Project Proposal - Panorama Stitching

Project Id - 2
Title: Panorama Stitching

Team Name: Team Shinigami
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Github Link: https://github.com/adityaaggarwal97/DIP_Panorama-Stitching

Goal of the Project

Implementation of **'Automatic Panorama Stitching'** using invariant Features. The algorithm works with images independent of their orientations, order, scale and illumination of the input images.

Problem Definition

Problem: Given multiple images of one scene, reconstruct a single panoramic image. The input images can be unordered, orientation, scale or illumination invariant. It also takes care of the noise images which are not a part of the scene during the reconstruction process. Automatic straightening and Multi Band Blending is applied to achieve the final output.

Action Plan:

- The first step in the algorithm is to find the common features in all the images using SIFT Descriptor, which is independent of rotation and scale.
- Next we group images with maximum matching features and use some fixed number of images for reconstruction. A probabilistic model is used to verify all the matches.
- Then we find the pairwise homographies between the matched images using RANSAC.
- Next we use Bundle Adjustment by adding each matched image one by one to the original image using the above extracted pairwise homographies. It will remove the accumulated errors and disregard multiple constraints between images.
- Next Automatic Straightening, Gain compensation and Multi Band Blending techniques are applied to find the final enhanced panorama output of the given input images.

Results of the Project

Expected Outputs of each stage of the given action plan are described in the following images.

(a) Image 1

(b) Image 2

(c) SIFT matches 1

(d) SIFT matches 2

(e) RANSAC inliers 1

(f) RANSAC inliers 2

Output after Bundle Adjustment

Output after bundle adjustment

Image straightening Output

Gain compensation Output

Multi band blending Output
The Final Output

Individual Contributions

- **Prakyath:** Image Matching, Bundle Adjustment, Gain Compensation
- **Aditya:** Feature Extraction, Bundle Adjustment, Multi-band Blending

Project Milestones

- Create a dataset of input images.
- Extract features and group images with common features.
- Apply RANSAC to find pairwise homographies and then apply Bundle Adjustment.
- Apply different image enhancing techniques to get the final output.

Expected Timeline