Computer Vision

Assignment-4 and 5 Report

By Kaustav Vats

Question-1:

Senior Researcher

- **Andrew Ziserman** - He has made contribution in Multi view geometry in computer vision
- **Jitendra Malik -** He has made contributions in Artificial intelligence book and Normalized cuts and image segmentation also in solving the perceptual grouping problem in vision.
- **Takeo Kanade** - Author of Lucas Kanade method for tracking, action recognition, compression etc.
- **David Lowe -** He has made a vital contribution in introducing SIFT features, object recognition using SIFT features
- **Paul Viola -** One of the author of Voila Jones face detection algorithm which uses ensemble learning methods of multiple adaboost classifiers.
- **Richard Szeliski -** Author of dense two frame stereo correspondence, worked on stereos.
- **Richard Hartly -** Worked on multi view geometry and co author of dense two frame stereo
- **Anil K Jain -** Given huge contribution in biometrics with very high h index.
- **alex krizhevsky** - Computation approach to edge detection and complexity of robot motion planning. Finding edges and lines
- **David Forsynth** - worked in describing object by their attributes and modern computer vision approaches.

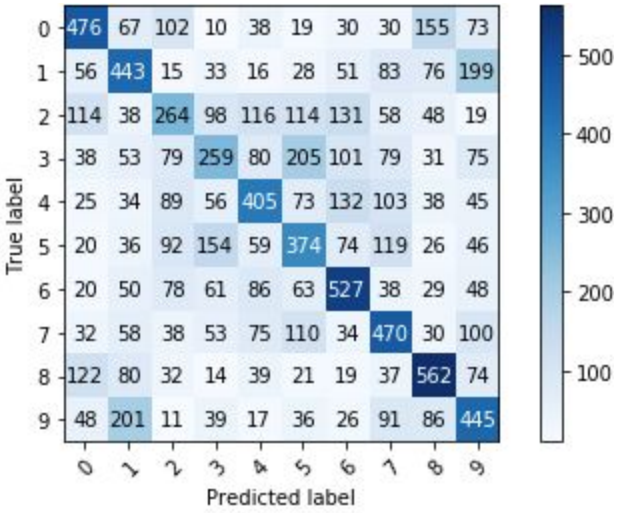
Young Researchers

- **Ross Girshik -** one of the author of faster RCNN and also the author of Fast RCNN.
- **Kaming He -** Author of highly popular paper called “deep residual learning for image recognition”
- **David Eigen -** Work in integrated recognition, localization and detection using ConvNet
- **Yann Le Cun -** Created MNIST DIGIT dataset, mostly work recognitions.
- **Luc Van Gool -** Inventor of SURF, Mostly worked in improving detectors.
- **Ramesh Jain -** Vital contribution towards image segmentation and image retrival.
- **Vinod Nair -** Worked related to object recognition improved recognition techniques.
- **Demetri** - Author of contours for object detection and segmentation.
- **Nitish Srivastava -** Worked related to dropout to prevent overfitting.
- **alex krizhevsky -** Imagenet classification with deep learning convolution network, also worked related to dropouts.

Question-2:

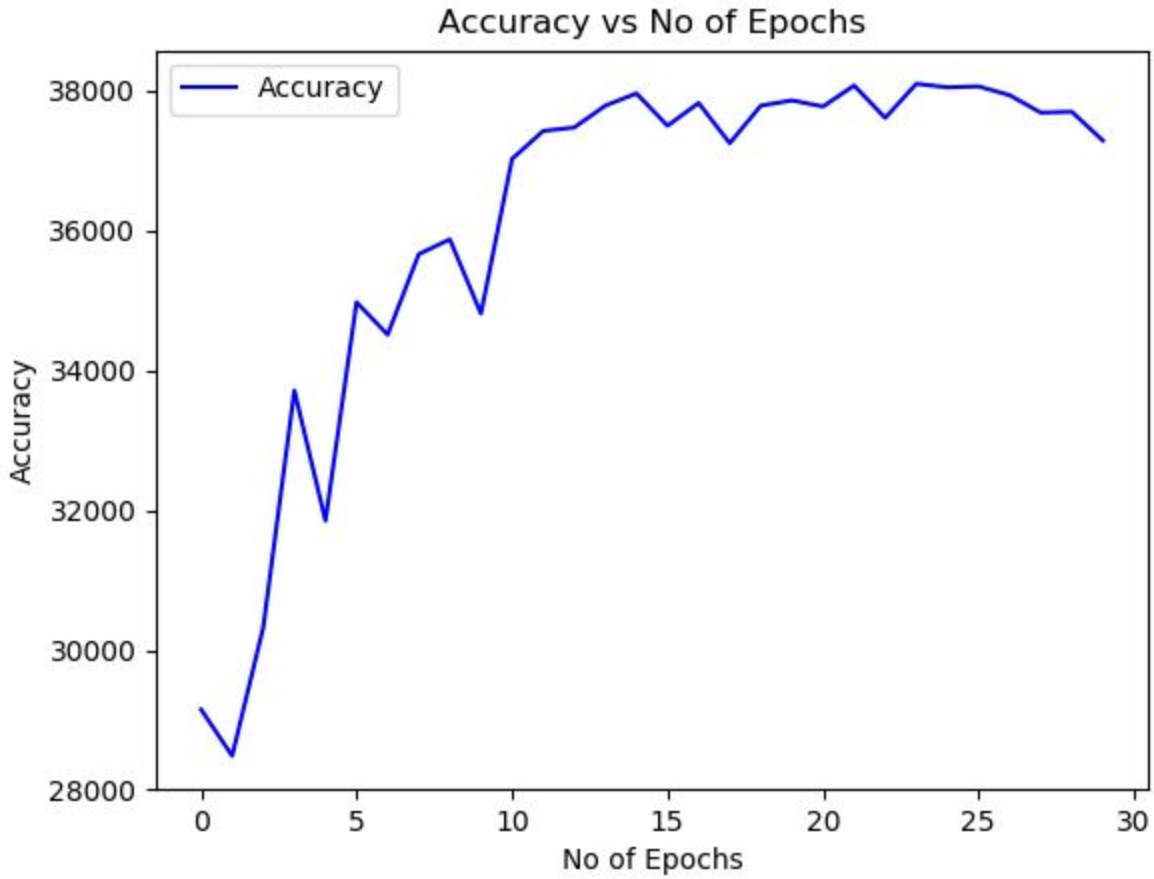
Alexnet

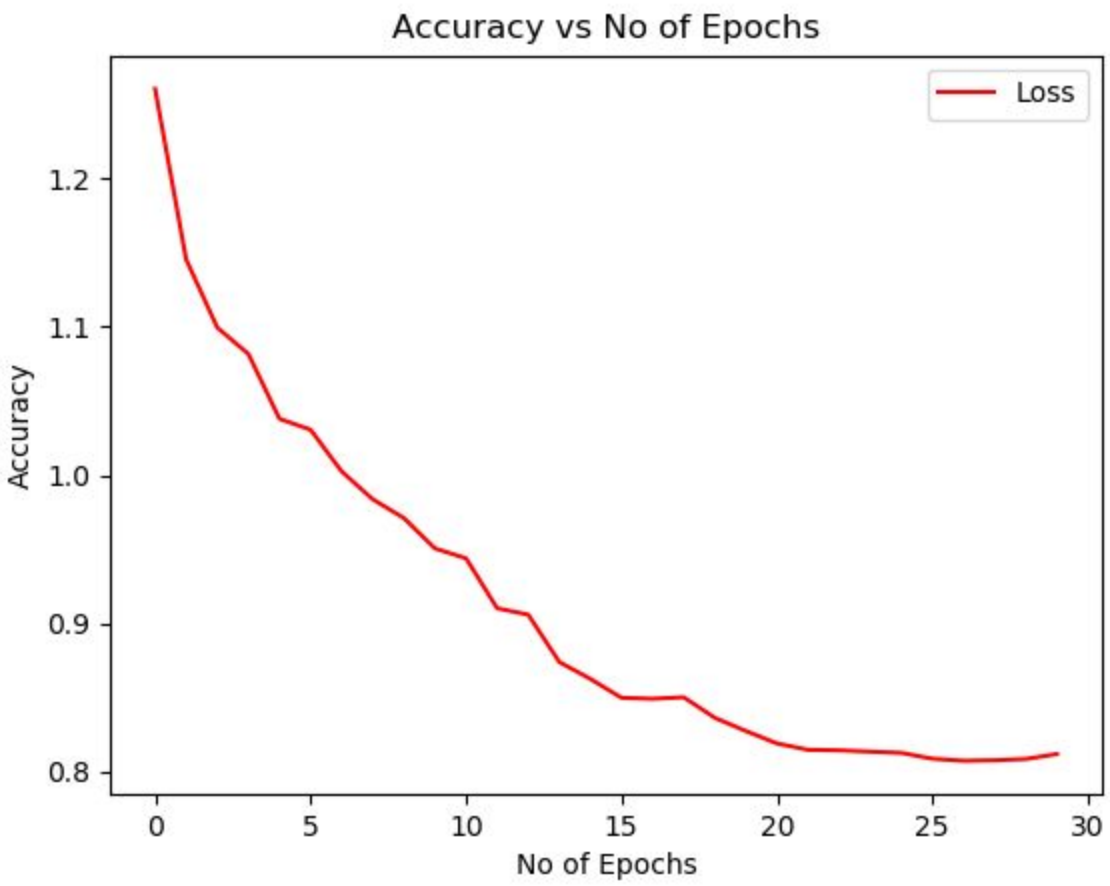
Testing Accuracy	**40.86%**



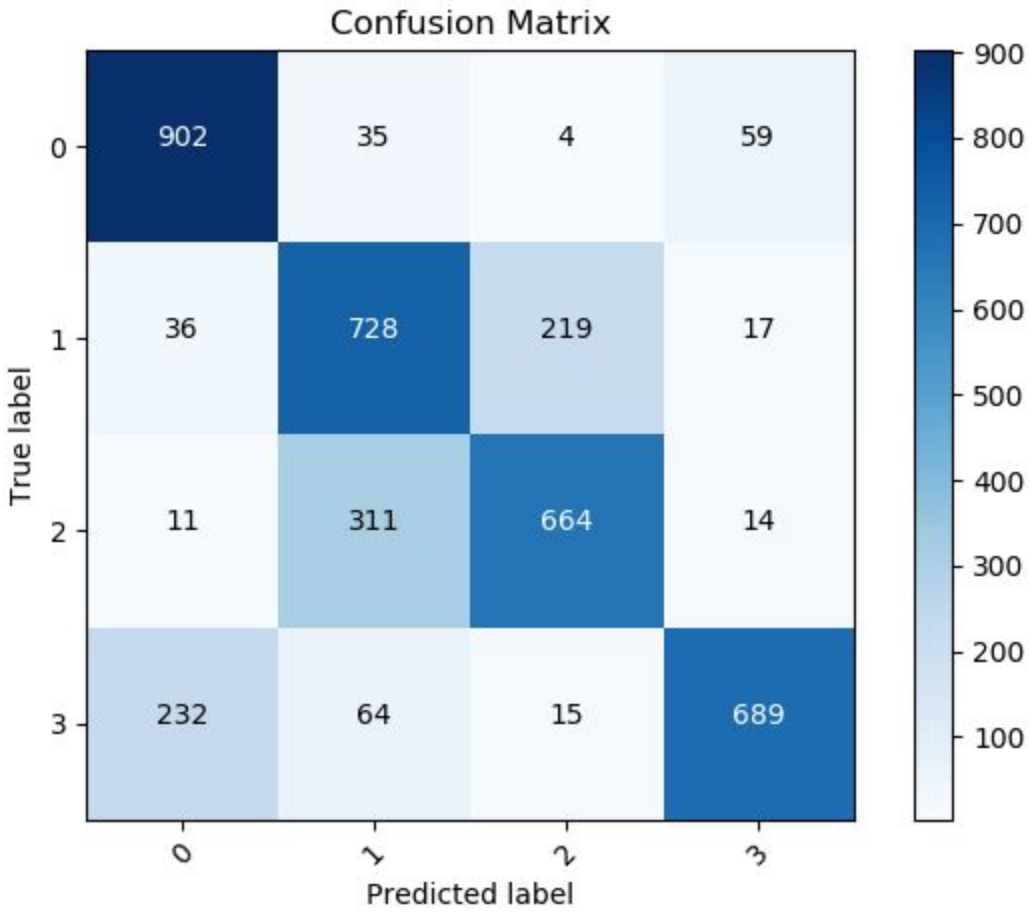
Convolutional Neural Network

Testing Accuracy	75%



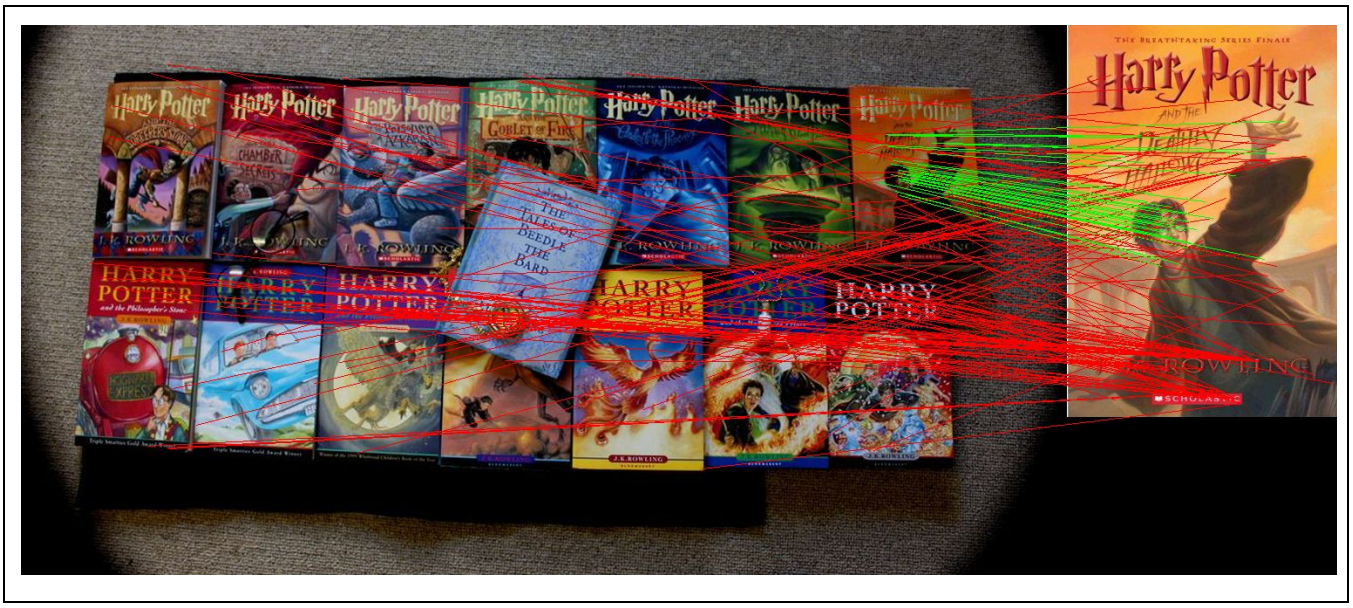


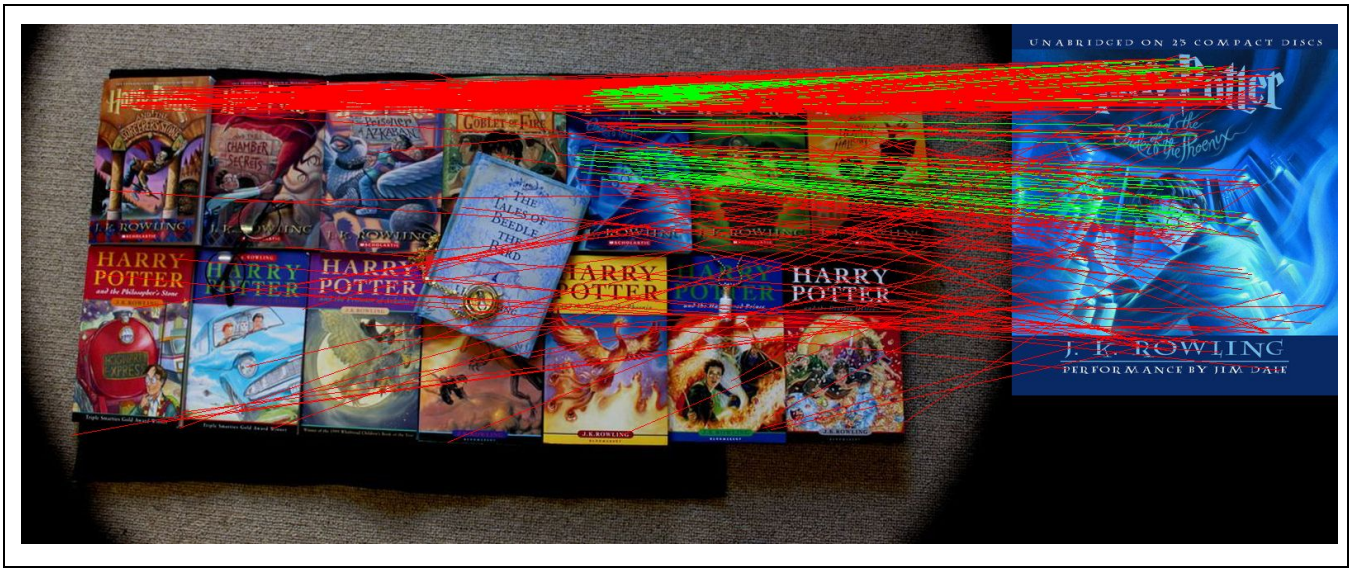
Training Loss



Question-3: Key Points matching

A. Plotting True and False Key Points matched for both test images.





Here correctly matched keypoints are marked as green, wrongly matched as red color lines. I used SIFT to identify the key points in image and plotted those key points.

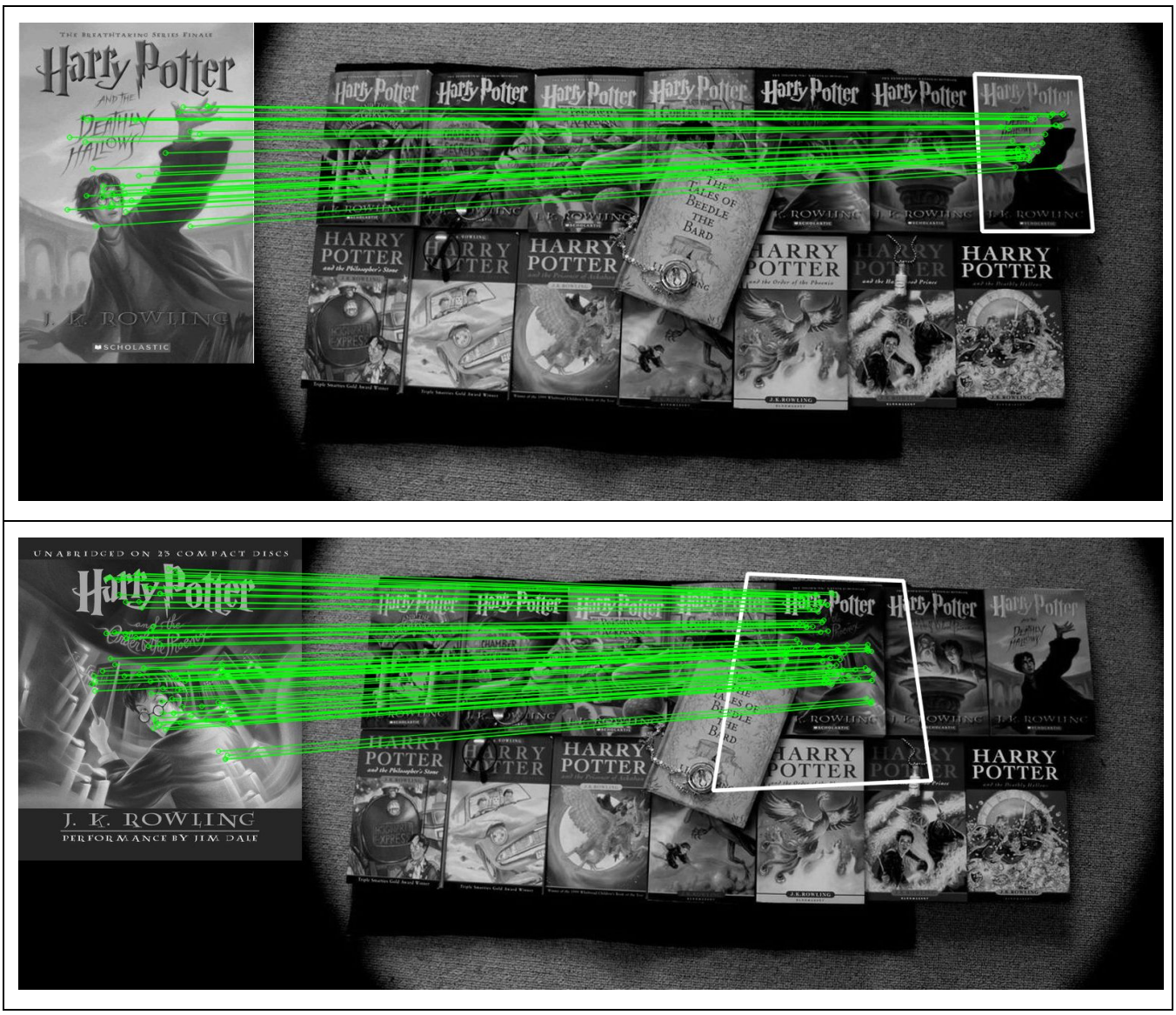
B. Homography Matrix
Original and test1

2.04	-6.04	-1.942
-6.73	2.20	-9.13
-1.29	5.20	1

Original and test 2

1.63	4.21	-1.05
-7.14	2.07	-7.17
-4.35	2.29	1

C. Corner of the bounding box for test images



Question-4: Panorama Stitching

I observed that images can be stiched horizontally, based on the visualization of the image.
Algorithm -

1. Create a resultant image of size (Image_2_Heigth, Image_1_breadth + Image_2_breadth + Image_3_breadth).
2. After created above image i copied middle image to the resultant image leaving the space for first image from the left.
3. I did stitching for first two images. For both the images, extract keypoints using SIFT.
4. From the extracted keypoints, do a feature matching, resulting in the points which are present in both the images having similar feature value.
5. After this i created a homography matrix, which included all the scaling, rotation functions required to register the images.
6. In the last i warp the homography image in a new resultant image. And copied another image in previous resultant image.

7. Repeated same steps for image3 and resultant image from above steps. There only a small change in pasting of the resultant image in homographed image3.

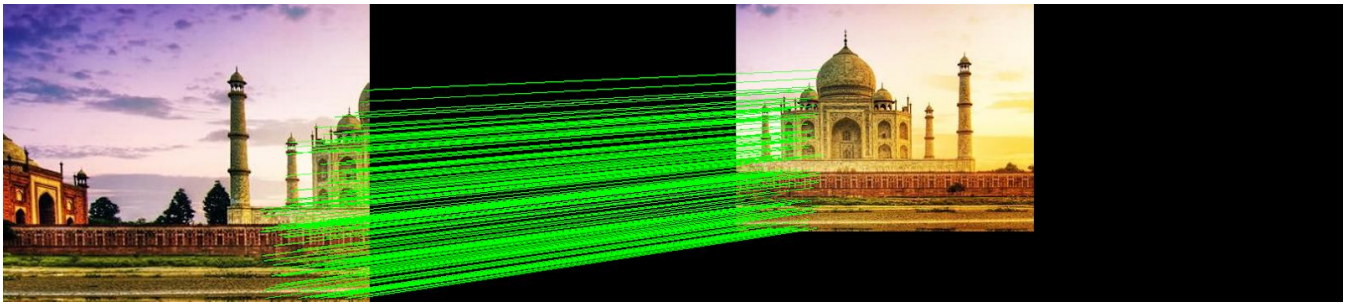
Parameters:

1. Ratio 0.75 - used for considering the good point match.
2. Ransac Threshold 4.0

Results

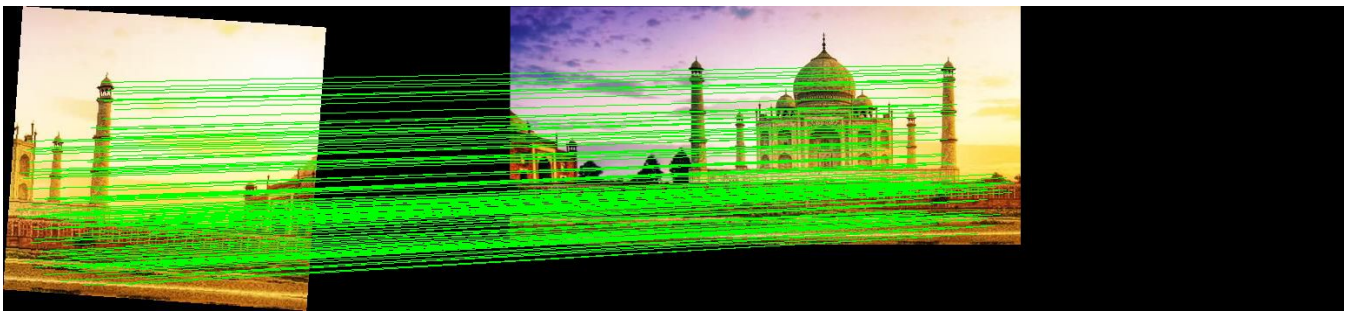
Image 2 on the resultant image.

Stiching of Image_1 and Image_2



Matching Points Visualization [Image_1, Image_2]

Stiching Image_1, Image_2 and Image_3



Matching Points Visualization [Image_1, Image_2, Image_3]

Assignment -5