Image Matching with KNN.

- Try the provided image matching program on a test image of an object you photographed yourself. Then photograph the object in a different environment as a target image.
- Show your input and output image.

Image size: (616, 1024)

sift = cv2.SIFT create()

In []: # Initiate SIFT detector

In []: import cv2 import matplotlib.pyplot as plt import numpy as np In []: def read_image(filename): img = cv2.imread(filename, cv2.IMREAD_GRAYSCALE)

if img is None: print("Error opening image: " + filename) exit() print("Image size: ", img.shape) return img

In []: # Read image and query image target = read_image("./boxes.jpeg") query = read_image("./logo.jpeg") Image size: (369, 500)

> # find the keypoints and descriptors with SIFT # cv.KeyPoint(pt, size[, angle[, response[, octave[, class_id]]]]) kp1, des1 = sift.detectAndCompute(target, None) kp2, des2 = sift.detectAndCompute(query, None)

 $print(kp1[0], '\n', des1[0], '\n Size = ', des1[0].size)$ < cv2.KeyPoint 0x125d822a0> 2. 206. 7. 4. 123. 0. 1. 1. 1. 0. 6.

2. 60. 2. 0. 0. 0. 0. 7. 160. 15. 1.

7. 7. 1. 6. 1. 1. 26. 0. 0. 4. 206. 12. 0. 0. 0. 21. 157. 33. 0. 0. 3. 5. 8. 3. 8. 7. 4. 0. 0. 0. 0. 0. 1.206. 10. 0. 112. 20. 1. 1. 0. 0. 0. 2. 3. 6. 6. 7. 2. 0. 0. 0.] Size = 128In []: kp1[0].pt, kp1[0].size, kp1[0].angle

Out[]: ((2.864588975906372, 354.56903076171875), 2.0855965614318848, 8.624725341796875) In []: # BFMatcher with default params bf = cv2.BFMatcher()

matches = bf.knnMatch(des1,des2,k=2) In []: | print(matches) ((< cv2.DMatch 0x125c31210>, < cv2.DMatch 0x125d934d0>), (< cv2.DMatch 0x125d93230>, < cv2.DMatch 0x125d939f0>), (< cv2.DMatch 0x125d935b0>, < cv2.

DMatch 0x125d933b0>), (< cv2.DMatch 0x125d93590>, < cv2.DMatch 0x125d934f0>), (< cv2.DMatch 0x125d935d0>, < cv2.DMatch 0x125d936d0>), (< cv2.DMatch 0x125d935d0>, < cv2.DMatch 0x125d935d0>) 0x125d93470>, < cv2.DMatch 0x125d931f0>), (< cv2.DMatch 0x125d93190>, < cv2.DMatch 0x125d93af0>), (< cv2.DMatch 0x125d93950>, < cv2.DMatch 0x125d93 a90>), (< cv2.DMatch 0x125d935f0>, < cv2.DMatch 0x125d930d0>), (< cv2.DMatch 0x125d93930>, < cv2.DMatch 0x125d93a70>), (< cv2.DMatch 0x125d93330>, < cv2.DMatch 0x125d939b0>), (< cv2.DMatch 0x125d93ad0>, < cv2.DMatch 0x125d93b10>), (< cv2.DMatch 0x125d93b30>, < cv2.DMatch 0x125d93b50>), (< cv2.DMatch 0x125d93b50>) DMatch 0x125d93b70>, < cv2.DMatch 0x125d93b90>), (< cv2.DMatch 0x125d93bb0>, < cv2.DMatch 0x125d93bd0>), (< cv2.DMatch 0x125d93bf0>, < cv2.DMatch 0x125d93bd0>),

#in our example k=2, so will get a list of best 2 matches per feature point

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(< cv2.DMatch 0x125c8f2f0>, < cv2.DMatch 0x125c8f310>), (< cv2.DMatch 0x125c8f330>, < cv2.DMatch 0x125c8f350>), (< cv2.DMatch 0x125c8f370>, < cv2.D Match 0x125c8f390>), (< cv2.DMatch 0x125c8f3b0>, < cv2.DMatch 0x125c8f3d0>), (< cv2.DMatch 0x125c8f3f0>, < cv2.DMatch 0x125c8f410>), (< cv2.DMatch 0x125c8f3b0>, < cv2.DMatch 0x125c8f3b0>) 0x125c8f430>, < cv2.DMatch 0x125c8f450>), (< cv2.DMatch 0x125c8f470>, < cv2.DMatch 0x125c8f490>), (< cv2.DMatch 0x125c8f4b0>, < cv2.DMatch 0x125c8f 4d0>), (< cv2.DMatch 0x125c8f4f0>, < cv2.DMatch 0x125c8f510>), (< cv2.DMatch 0x125c8f530>, < cv2.DMatch 0x125c8f550>), (< cv2.DMatch 0x125c8f570>, < cv2.DMatch 0x125c8f590>), (< cv2.DMatch 0x125c8f5b0>, < cv2.DMatch 0x125c8f5d0>), (< cv2.DMatch 0x125c8f5f0>, < cv2.DMatch 0x125c8f610>), (< cv2.DMatch 0x125c8f5f0>, < cv2.DMatch 0x125c8f610>), (< cv2.DMatch 0x125c8f5f0>), (< cv2.DMatch 0x125c8f610>), (< cv2.DMatch 0x125c8f5f0>), (< cv2.DMatch 0x125c8f610>), (< cv2.DMatch 0x125c8f6 DMatch 0x125c8f630>, < cv2.DMatch 0x125c8f650>), (< cv2.DMatch 0x125c8f670>, < cv2.DMatch 0x125c8f690>), (< cv2.DMatch 0x125c8f6b0>, < cv2.DMatch 0x125c8f690>), x125c8f6d0>), (< cv2.DMatch 0x125c8f6f0>, < cv2.DMatch 0x125c8f710>), (< cv2.DMatch 0x125c8f730>, < cv2.DMatch 0x125c8f750>), (< cv2.DMatch 0x125c8 f770>, < cv2.DMatch 0x125c8f790>), (< cv2.DMatch 0x125c8f7b0>, < cv2.DMatch 0x125c8f7d0>), (< cv2.DMatch 0x125c8f7f0>, < cv2.DMatch 0x125c8f810>), (< cv2.DMatch 0x125c8f830>, < cv2.DMatch 0x125c8f850>), (< cv2.DMatch 0x125c8f870>, < cv2.DMatch 0x125c8f890>), (< cv2.DMatch 0x125c8f8b0>, < cv2.D Match 0x125c8f8d0>), (< cv2.DMatch 0x125c8f8f0>, < cv2.DMatch 0x125c8f910>), (< cv2.DMatch 0x125c8f930>, < cv2.DMatch 0x125c8f950>), (< cv2.DMatch 0x125c8f950>)

(< cv2.DMatch 0x125dadd70>, < cv2.DMatch 0x125dadd90>))In []: # Apply ratio test good = []for m, n in matches: if m.distance < 0.75*n.distance:</pre> good.append([m]) In []: # cv2.drawMatchesKnn expects list of lists as matches.

DrawMatchesFlags_DEFAULT

DrawMatchesFlags DRAW RICH KEYPOINTS # DrawMatchesFlags_NOT_DRAW_SINGLE_POINTS img3 = cv2.drawMatchesKnn(target, kp1, query, kp2, good, None, flags=cv2.DrawMatchesFlags_DRAW_RICH_KEYPOINTS) plt.imshow(cv2.cvtColor(img3, cv2.COLOR_BGR2RGB))

DrawMatchesFlags DRAW OVER OUTIMG

Out[]: <matplotlib.image.AxesImage at 0x125dd5820>

1200 600 800 1000 1400

200 400 0 In []: # write cv2.imwrite('output.png', img3)

Also, show the 2 input images with SIFT features as asked for in the jupyter notebook provided.

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#if you use knnMatch, it will return a list of (the best) k matches instead of a single DMatch.

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f230>, < cv2.DMatch 0x125c8f250>), (< cv2.DMatch 0x125c8f270>, < cv2.DMatch 0x125c8f290>), (< cv2.DMatch 0x125c8f2b0>, < cv2.DMatch 0x125c8f2d0>), 0x125c8f970>, < cv2.DMatch 0x125c8f990>), (< cv2.DMatch 0x125c8f9b0>, < cv2.DMatch 0x125c8f9d0>), (< cv2.DMatch 0x125c8f9f0>, < cv2.DMatch 0x125c8f a10>), (< cv2.DMatch 0x125c8fa30>, < cv2.DMatch 0x125c8fa50>), (< cv2.DMatch 0x125c8fa70>, < cv2.DMatch 0x125c8fa90>), (< cv2.DMatch 0x125c8fab0>, < cv2.DMatch 0x125c8fad0>), (< cv2.DMatch 0x125c8faf0>, < cv2.DMatch 0x125c8fb10>), (< cv2.DMatch 0x125c8fb30>, < cv2.DMatch 0x125c8fb50>), (< cv2.DMatch 0x125c8fb50>), (< cv2.DMatch 0x125c8fb50>)

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Out[]: True

100

200

300

400

500 -600 -