Assignment 2: Report
Computer Vision COL780

1. **Feature detector:**

ORB feature detector is used to find the Key-points. A total of 20,000 key points were detected for the purpose of matching

2. **Feature matching**

- Brute Force Matcher (BFMatcher) along with Best KNN match was used. Top 2 KNN matches were considered.
- Ratio Test was also applied to further choose only valid key points wherein For each pair of features (f1, f2), if the distance between f1 and f2 is within a certain ratio, we keep it, otherwise, we throw it away.

3. **Order of Panorama Stitch:**

Homography matrix for every two distinct matrices was found out.
Using this we created a sequence of the images in the order of panorama stitching from left to right.

4. **Panorama Creation**

After the last step we have our image order and the corresponding Homography matrices.

A. Naive Idea of Panorama construction:

- One simple approach could be to take the leftmost image as the base and keep moving right say $I_1, I_1, I_3 \ldots$.
- The next image (I_2) is stitched with the base image (I_1) using its pairwise Homography matrix.
- For the image I_3, we have H_{23} i.e. the homography between I_2 and I_3. We multiply H_{12} and H_{23} to get H_{13} i.e. homography of Image 3 i.e. I_3 w.r.t. I_1(base image)
- This method would lead to error propagation and distorted panoramas.

B. Smart Idea of Panorama construction:

- One approach is to take the centre image as the base and stitch the left images $I_{-1}, I_{-2}, I_{-3} \ldots$ and the right images $I_1, I_2, I_3 \ldots$ w.r.t to the centre image i.e. I_0.
- Error is heavily reduced and better results are obtained.

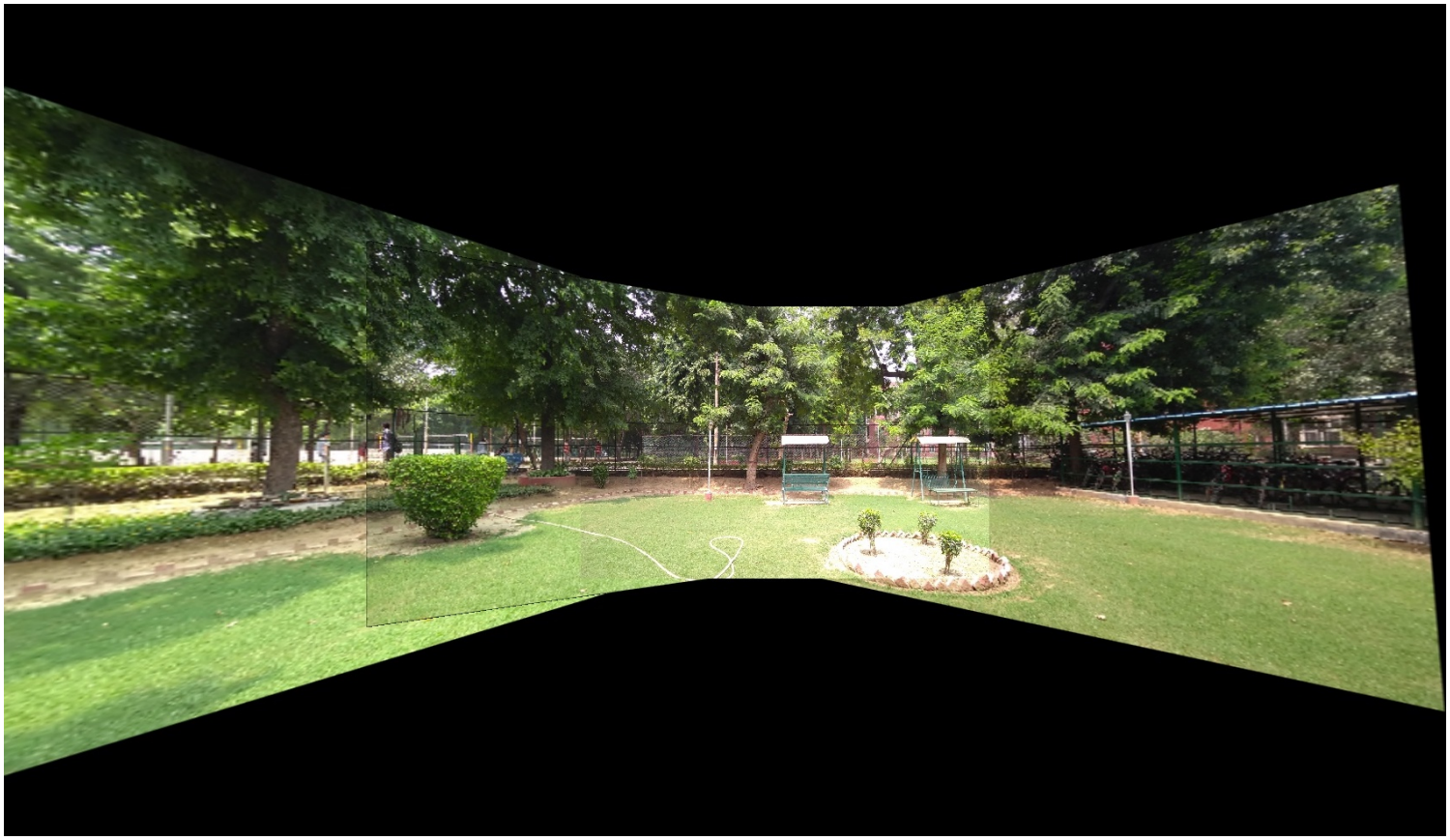
5. Image Blending using Laplacian Blending

Image blending and stiching is done through Laplace blending.

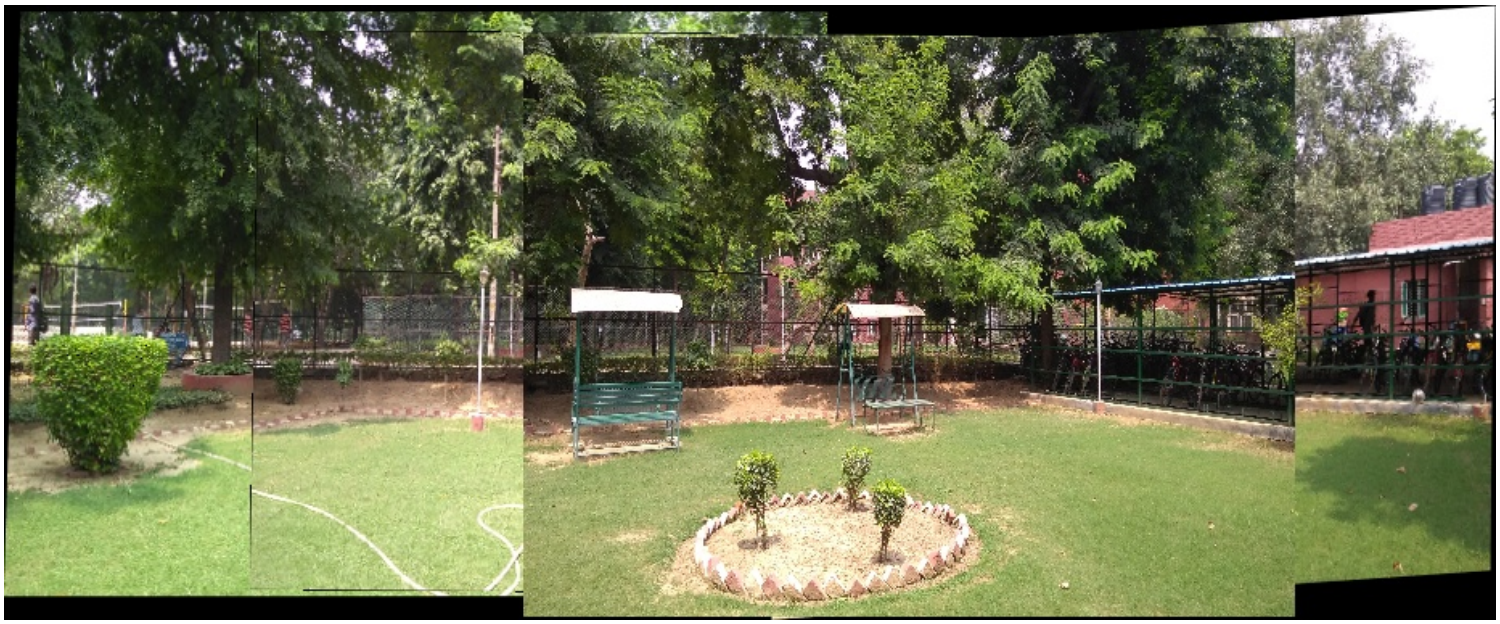
In Sample Results:

Dataset1

Homography assisted Panorama:

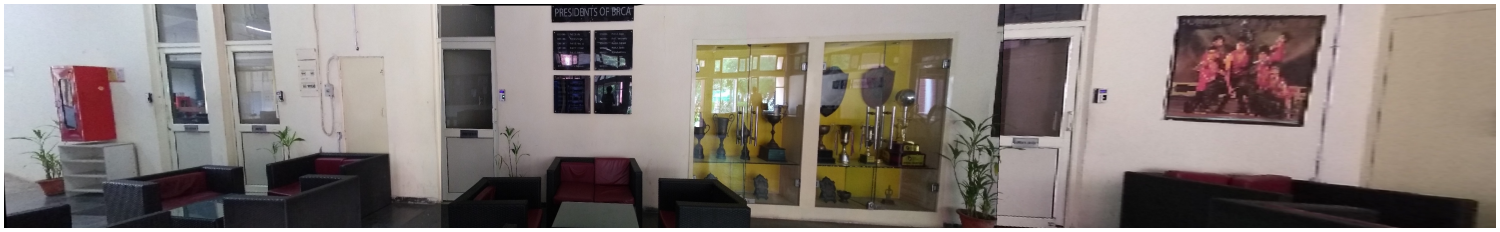


Affine assisted Panorama:



Dataset2

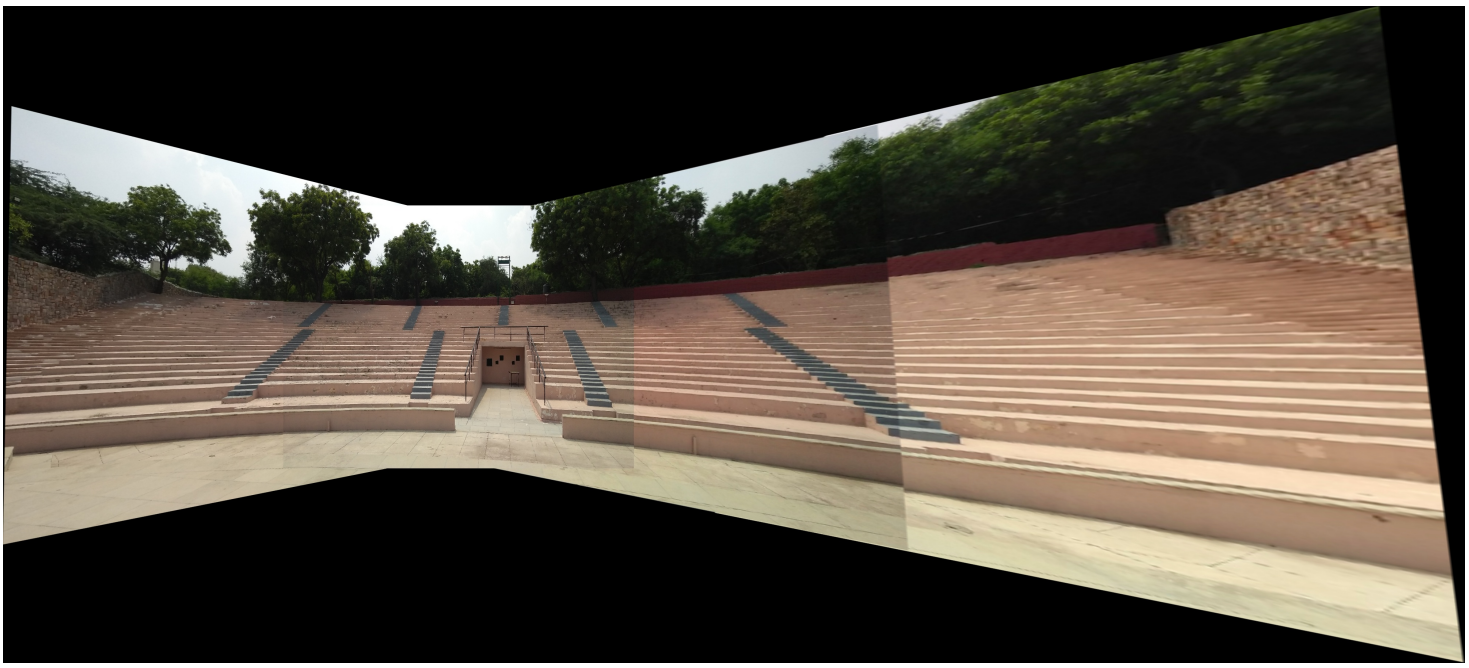
Homography assisted Panorama:



Affine assisted Panorama:

Dataset3

Homography assisted Panorama:



Affine assisted Panorama

Dataset4

Homography assisted Panorama:

Affine assisted Panorama:

Dataset5

Homography assisted Panorama:

Affine assisted Panorama:

Observation:

It can be clearly seen that if calculated the panorama using Affine transform, an overlap among regions is observed.

In reality, Affine preserves **Parallel lines**. Hence it will find a parallelogram transformation rather than a trapezium one. This will result in error propagation throughout the views. It is also observed that in case of dataset4, we get good results even with affine transform. This is because the images given in this dataset are already aligned with each other and even parallel to the baseline.

Our Sample Results:

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Discussion area near Vision Lab

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