Computer Vision and Image Processing

Image Stitching

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Open CV Version: 3.4.2.17

Steps Implemented

Right image has been warped into left image.

* Extract Keypoints:

In order to extract keypoints and compute keypoint descriptor, I have used SIFT detector + SIFT descriptor in both left and right images.

* Match Keypoint

Line 42-52 matches the 2 best keypoint based on 2 norm distance between keypoint descriptors. Distance is calculated using norm\_distance function defined in line 70.

In order to obtain 2 best keypoint I have used np.argpartition function which sorts the distance array and provides the index of the smallest 2 distances.

Line 55-62 provides ratio Testing with 0.75 as threshold. After Ratio Testing approximately 951 keypoints are left

* Estimate Homography

Line: 74-85 I have defined homography\_estimate function which calculates the homography matrix and returns it. This function is called inside the Ransac Function(Line: 88-129). Ransac function runs for 1000 iterations with threshold equals to 1 and calculates maximum inliers set.

Line 65 uses the maximum inlier set and finds the final homography matrix.

* Warp & Stitch Images

Line 138-158 offset\_warp\_stitch stitches the image after obtaining the final homography matrix. Since I am warping right image into left image, I have taken boundaries of right image and applied cv.perspective\_transform() (Line 143) function which returns the transformed boundaries of right image after it will be warped into left image. Then we find the minimum and maximum x,y coordinates from transformed right image boundaries and left image boundaries Line: 147-151.

These min and max x,y coordinates are the offset which needs to be applied for stitching the two images so that they are not cropped. Translation matrix has been created using minimum x and y coordinates and is multiplied with homogenous matrix so that right image is translated perfectly in the frame and not cropped. Then I have applied cv.warpPersepctive function on right image. After that left image is added to the right image.