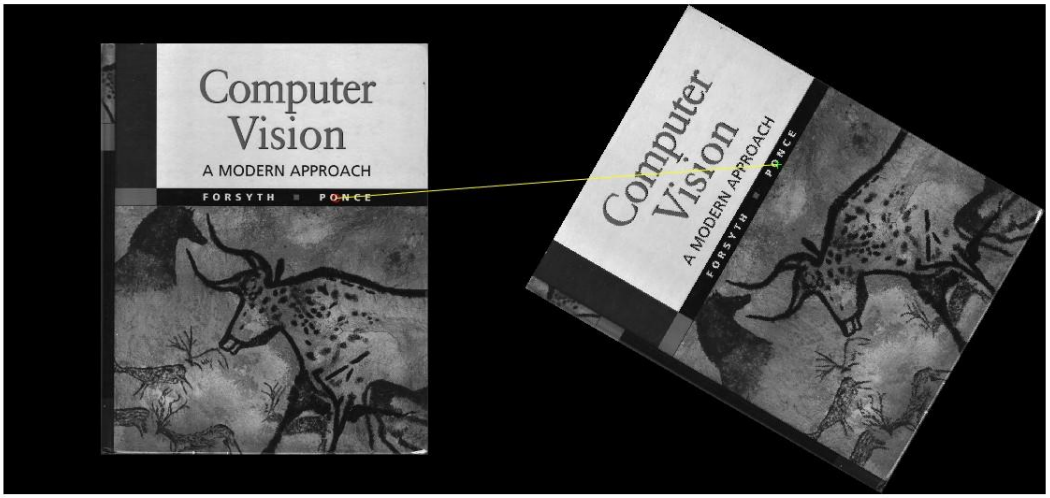
When writing the matchPics method, the only problem is what maxRatio I set for improving my model. When maxRatio is too low, even though the matched points are high in accuracy, the number of detected pairs will be too low to compute homography. This will lead to failure in generating ar.avi . After all the adjustment, I found the best maxRatio is 0.75. (The detailed process of adjustment will be with images shown in later parts.)

4.2

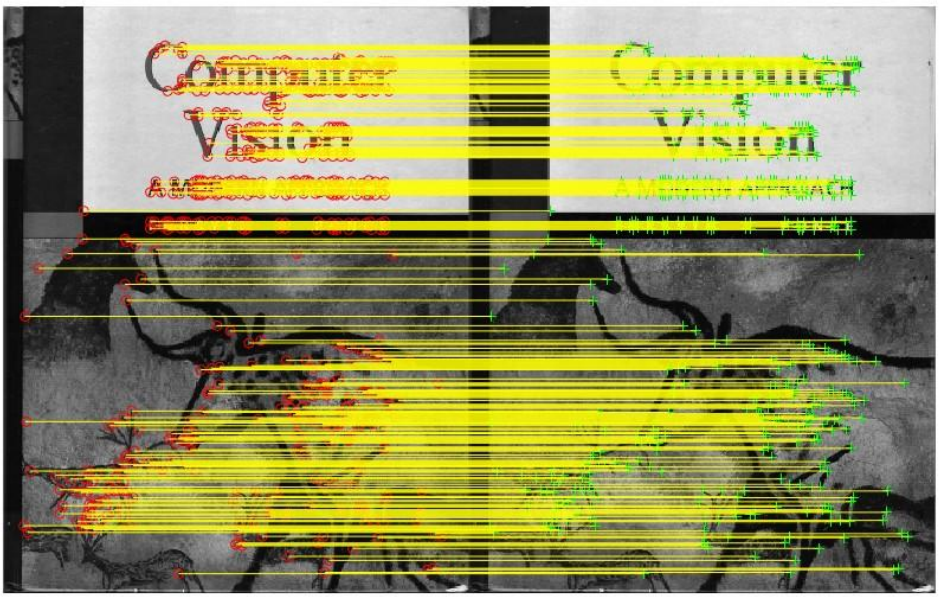
The followings are the image pairs from degree = 10, degree = 60 and degree = 360



(10 degree)

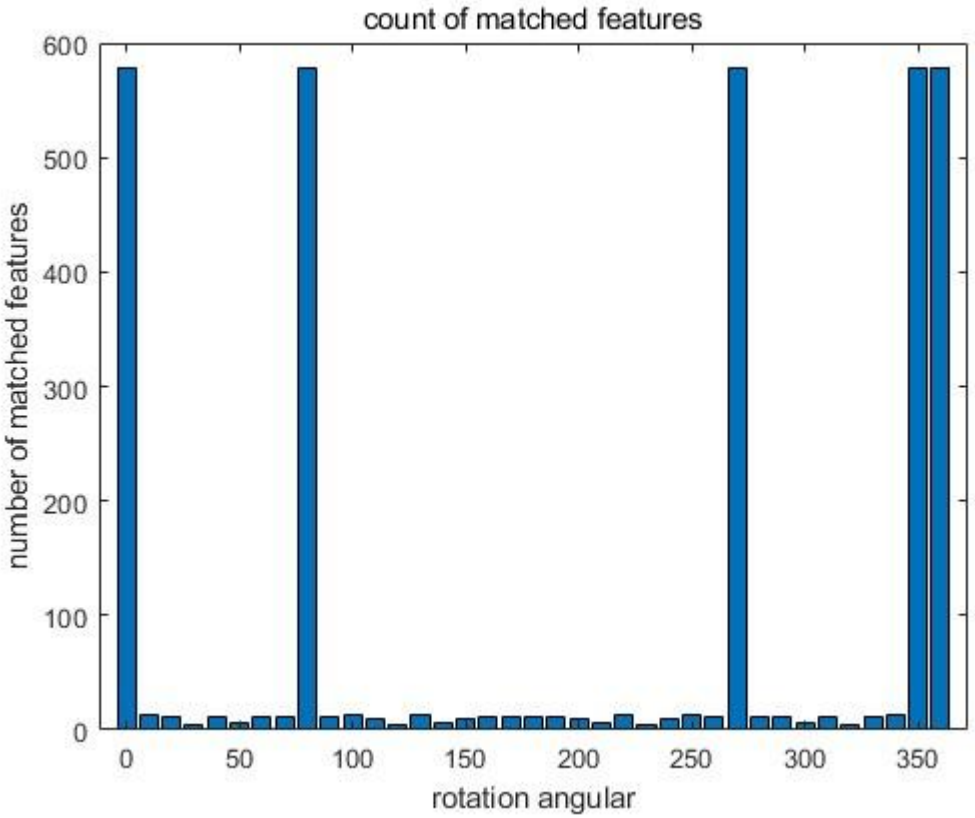


(60 degree)



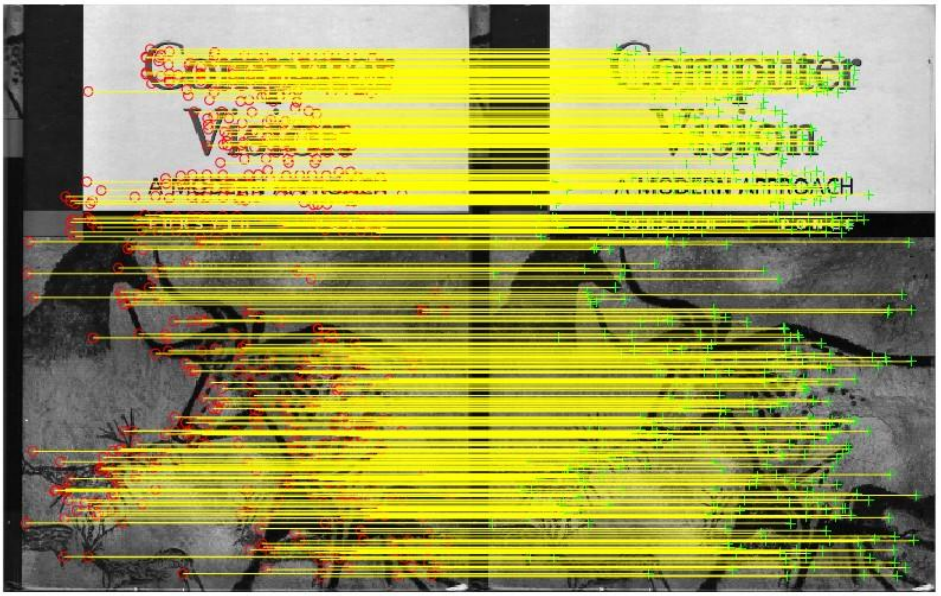
(360 degree)

From three figures, we can tell that BRIEF detection performs bad on image rotation. For detailed matched_points count, it is shown below:

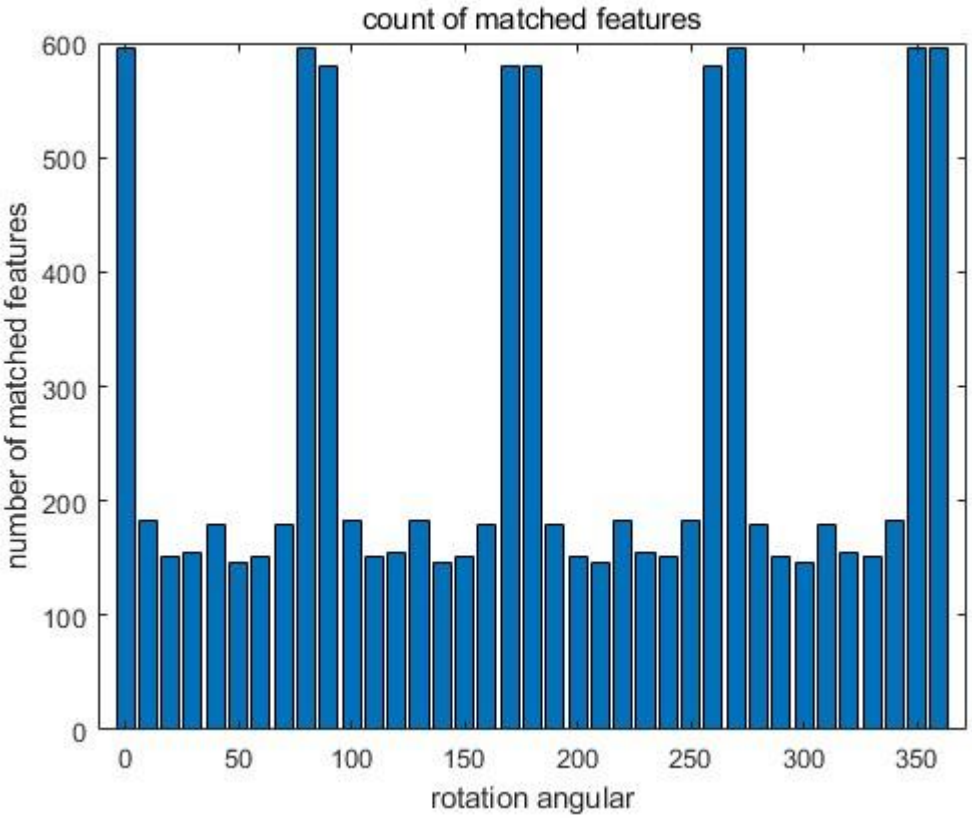


From the histogram above, we can tell that when the rotating degree is 0, 90, 270, 360, BRIEF detection performs well. For other conditions, the number of detected points pairs are small.

After replace computeBrief with SURF and extractFeature, I got three matched images under same rotation degree



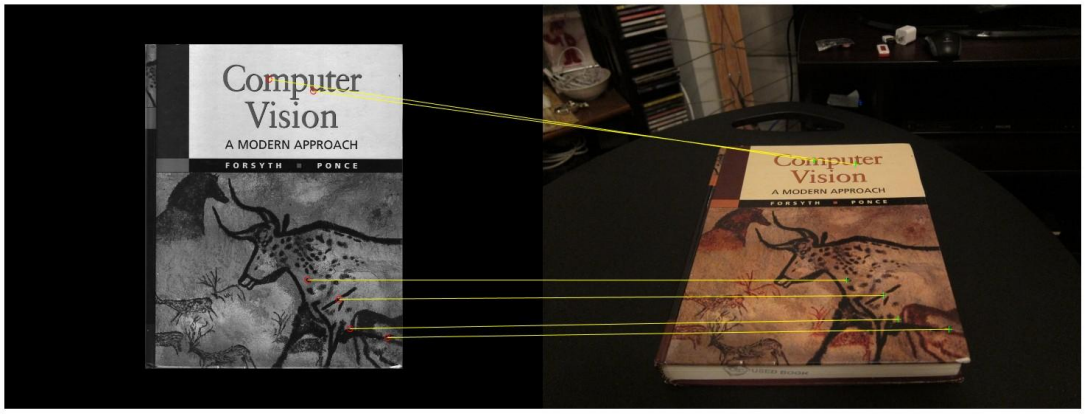
Above are output from SURF and extratFeatures. We can see that even if detected points for 60 degrees are less than other two degrees, the number of them is still much larger than FAST and BRIEF. Therefore, in overall view, SURF and extractFeature performs better than FAST and BRIEF.
Below is the histogram of SURF detection



4.3 ~ 4.4

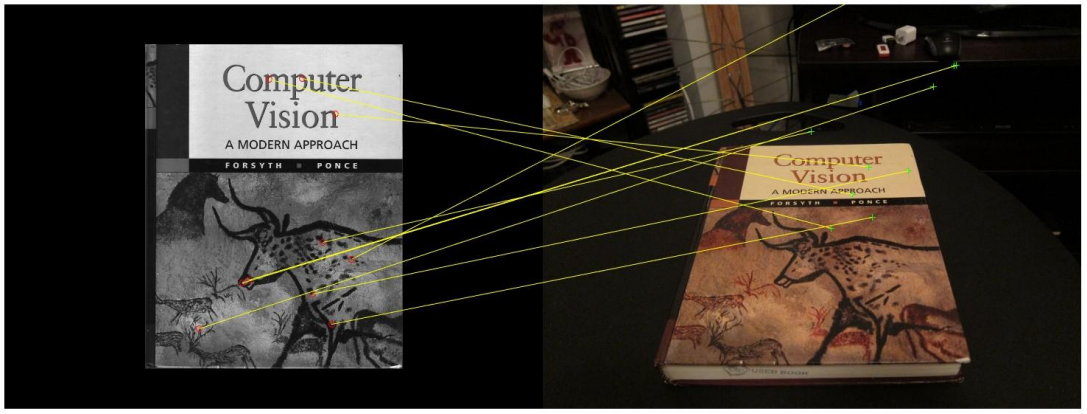
When testing the computeH method, I found different maxRatio influences its output a lot (maxRatio in matchPic method).

Below is the output when maxRatio is 0.65



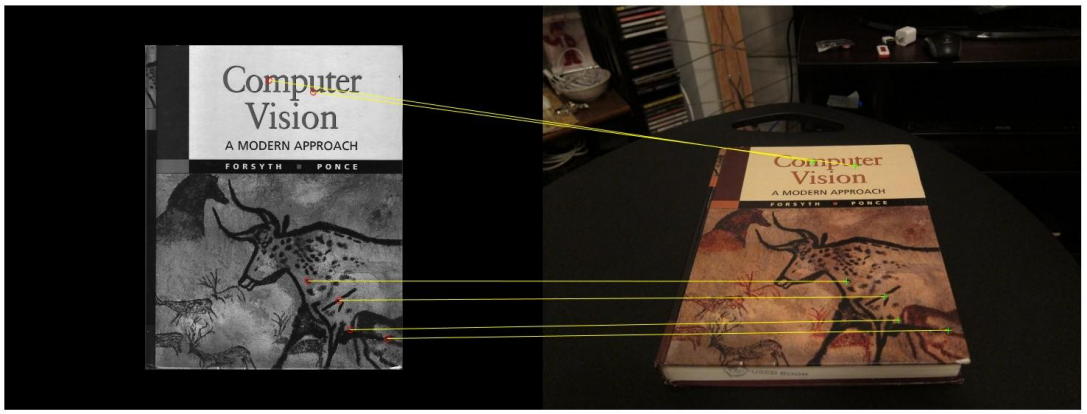
It can be seen that the detected points number is only 6, which is less than 10. But the accuracy of point-pairs are high.

Below is the output when maxRatio is 0.75 (my final maxRatio decision).

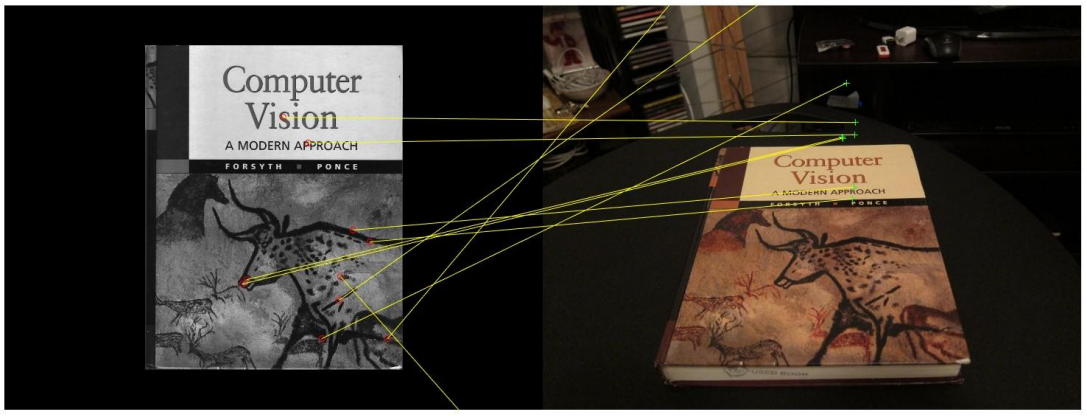


The number of matched points is large and it is accessible that we pick 10 points out. But the accuracy is much lower than the output with maxRatio = 0.65.

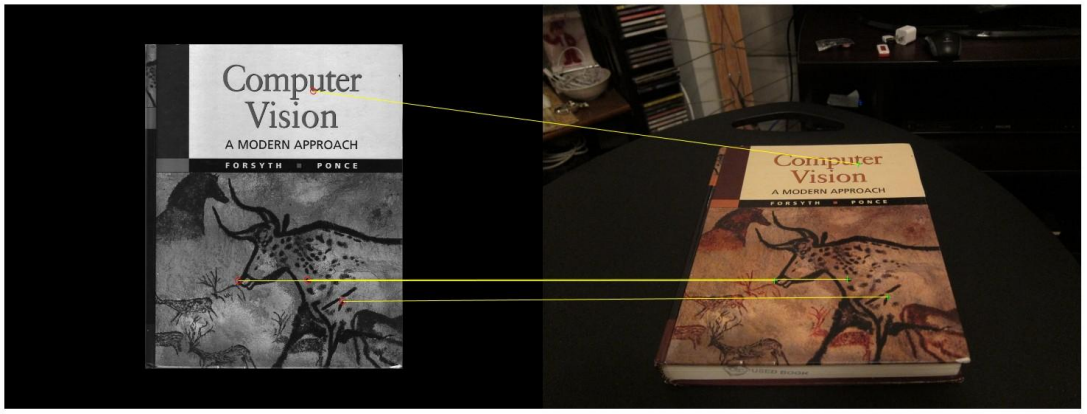
Same as computeH_norm. The outputs are shown below
(maxRatio = 0.65)



(maxRatio = 0.75)



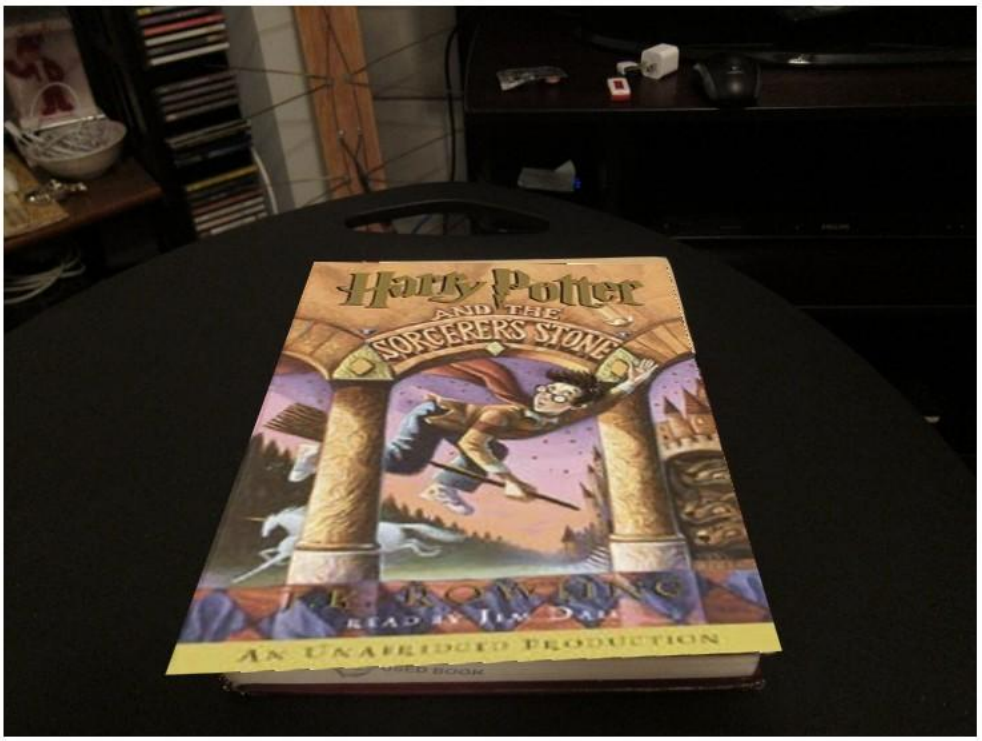
4.5
Below is the output of 4 points-pair that form the bestH.



Below is the output of inlier-pairs

After tons of attempts, I found one interesting thing. Sometimes even though my points-pair are different, the inlier matched points are still the same. That is because bestH2to1 should be quite unique, which means its inliers should always stay the same.
(note: the output images above are under maxRatio 0.75)

4.6
Below is the output of HarryPotterize_auto.



For the computeH_ransac, I set the threshold as 0.5 and iteration as 10000. In fact, 500 iterations is enough for the ransac loop. But it will perform badly on generating videos in the next part. Therefore, I finally decided to set it to 10000.

5.
The video “ar.avi” is in “301416863/project4_package/results/”. It should be submitted in Lab4_file.