Project 2
Image Stitching, Grayscale Image Processing, Morphology Image Processing

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1 Application used to implement code

I have written whole code in google colab, to run the code in google colab. Please run below command.
!pip install opencv-contrib-python==4.4.0.44

opencv version do not have cv2.xfeatures2d.SIFT_create(). I have directly used cv2.SIFT_create() instead of given in project2.pdf. Please run the code according to get the output.
Also to save the picture please give the local path in google colab to get proper output.

For Example - cv2.imwrite('/content/task1_result.jpg', result_img)
Above is the path for local directory.

1.1 Image Stitching

Image stitching mainly consist of three parts.
1.Reading the images to create the panaroma.
2.finding homography matrix.
3.Stitch image with the help of homography matrix.

1.1.1 Homography Matrix

Homography matrix is used to find the common points in the image. Every image contain some portion which is common to the other image. let say there are 2 images I1 and I2.
I1 = H*I2
where H is homography matrix.

To stitch the image need to calculate need to find the homography matrix first.

1.1.2 Features Extraction

Features are extracted from the image with the help of sift functions. From the obtain features(Descriptors) need to find euclidean distance between image1 and image2 and distance which is having less difference should be chosen. All the chosen should be stored in list with their indexes for further use in image stitching. This process of finding the corresponding points is called Registration.

Figure 1: Keypoints obtain on right Image

Figure 2: Keypoints obtain on left Image

1.1.3 Removing outliers with help of Ransac

Ransac is Random sample consensus, it is a iterative method to remove the outliers since outliers have no use which is basically wrong mapping in correspondence points. This is also as an outlier detection method. By removing the outliers iteratively. We can calculate homography matrix.

```
[[ 1.95288780e-03  1.35932185e-04  9.99498159e-01]
 [-9.96871448e-05  2.24446795e-03 -3.14557704e-02]
 [-3.75353908e-07  1.07855441e-07  2.25491182e-03]]
```

Figure 3: Homography Matrix after running for 5000 iteration

1.1.4 Warping and Stitching

Warping is the process in which image distortion is removed by manipulating it. Warping of image is done with the help of predefined function.

After warping the stitching is done.

2 Output

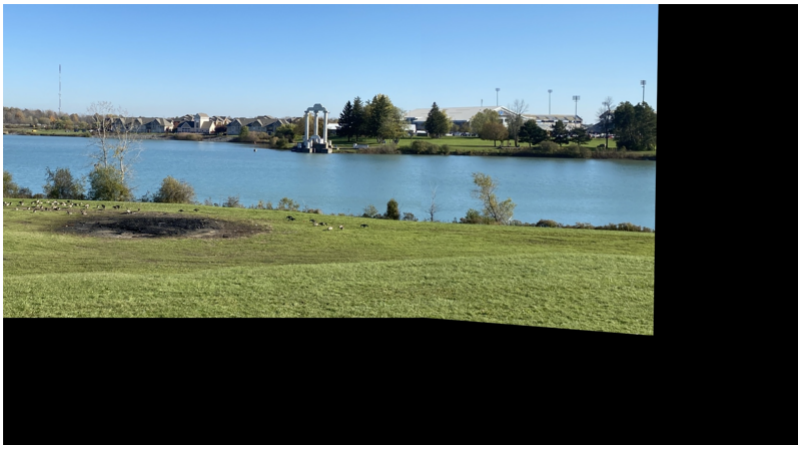

Figure 4: Panaroma Image obtained