

Digital Image Analysis (COL783)

Assignment-2 Report

Mosaicing (Panorama Construction)

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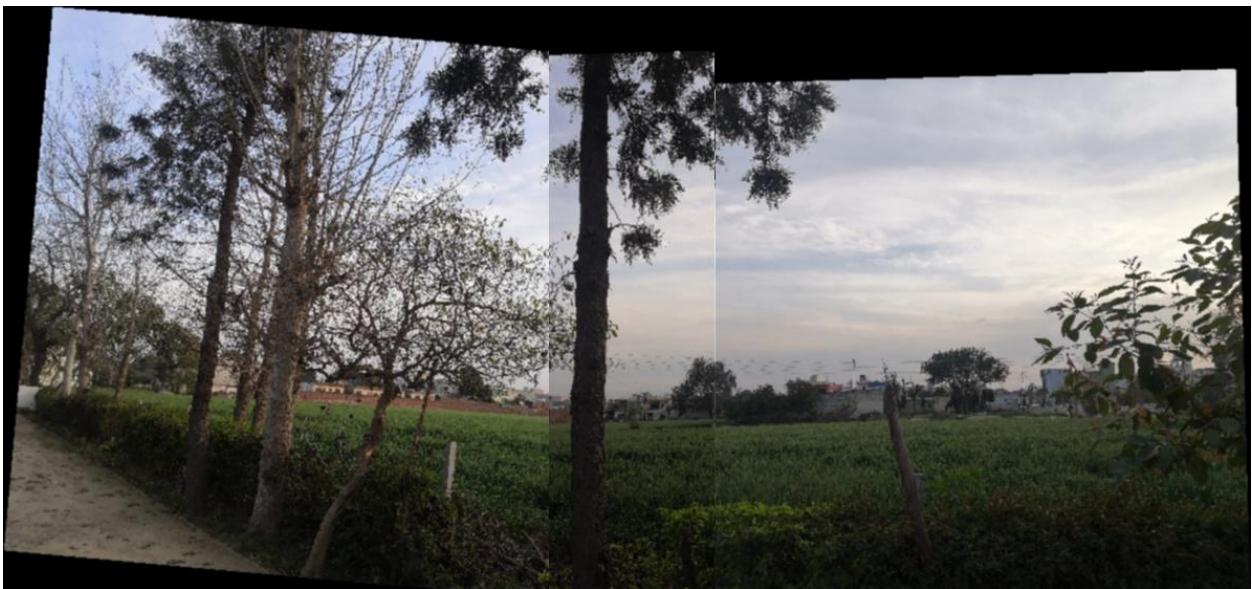
K N Ajay Shastry (2021CSY7547)

Brief description of our method:

- First we are setting an image as the reference image, according to which we will transform all other images.
- Finding SIFT keypoint and their descriptor vectors for each pair of adjacent images.
- Finding keypoints correspondences between images.
- Finding the Affine Transformation and Homography from those correspondences.
- Then we are warping the new image and pasting it to a black background image(which would be sufficient to contain the whole panorama).
- Stitching and Blending the image.
- Blending methods used are Feathering, Laplacian Pyramid Blending, and Poisson Blending.

Outputs:

1. Transform model: Affine
 - a) Blending method: Feathering

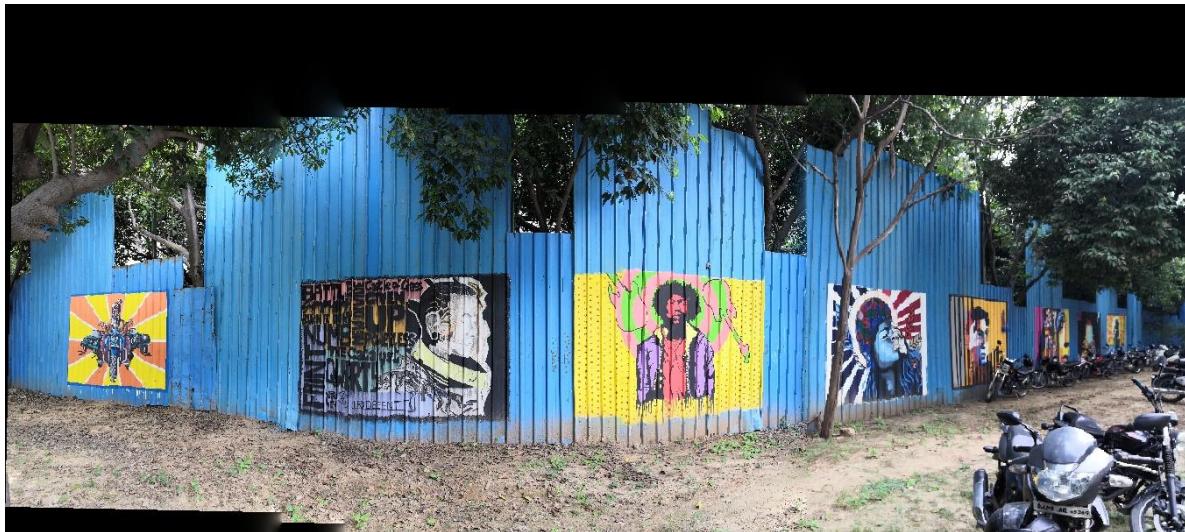




Our Images:



1. Transform model: Affine
- b) Blending method: Laplacian Pyramid

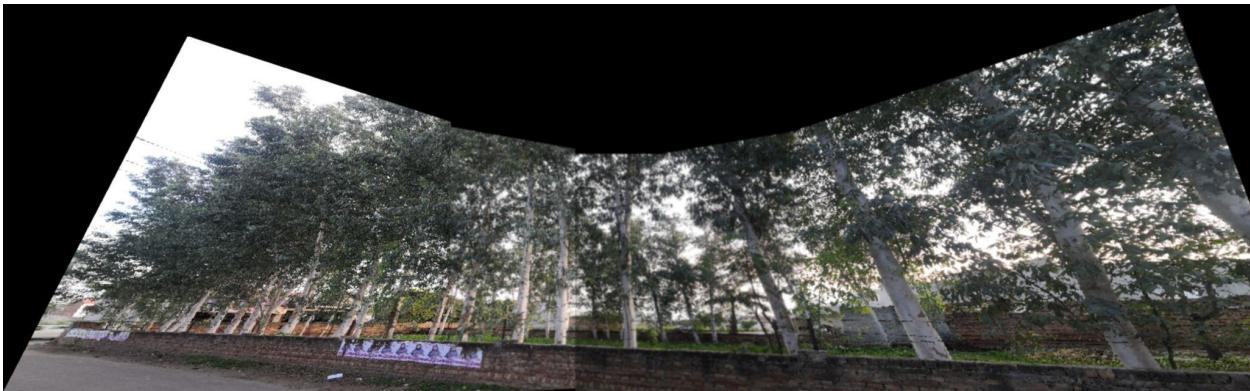
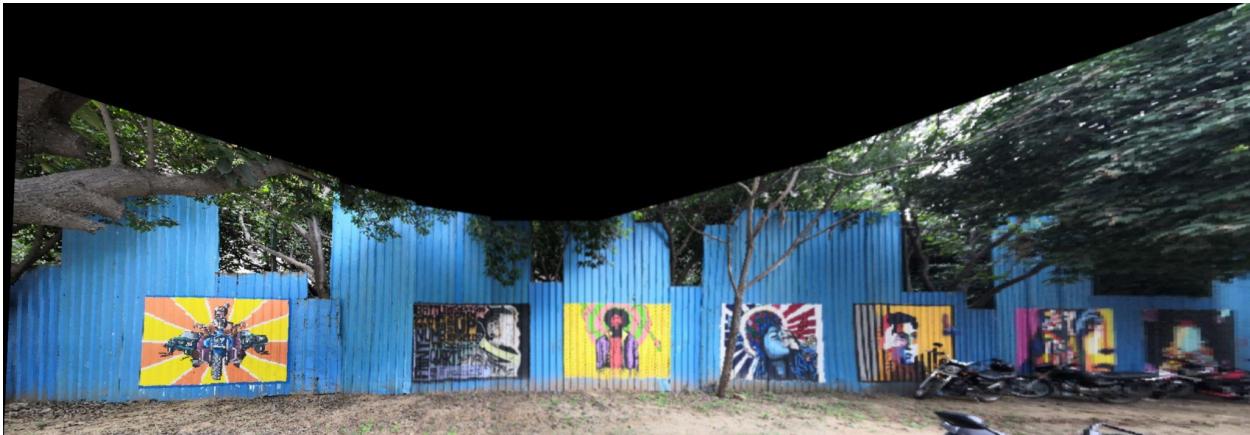




Our Images:

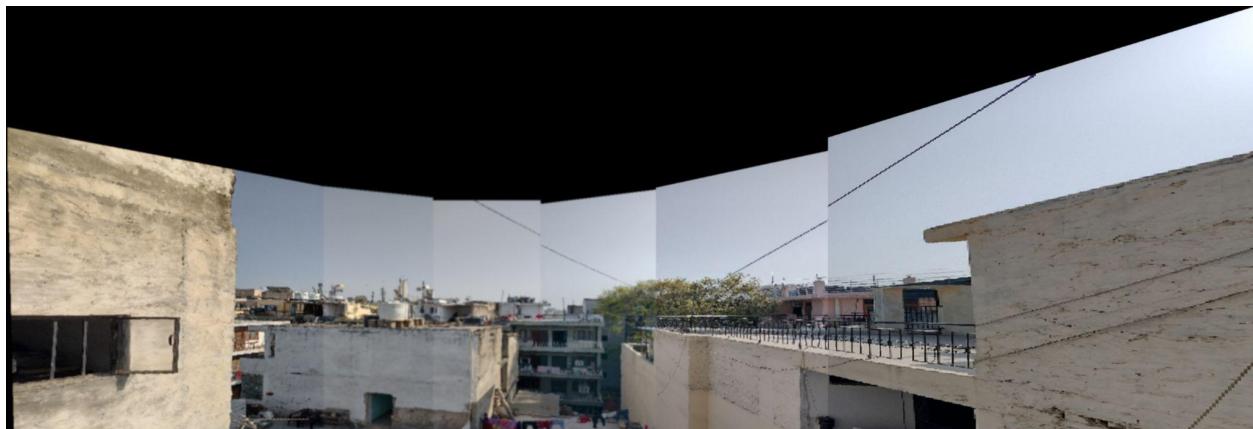


1. Transform model: Homography
a)Blending method: Feathering

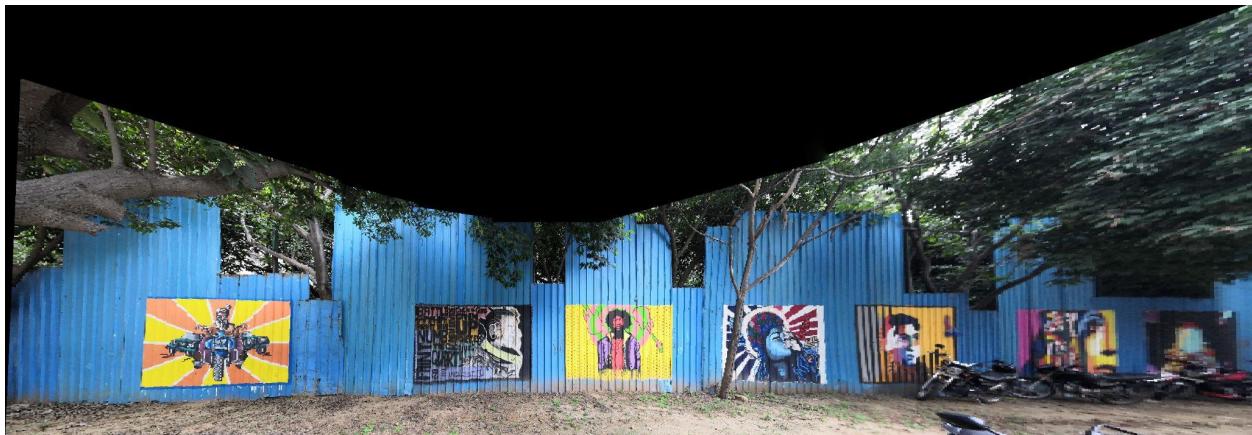




Our Images:

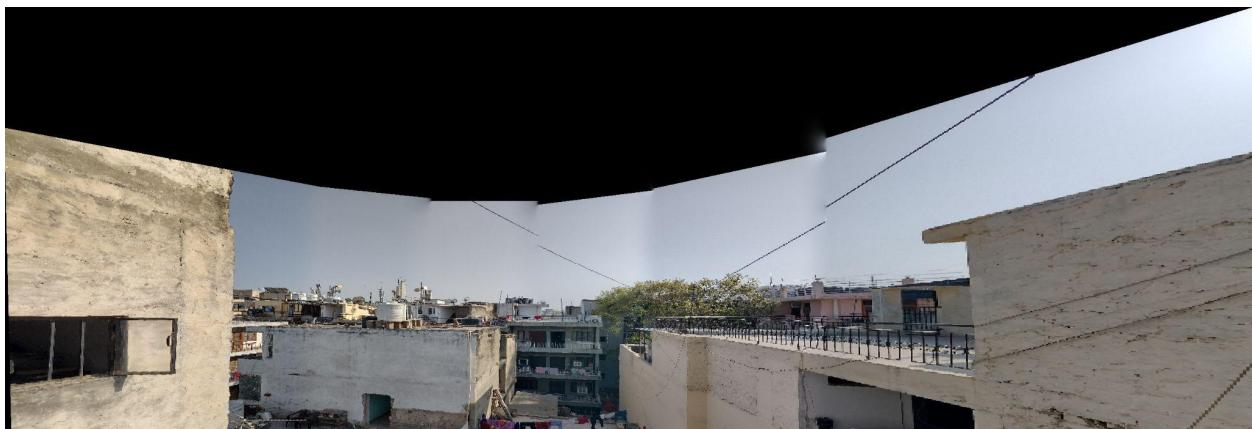


1. Transform model: Homography
- b) Blending method: Laplacian Pyramid





Our Images:



Best Method for Each Image

Method Name	Output
Projective_pyramid	
Affine_pyramid	
Projective_pyramid	

Projective_pyramid



Projective_pyramid



Projective_pyramid



Analysis and comparison of the different methods

- As all of the given images are taken by a camera that is rotating around a point (the observer is clicking pictures standing at the same end). So Homography is the best Transformation model to find between images. And from our output images, we can see that Homography gives the best output.
- Due to the limitation of the Affine Transform(it has less degree of freedom), we can see Perspective effects in the outcomes of Affine transformation. Parallel lines will be meeting at a vanishing point. That is not the case with Homography.

E.g.:

Affine Transformation	Homography
is Not able to restore parallel lines. 	Able to restore parallel lines. 

- Feathering is blending by blurring, making the images blurred, and the output quality is not so good.

E.g.:

Feathering	Homography
Blur 	Clear 

- Pyramid Blending is doing the gaussian blurring according to the frequency information in the image (for low-frequency pyramid levels it is doing less blurring and for high-frequency pyramid levels it is doing high blurring), So it is giving the best output.
- So Homography with Laplacian Pyramid Blending is providing the best result.
- Link to output images:
[https://drive.google.com/drive/folders/1n77NGvv18en8-pXyE-_hQwZiE1SKf5JP?
usp=sharing](https://drive.google.com/drive/folders/1n77NGvv18en8-pXyE-_hQwZiE1SKf5JP?usp=sharing)

References

- <https://pyimagesearch.com/2016/01/11/opencv-panorama-stitching/>
- <https://pyimagesearch.com/2018/12/17/image-stitching-with-opencv-and-python/>
- <https://github.com/varunjain3/PanoramaStitching>
- <https://github.com/avinashk442/Panoramic-Image-Stitching-using-invariant-features>