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# Approach of My Algorithm

1. fetch images pairwise say (sourceImage, destinationImage).
2. convert the images to grayscale say (source, destination)
3. Find Keypoints and descriptors of each of the image using OpenCV function sift.detectAndcompute.
   1. This returns list of keyPoints(KP) and descriptor(desc) for each of the images mentioned above.
4. Draw the key Points of source image
5. Find number of key points by calculating length of source KP.
6. Then invoke instance of BFMatcher.
7. Invoke match API of Brute Force Matcher(BFMatcher). This returns List of <DMATCH>
   1. Each DMATCH is a tuple of <distance, imgIdx, queryIdx, trainIdx>
8. Sort matches as per distances.
9. Plot top 20 matches using drawMatches function.
10. Find Homography function
    * 1. For this, use the function findHomography. This returns H matrix and status. That is True/False value if corresponding keypoint is consistent or not.

11.) Then given the status received in step above, figure top 10 distances that are consistent.

12.) Display top 10 distances or matches on Image and find the number of consistent matches.

# Results

## For Image Pair: (image\_1, image\_3)

|  |  |
| --- | --- |
| SIFT KeyPoints | 3253 |
| KeyPoints Image | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:KP1_3.jpg |
| Number of Matches Found | 3253 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_1_3.jpg |
|  |  |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_1_3.jpg |
| Number Consistent of Matches | 321 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMD61BB8A97-7A54-4A23-A316-C9D5B5926C1A:SOURCE___1_DESTINATION___3.png |
|  |  |

## For Image Pair : (image\_1, image\_4)

|  |  |
| --- | --- |
| SIFT KeyPoints | 3253 |
| KeyPoints Image | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:KP1_4.jpg |
| Number of Matches Found | 3253 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_1_4.jpg |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_1_4.jpg |
| Number Consistent of Matches | 42 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMD25E2107F-4482-4906-8F51-5A3E1BFCB77A:untitled.png |

## For Image Pair: (image\_1, image\_5)

|  |  |
| --- | --- |
| SIFT KeyPoints | 3253 |
| KeyPoints Image | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:KP1_5.jpg |
| Number of Matches Found | 3253 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_1_5.jpg |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_1_5.jpg |
| Number Consistent of Matches | 602 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMDFD0D15C1-4CAE-4FD8-9918-D439A2F5E709:untitled.png |

## For Image Pair: (image\_2, image\_3)

|  |  |
| --- | --- |
| SIFT KeyPoints | 2815 |
| KeyPoints Image | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:KP2_3.jpg |
| Number of Matches Found | 2815 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_2_3.jpg |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_2_3.jpg |
| Number Consistent of Matches | 70 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMDFEA4F3FC-5CE4-484A-9C7A-6F297F7B6BEC:__________________________________________________.png |

## For Image Pair: (image\_2, image\_4)

|  |  |
| --- | --- |
| SIFT KeyPoints | 2815 |
| KeyPoints Image | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:KP2_4.jpg |
| Number of Matches Found | 2815 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_2_4.jpg |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_2_4.jpg |
| Number Consistent of Matches | 128 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMD564E6191-28CE-47BE-BA4C-A6F6D22CB5FF:SOURCE___1_DESTINATION___3.png |

## For Image Pair: (image\_2, image\_5)

|  |  |
| --- | --- |
| SIFT KeyPoints | 2815 |
| KeyPoints Image |  |
| Number of Matches Found | 2815 |
| Top 20 match images | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M20_2_5.jpg |
| Top 10 matches after Homography | deepika:Users:deepika:anaconda:envs:MyOpenCVAlgorithms:Assign3:M10_2_5.jpg |
| Number Consistent of Matches | 43 |
| Homography Matrix | deepika:private:var:folders:vs:41q3b56n323dlcj_3jz6f8j00000gn:T:DMD955A75C0-52D6-42B7-B7E6-447B11618DA0:SOURCE___1_DESTINATION___3.png |

# General analysis

The Algorithm in general performs very well and is rotation invariant. However, the algorithm doesn’t seem to be well invariant to illumination. For ex: white portion on source cover page of the book tend to be confused with white portion of pizza hut sachets.

If the object is surrounded by objects that have intensity different from that of target object then the detection gets easier. In this case, the algorithm performs better as in image\_5.