

Comp Photography

Assignment #7

Feature Detection and Matching

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Part 1: Five images with the same subject



***Original image:** This is my template. I decided to use my oatmeal box as the image subject



***Sample image:** The subject (oatmeal box) is standing with memmonish(ông thần tài), cups, and candles,...etc.

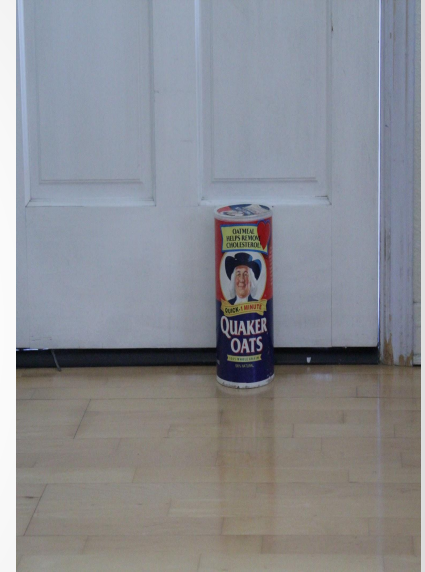
Part 1: continue.... input image



* **Lighting image:** I took this picture outside, it's much brighter.



* **Rotation:** I rotated my object. The box lying upside down.



* **Scale image:** I took this picture about ~3 feet away from the object and, and zoom in a little for the object look more clear

Part 2: Feature Detection and Matching

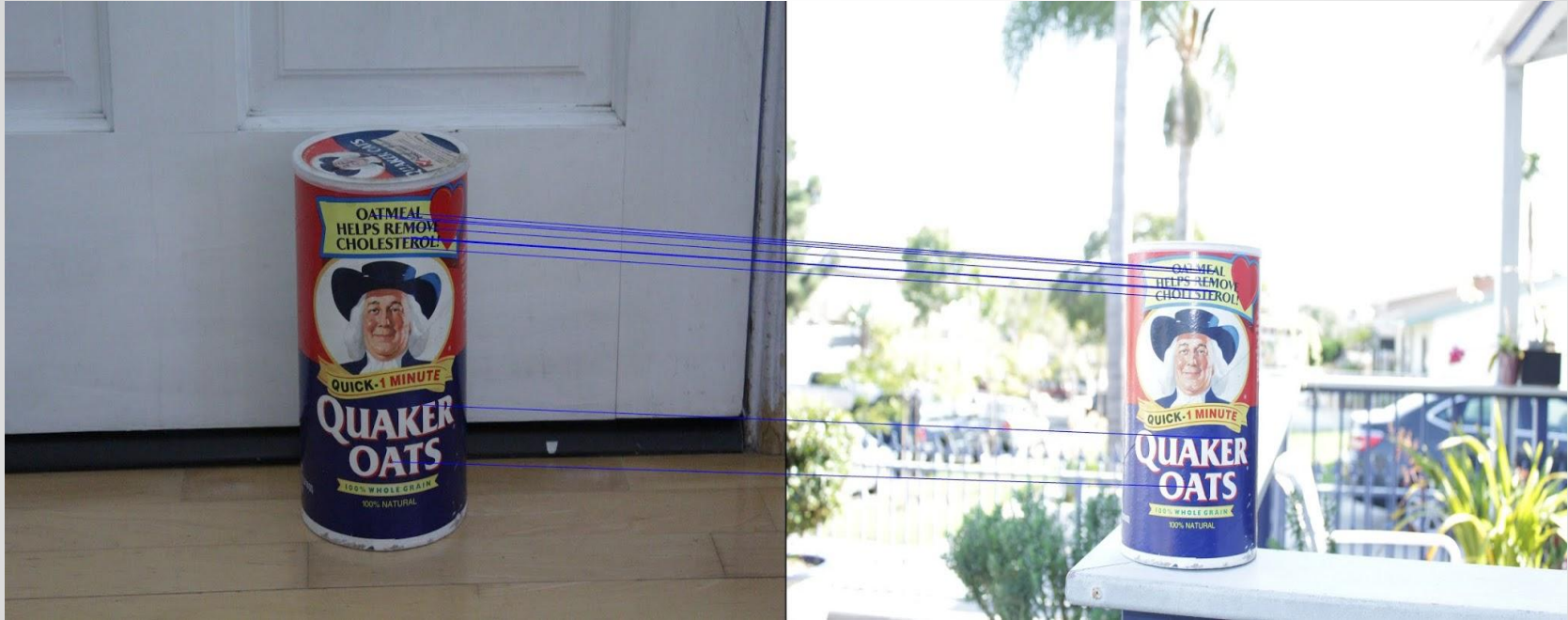
findMatchesBetweenImages:

- To implement this function using openCV. At the initial SIFT detector, start by create an ORB object with the function, **cv2.ORB()**.
- find the keypoints and descriptors with SIFT using function **detectAndCompute()**, I create keypoint and descriptor of the keypoints using SIFT on the input image_1 and also use the same to create keypoint & descriptor with input image_2
- After that, I create the Brute Force Matcher object using the hamming distance and enable cross check "bfMatch = cv2.BFMatcher(cv2.NORM_HAMMING, crossCheck=True)"
- Then using the bfMatch object's match() function, this match() function take two lists of descriptors and compare each entry to each corresponding one to see if they are match, and appends a match to a new list.
- After that , I use function sort() to sort to organize the list entries.
- To return the top 10 matches in the list, i slice the list from the first top 10 using match[:10]

Conclusion:

I'm using the same code, but different images will give different results. Base on my observation, i can conclude that the results mainly depend on pictures. Also, the subject with more texture will work better.

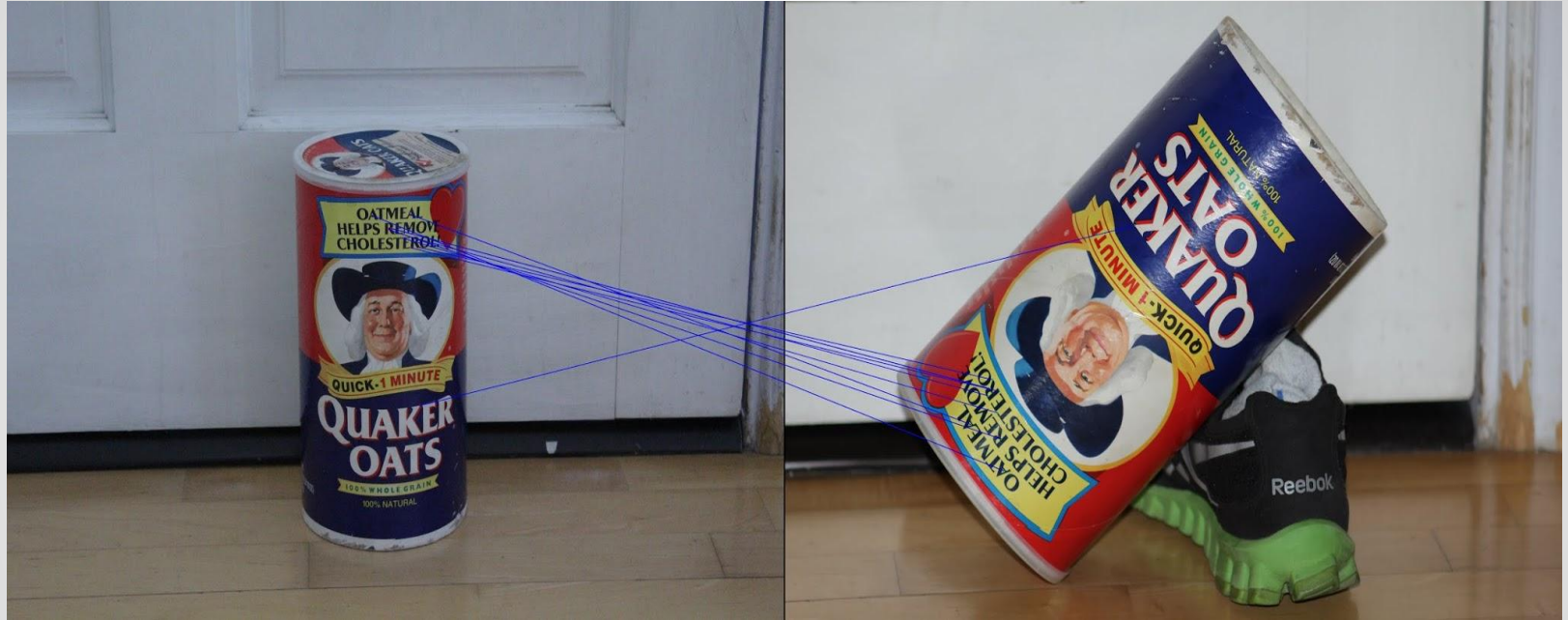
Part 2: Lighting output-1



*The lighting: I got all the keypoints matches correctly from what I can see. It matched very well from this image.

I tried many different images with brighter and darker scene and took me hours to try different setting and I found this one matched perfectly! The brightest of background blur and clear image of the oatmeal box helped easily detect keypoints.

Part 2: Rotation Output-2



*Rotation images output are successfully matched. It matched well, but if I zoom in, I can see it kind of shift a little bit.

I only take few photos of rotation to get it matches successfully. I tried couple images and all matches well.

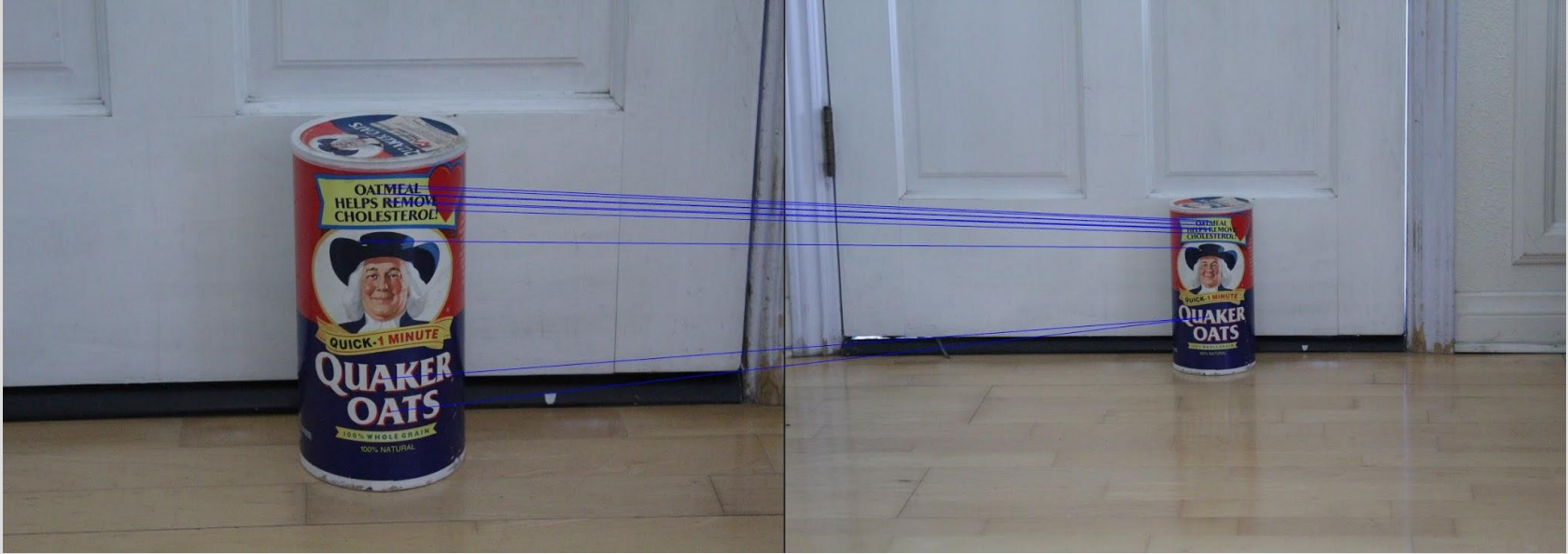
Part 2: Sample Output-3



*Sample output: I got all the key points correctly matches. It matched very well from what I see. The best matches are in a line and it hard to see if something may not matches.

I only took this picture once as it didn't need improvements since it matched successfully.

Part 2: Scale Output-4



*Scale output: I can see only 1 error on the letter A (from OATS) did NOT detect correctly, it were matched with the letter A from the top of word QUAKER instead of matched the A from OATS. And clearly see the hat matched well. Also, all other keypoints from top of the box are also matched successfully.

I took many different images by change the size of subject, distance. The distance image come out matched well.