Computer Vision

Coding Assignment 4

Image Stitching and Disparity Map

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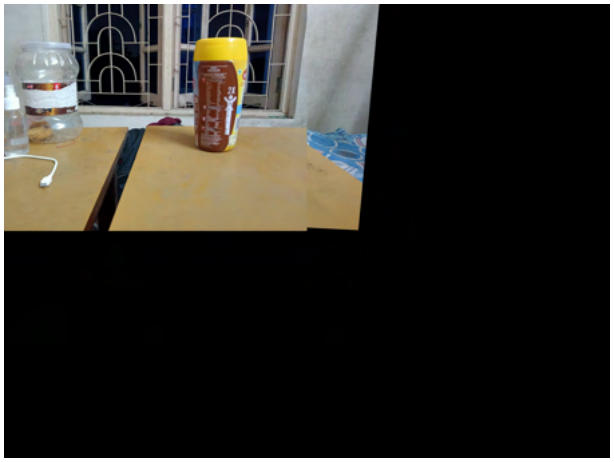
1. Image Stitching

To stitch two or more images we need to follow certain steps:

1. Detect keypoints (DoG, Harris, etc.) and extract local invariant descriptors (SIFT) from the two input images.
2. Match the descriptors between the two images.
3. Use the RANSAC algorithm to estimate a homography matrix using our matched feature vectors.
4. Apply a warping transformation using the homography matrix obtained from last step (3).

2. RESULTS:



2.1 Disparity Map

Writing their equivalent equations will yield us following result:

$$disparity = x - x' = \frac{BF}{Z}$$

x and x' are the distance between points in image plane corresponding to the scene point 3D and their camera center. B is the distance between two cameras (which we know) and f is the focal length of camera (already known). So in short, above equation says that the depth of a point in a scene is inversely proportional to the difference in distance of corresponding image points and their camera centers. So with this information, we can derive the depth of all pixels in an image.

So it finds corresponding matches between two images. We have already seen how epiline constraint make this operation faster and accurate. Once it finds matches, it finds the disparity. Let's see how we can do it with OpenCV.

2.2 Example