**LABTASK 10**

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import cv2

import matplotlib.pyplot as plt

import numpy as np

%matplotlib inline

image1 = cv2.imread("image.jpg")

training\_image = cv2.cvtColor(image1, cv2.COLOR\_BGR2RGB)

training\_gray = cv2.cvtColor(training\_image,cv2.COLOR\_RGB2GRAY)

test\_image = cv2.pyrDown(training\_image)

test\_image = cv2.pyrDown(test\_image)

num\_rows, num\_cols =test\_image.shape[:2]

rotation\_matrix =cv2.getRotationMatrix2D((num\_cols/2,num\_rows/2),30,1)

test\_image = cv2.warpAffine(test\_image,rotation\_matrix,(num\_cols,num\_rows))

test\_gray = cv2.cvtColor(test\_image,cv2.COLOR\_RGB2GRAY)

fx,plots = plt.subplots(1,2,figsize=(20,10))

plots[0].set\_title("Training Images")

plots[0].imshow(training\_image)

plots[1].set\_title("Testing Images")

plots[1].imshow(test\_image)

surf = cv2.xfeatures2d.SURF\_create(800)

train\_keypoints, train\_descriptor = surf.detectAndCompute(training\_gray, None)

test\_keypoints,test\_descriptor = surf.detectAndCompute(test\_gray,None)

keypoints\_without\_size = np.copy(training\_image)

keypoints\_with\_size = np.copy(training\_image)

cv2.drawKeypoints(training\_image,train\_keypoints,keypoints\_without\_size,color = (0,255,0))

cv2.drawKeypoints(training\_image,train\_keypoints,keypoints\_with\_size,flags = cv2.DRAW\_MATCHES\_FLAGS\_DRAW\_RICH\_KEYPOINTS)

fx,plots = plt.subplots(1,2,figsize=(20,10))

plots[0].set\_title("TRAIN KEYPOINT WITH SIZE")

plots[0].imshow(keypoints\_with\_size,cmap ='gray')

plots[1].set\_title("TRAIN KEYPOINT WITHOUT SIZE")

plots[1].imshow(keypoints\_without\_size,cmap ='gray')

print("Key point detected in the training image: ",len(train\_keypoints))

print("Key point detected in the query image: ",len(test\_keypoints))

bf= cv2.BFMatcher(cv2.NORM\_L1, crossCheck=False)

matches= bf.match(train\_descriptor,test\_descriptor)

matches = sorted(matches,key=lambda x : x.distance)

result= cv2.drawMatches(training\_image,train\_keypoints,test\_gray,test\_keypoints,matches,test\_gray,flags=2)

plt.rcParams['figure.figsize'] = [14.0,7.0]

plt.title('Best Matching Points')

plt.imshow(result)

plt.show()

print("\nNumber of matching keypoints between the training and query images ",len(matches))

**OUTPUT:**



