

# Project Proposal

CS512- Computer Vision  
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## Topic: Panoramic Image Stitching

Parthkumar Patel – A20416508  
Arpit Hasmukhbhai Patel – A20424085

### Problem Statement:

Image stitching is considered as a very active research area in image processing and computer vision. It is fairly well researched problem which has been solved under certain constraints in last several years. Image stitching involves two or more images of the same scene which needs to be stitched together into one high resolution image. Image stitching techniques can be classified into two categories: 1. Direct techniques and 2. Feature based techniques. Direct techniques compare all the pixel intensities of the input images with each other, whereas feature-based techniques try to find association between the images through distinct features extracted from the input images. Feature based techniques has the advantage of being more robust against scene movement, faster, and has the ability to automatically discover the overlapping relationships among an unordered set of images. Our project will focus on implementing an accurate image stitching algorithm using feature-based techniques from taking reference from the below mentioned research papers.

### Approach:

Feature-based methods can recognize panoramas by automatic discovery of relations among the unsorted images. It locates common corresponding feature points between two images by comparing every feature of different images.

Feature based method consists of the following steps:

#### 1. Image Acquisition:

Image acquisition means capturing image by camera devices or selecting files from secondary sources.

#### 2. Feature detection and image matching:

In feature detection and matching corners are matched to give quantitate measurements. It provides a rational matching for the image pairs based on rotation, translation and scaling.

#### 3. Alignment:

The purpose of alignment is to locate a reliable alignment parameter set which can decrease the mis-registration between every pair of images.

#### 4. Blending and Composition

When few images are stitched together, one image is selected as the reference and then twisted all images in the system of that location.

## 5. Output Panorama

The result of the above steps is often known as flat output panorama.

### Datasets:

#### 1. Adobe Panormas Dataset [1]

This data set consists of a set of 10 panorama image sets, together with precomputed local features for each image, and ground truth homographies for each overlapping image pair.

#### 2. PASSTA Datasets [2]

#### 3. Github tsherlock Test Images [3]

### Research Papers:

1. Chen, Kaili, and Meiling Wang. "Image stitching algorithm research based on OpenCV." Control Conference (CCC), 2014 33rd Chinese. IEEE, 2014. [4]
2. Bonny, Moushumi Zaman, and Mohammad Shorif Uddin. "Feature-based image stitching algorithms." Computational Intelligence (IWCI), International Workshop on. IEEE, 2016. [5]
3. Brown, Matthew, and David G. Lowe. "Automatic panoramic image stitching using invariant features." International journal of computer vision 74.1 (2007): 59-73. [6]

### Responsibilities:

1. Learning and implementing different image stitching techniques will be shared by both. Each individual will select a different technique like RANSAC algorithm, Harris corner detector-based approach etc. and implement it.
2. Testing will be done by both of us using different datasets.
3. Code documentations and debugging will be done by Arpit.
4. Report will be done by Parth.
5. Presentation will be done by both of us together.

### References:

1. <https://sourceforge.net/adobe/adobedatasets/panoramas/home/Home/>
2. <http://www.cvl.isy.liu.se/en/research/datasets/passta/>
3. [https://github.com/tsherlock/panorama/tree/master/test\\_data](https://github.com/tsherlock/panorama/tree/master/test_data)
4. <https://ieeexplore-ieee-org.ezproxy.gl.iit.edu/document/6896208>
5. <https://ieeexplore-ieee-org.ezproxy.gl.iit.edu/document/7860365>
6. <http://matthewalunbrown.com/papers/ijcv2007.pdf>