# CMPT 412-COMPUTER VISION

# PROJECT-4 REPORT (NAVJOT KAUR: 301404765)

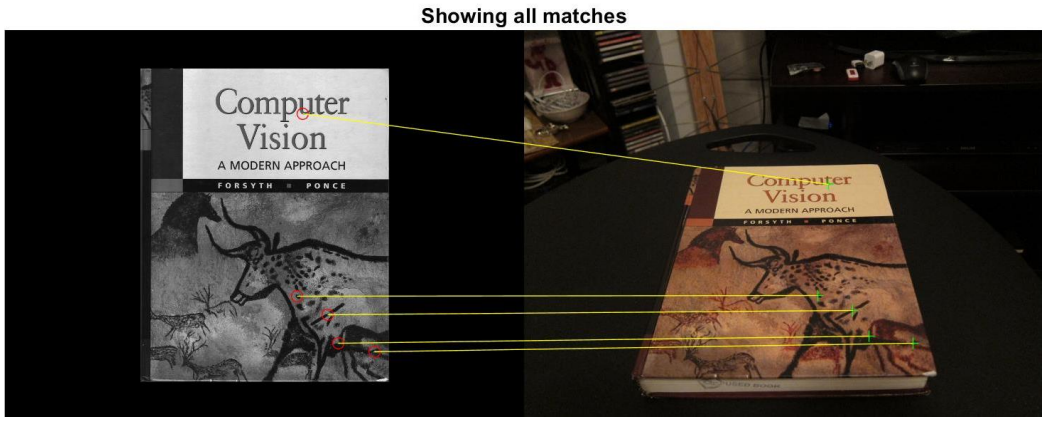
## I am claiming my ONE late day for this assignment

## TASKS: COMPUTING PLANAR HOMOGRAPHIES

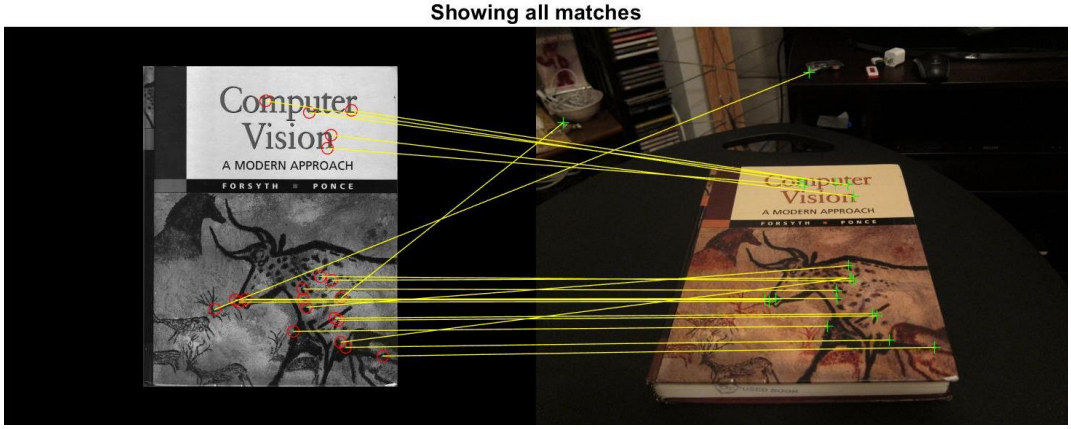
## 4.1 FEATURE DETECTION, DESCRIPTION AND MATCHING

In this part of the assignment MATLAB builtin functions are used to match two images in matchPics.m.

Firstly, as stated in the Hand-out, I let MatchThreshold to be 10 with no specific MaxRatio and got the image(below) where not so many points (only 5) are detected.




After that I started increasing the MaxRatio. I stopped when MaxRatio was specified as 0.71 where I got a better view of matching points on the book, however there were few points missing the book and hitting the background. The resulting and final image is shown below.



## 4.2 BRIEF AND ROTATIONS

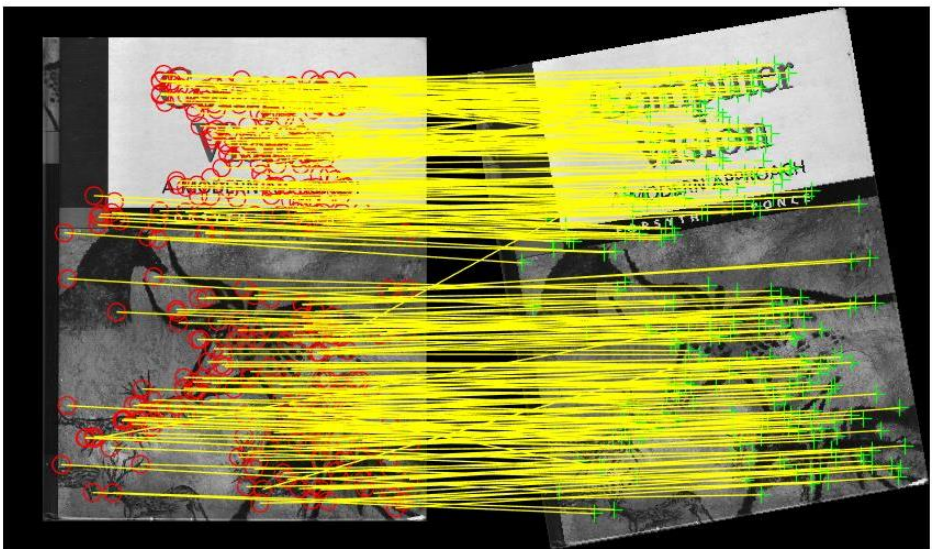
In breifRotTest.m, the cv_cover.jpg image is being matched to itself rotated in the increments of 10 degrees.

The three Visualizations when using (detectFASTFeatures and brief) and using (detectSURFFetaures and extractFeatures) are shown below at 10 degrees, 160 degree and 290 degrees.

10 degrees:

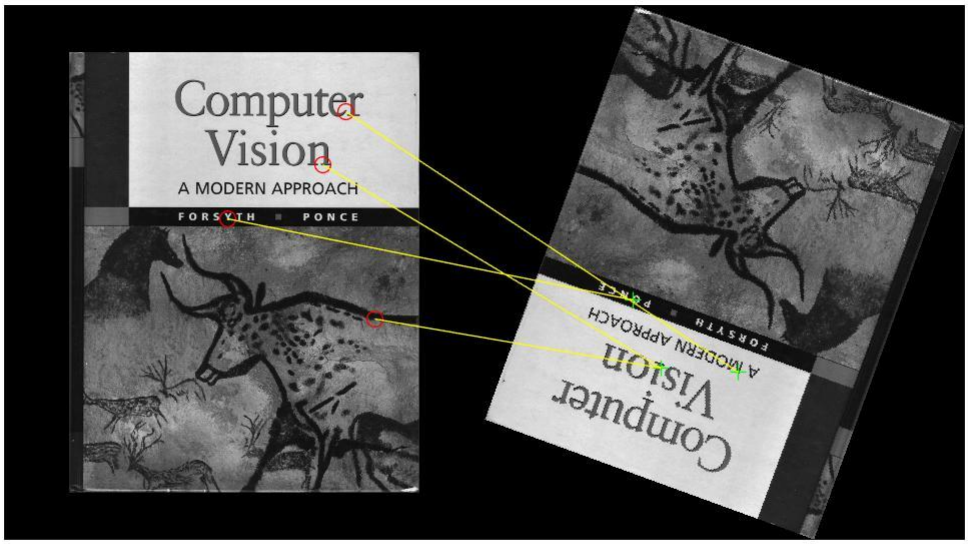
Using FASTFeatures and brief:


Using SURFFeatures and extractFeatures:

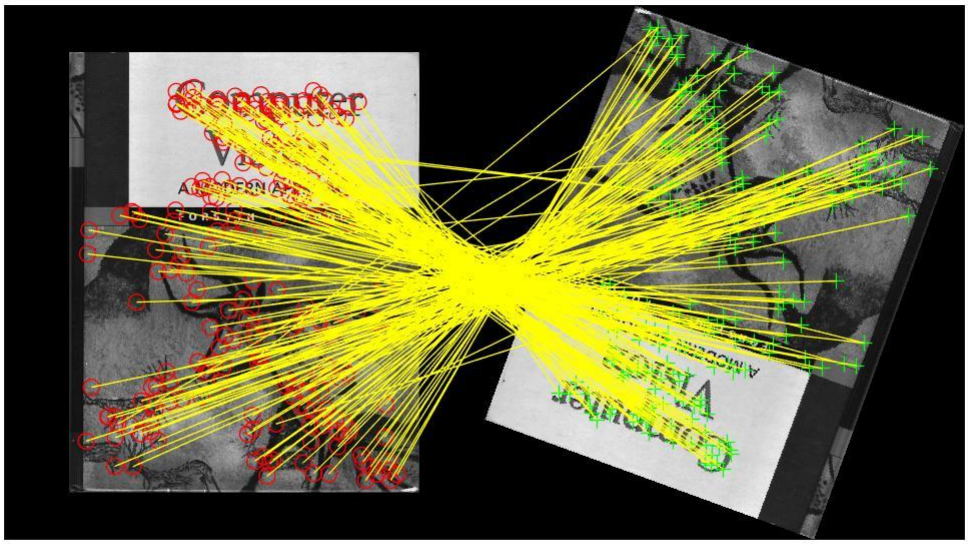


160 degrees:

Using FASTFeatures and brief:

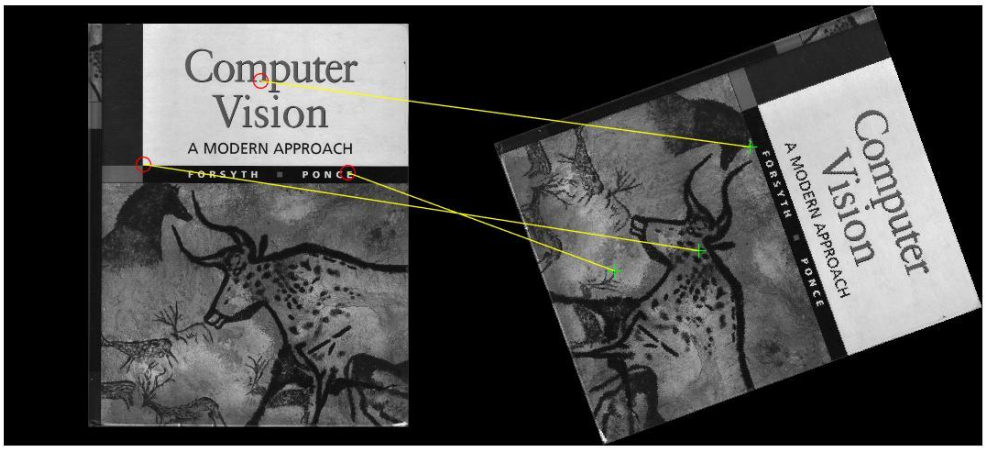



Using SURFFeatures and extractFeatures:

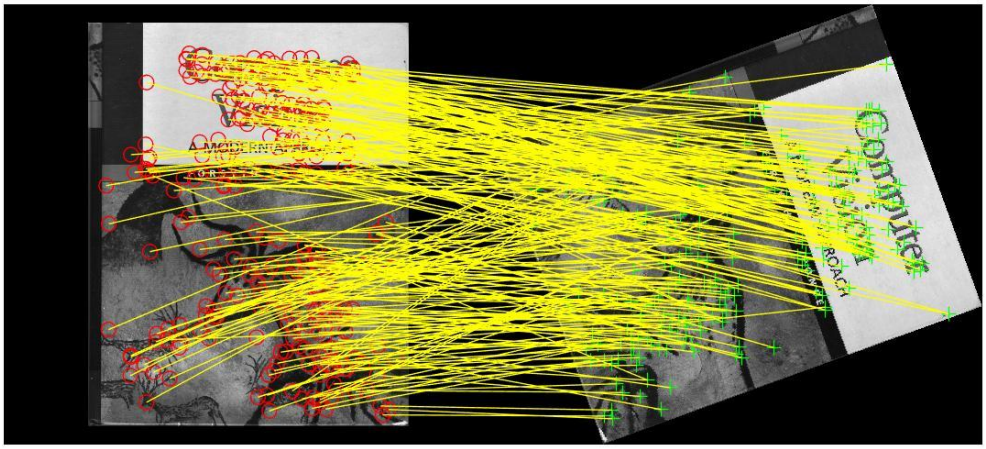


290 degrees:

Using FASTFeatures and brief:

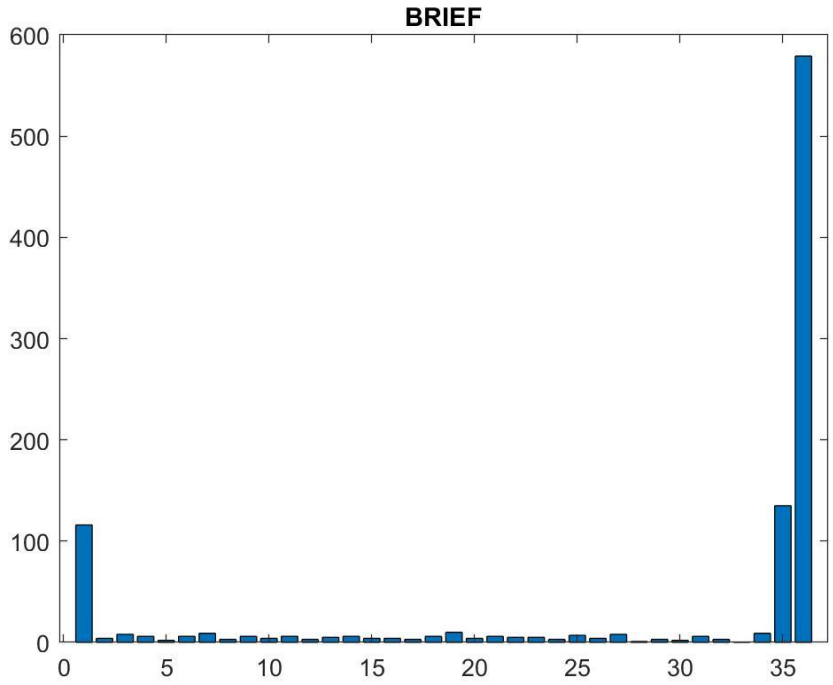



Using SURFFeatures and extractFeatures:

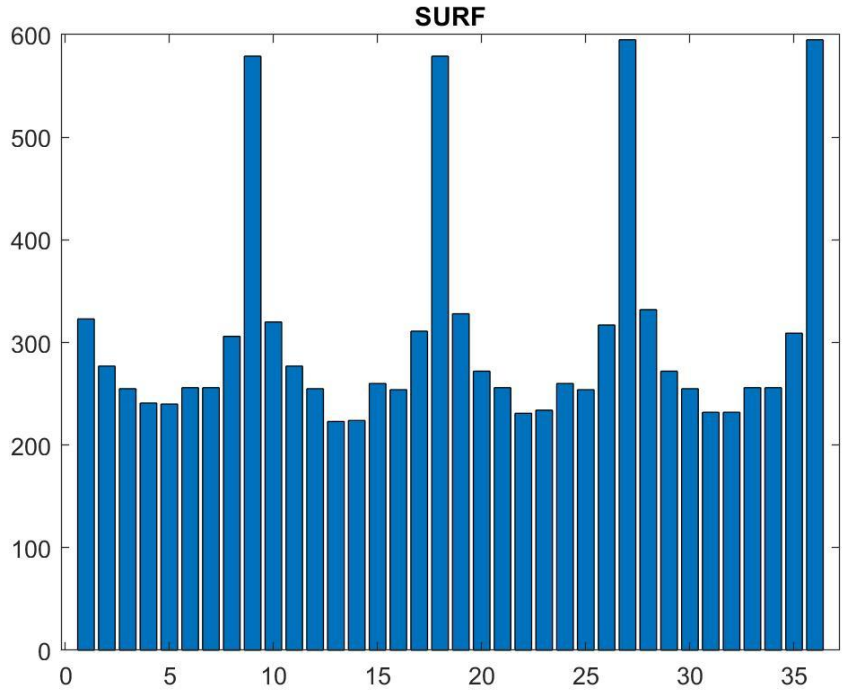


HISTOGRAM

Using FASTFeatures and brief:




Using SURFFeatures and extractFeatures:



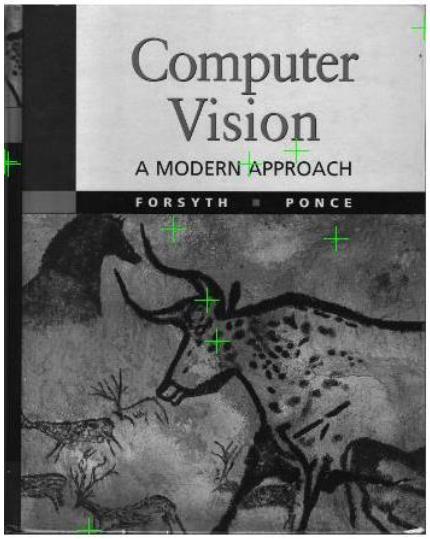
As seen from above different visualizations of using FASTFeatures with brief, using SURFFeatures with extractFeatures, and the histograms for both detection methods, BRIEF doesnot perform well with rotations because it is rotational invariant. It behaves quite nice for lower degrees but when we rotate more the accuracy reduces, whereas with SURF and extractFeatures we get really good results.

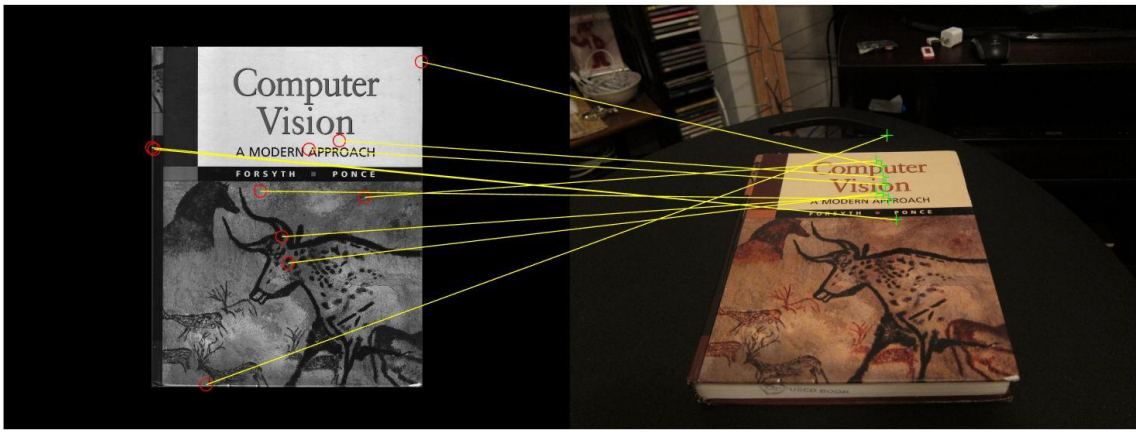
Histogram is being plotted by incrementing the degrees by 10 degrees for each iteration. As seen from histogram it is seen that SURF has better performance than BRIEF with highest performance at multiples of 90 degrees.

## 4.3 HOMOGRAPHY COMPUTATION

In computeH.m, the homography matrix is being computed with the help of previously computed matchPics.m points.

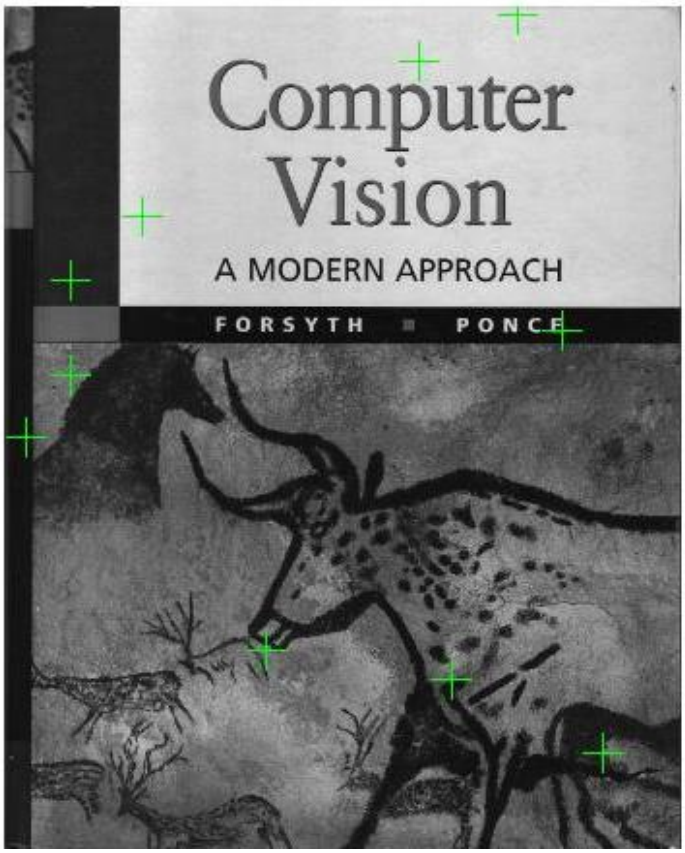
The 10 random points on the image are as follows:

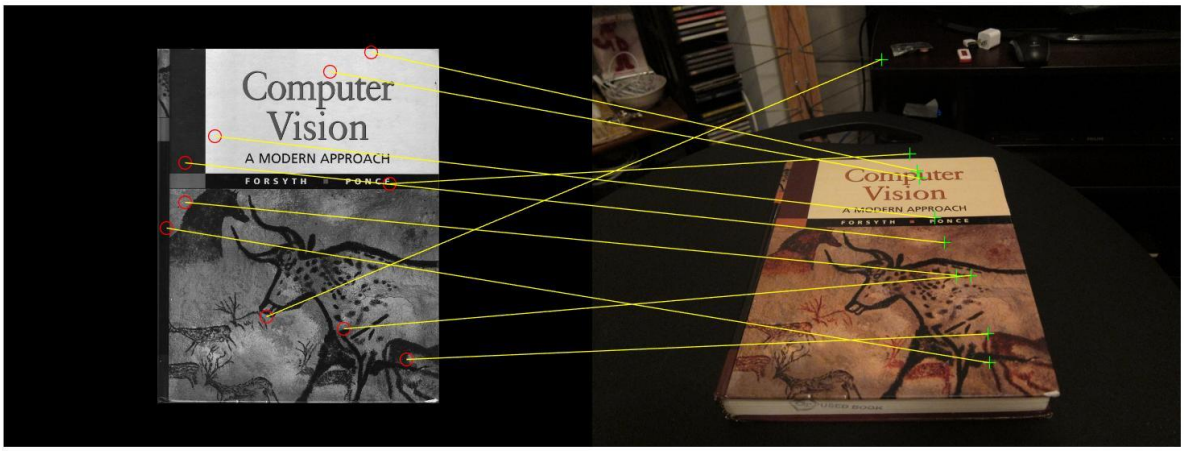


## 4.4 HOMOGRAPHY NORMALIZATION

In computeH_norm.m, the normalized homograph has been computed and 10 points on the images are as follows:



## 4.5 RANSAC

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%reference from https://www.youtube.com/watch?v=EkYXjmiolBg
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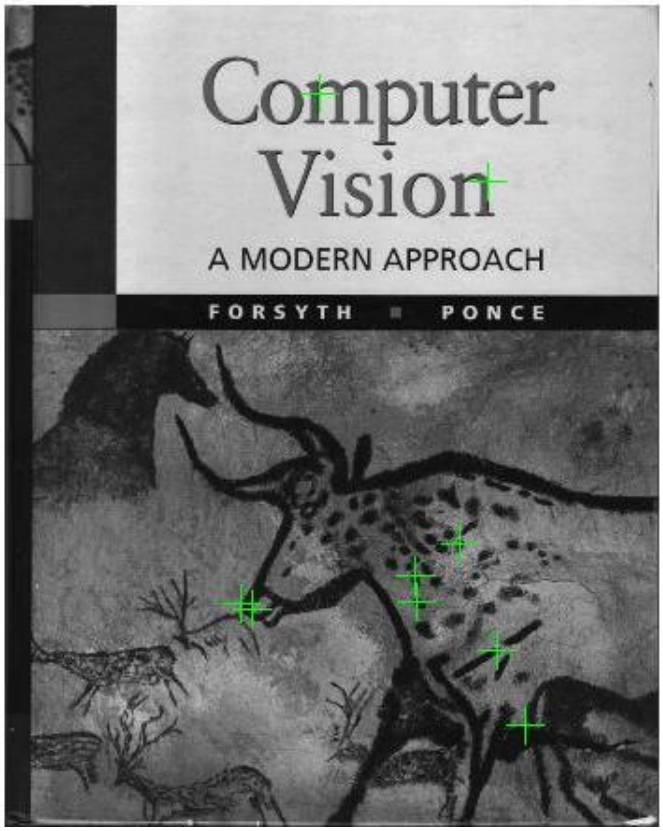
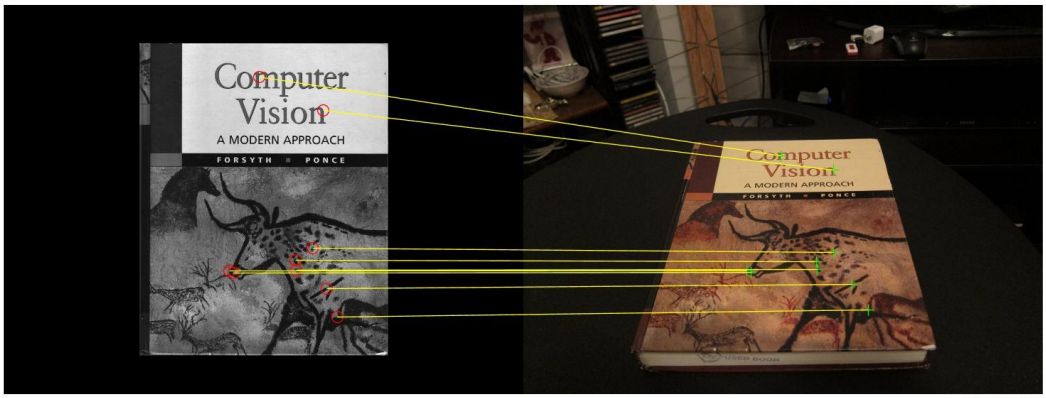
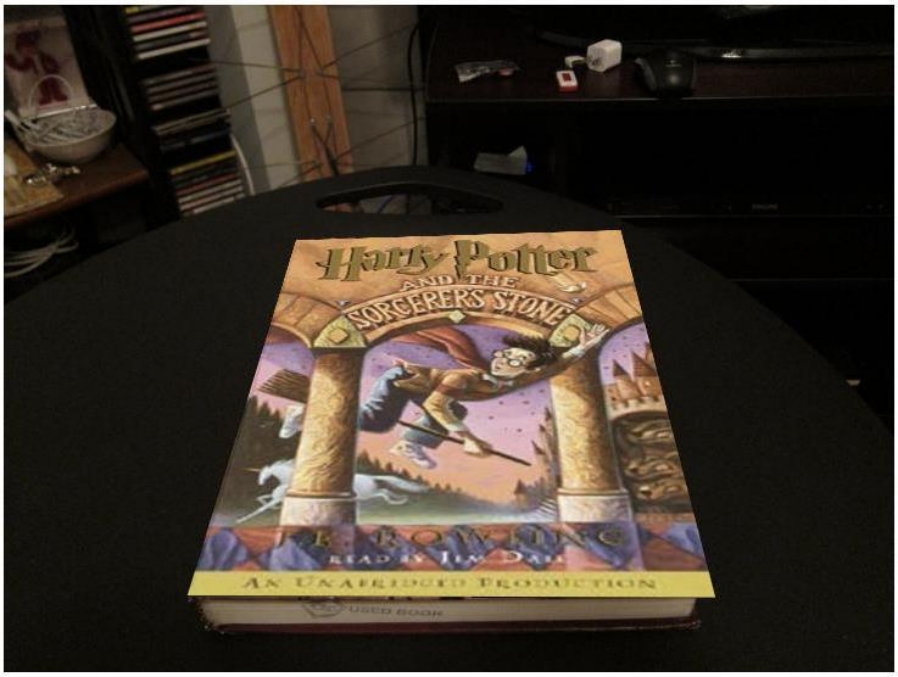
I took reference from the above source and the noisy data has been filtered by RANSAC algorithm in computeH_ransac.m. Below are the pairs shown on the image:



## 4.6 HARRYPOTTERIZING A BOOK

By using 5000 iterations, the resulting image is shown below. When less iterations were used, the image was blurry and did not quite fit the book cover so 5000 iterations seems a reasonable iteration count.




## 5. CREATING YOUR AUGMENTED REALITY APPLICATION

The ar.avi video is placed in the results folder that is being submitted. Below are two frame images about how the video frames actually look like.