

Answers A

1.2.1

1. a.

Detector : **SIFT** $\sigma = 1.6$ (default) , octave layers = 3 (default), contrast_threshold = 0.04 (default) , edge_threshold = 10 (default) , N_features = 300 , 1000 (user defined)

FAST : TYPE_5_8 = 0 (default), TYPE_7_12 = 1 (default), TYPE_9_16 = 2(default), THRESHOLD = 10000 (default), NONMAX_SUPPRESSION = 10001 (default), FAST_N = 10002 (default) ,

Threshold: 10

nonmaxSuppression: True

neighborhood: 2

Total Keypoints with nonmaxSuppression: n_points (300, 1000)

b.

N = 300

Detector	Descriptor	time_taken(s)
FAST	SIFT	1.08
FAST	BRIEF	0.99
DOG	SIFT	0.23
DOG	BRIEF	0.13

N = 1000

Detector	Descriptor	time_taken(ms)
FAST	SIFT	1.20
FAST	BRIEF	0.99
DOG	SIFT	0.23
DOG	BRIEF	0.13

2. Python v3.7.0 OpenCV v3.4.5.20 ()

Device specification:

Processor 11th Gen Intel(R) Core(TM) i5-1135G7 @ 2.40GHz 1.38 GHz

Installed RAM 8.00 GB (7.73 GB usable)

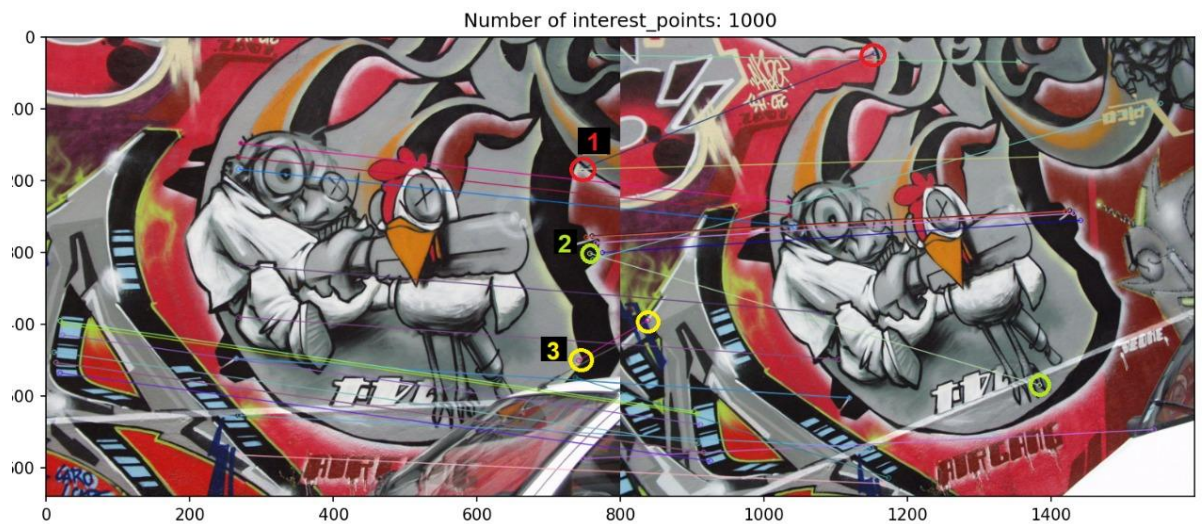
Device ID E5F4F071-49CC-4BF3-9D59-2B224FE6CE9E

Product ID 00327-35911-48146-AAOEM

System type 64-bit operating system, x64-based processor

3. It is possible that we can't clearly see every line in case of top matches = 5 .
if the keypoints are very close to each other. For example, if two points are very close to each other, the two lines corresponding to those 2 sets of keypoints look like a single line.

4. D (dog,sift ,view)



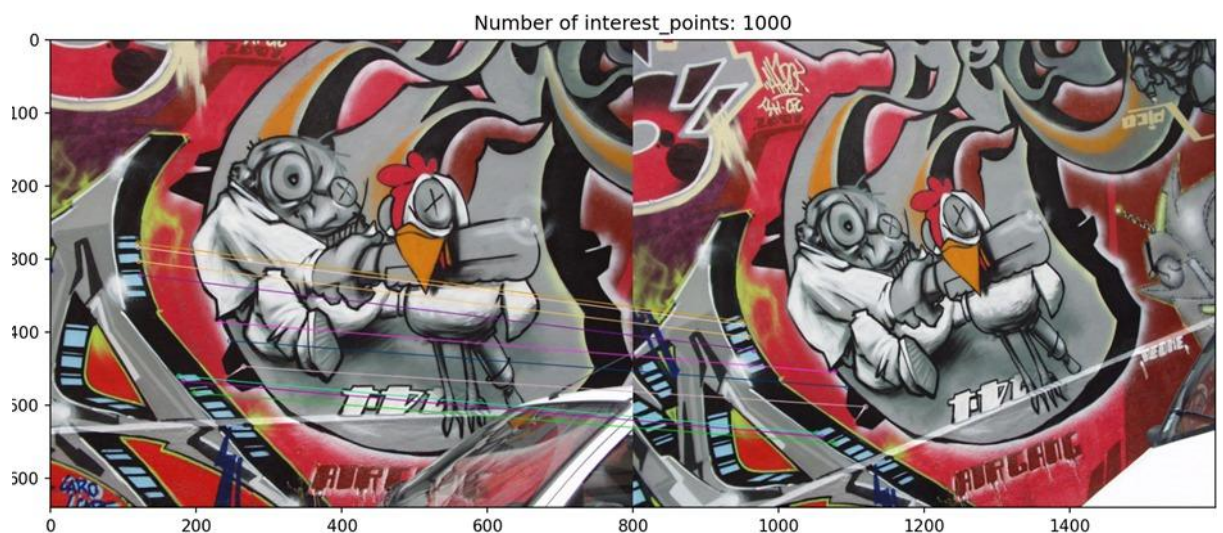
The detector and descriptor get confused when the descriptors has similar feature point and neighborhoods.

1 is getting detected at the similar coner than other

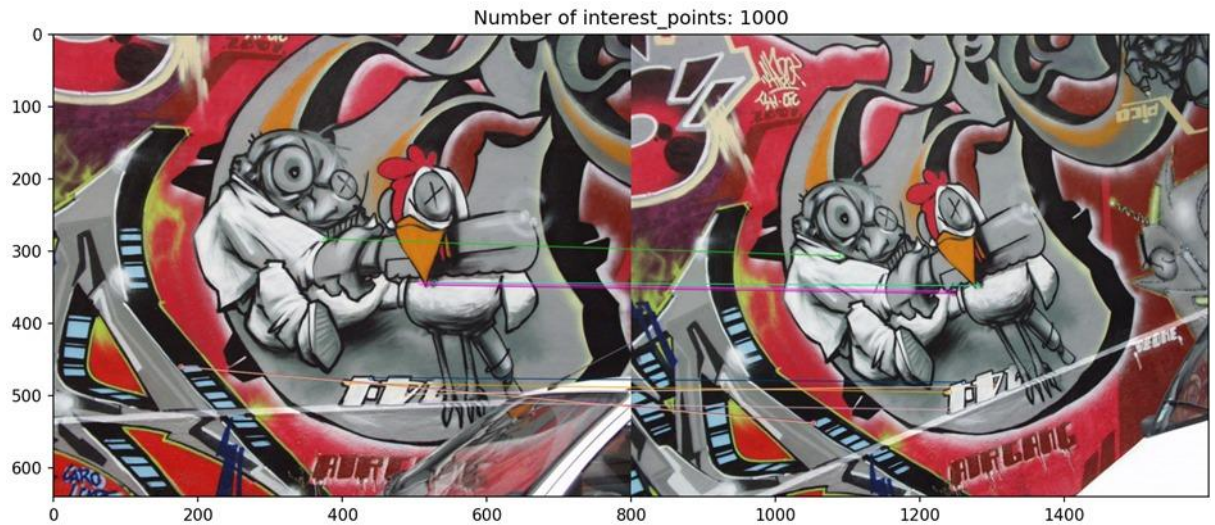
2 same as above

3 same as above

5. top_matches = 10 sift



BRIEF



From the images shown above (top matches = 5), it can be seen that the no. of incorrect matches is more in BRIEF. Hence, the performance of SIFT is much better than that of BRIEF.

- a. Computation cost and time of the inferior descriptor tend to be lower.
- b. In Rotation transformation, the difference is maximum.

Because the image corresponding to the rotation transformation has many corners and edges.

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1.3.1

1. Detector : SURF
Descriptor : FREAK
Detector SURF, because it is faster than SIFT .
Descriptor FREAK, performance comparable slightly better than SIFT descriptor, at low computational cost
2. As the properties of the above detector and descriptor,
Computation time:2.165 secs
Results quality: the result is better for rotation quality
It is a general observation that if there are a lot of corners or if the image has sharp features then the chances of erroneous matches is high.
3.
 - a. Sort matches according to the distance and pick a particular no. of sets of key points with the lowest distance
 - b. using g Lowe's ratio test: Pick the matches for which the distance ratio is 0.7.