Lab 8: Object Detection

Due Oct 26, 2020 by 11:59pm   **Points** 10   **Submitting** a text entry box

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The program **main_detect.py** ↓ (https://elearning.mines.edu/courses/25410/files/2307682/download?download_frd=1) detects and matches features between a training image and a query image. It tries to fit an affine transform to the feature matches, using a robust fitting method (least median of squares) to handle outliers (incorrect matches). If it can successfully fit an affine transform, the object is "detected", and the program warps the training image and blends it with the query image.

Run the program, using the training image "juice.pgm" and the query image "Img03.pgm" (from **images.zip** ↓ (https://elearning.mines.edu/courses/25410/files/2307689/download?download_frd=1)). Verify that the program successfully detects the object in the query image, meaning that the program overlays the object correctly on the blended image.

1. How many inlier matches were found?

Run the program, using the training image "juice.pgm" and the query image "Img02.pgm". In this case, the object is not in the query image, so the program should not be able to detect it. However, the program can still fit an affine transform, but it is incorrect. In other words, this is a "false positive".

2. How many inlier matches were found for this image?

One way to avoid errors like this is to require a larger number of inlier matches, in order to be sure that the affine transform is valid. Add code to count the number of inliers and test to see if it is greater or equal to a minimum threshold number. Use the value of 5 for this threshold. Now verify that the program does not report a detection for this image.

In addition to "recall" and "precision", another commonly used metric is "accuracy", for characterizing the performance of a classifier or recognition system. Accuracy is just the number of correct assessments divided by the number of all assessments. In other words, count the number of true positives (i.e., the number of times the object was detected and it was really there) and the number of true negatives (i.e., the number of times the object was not detected and it was not really there).

Run the program with the training image "book1.pgm", on the query images "TestImg01.pgm" through "TestImg010.pgm". It may help to fill in the following table with YES or NO in each entry. Hint: the object is present in half the images.

Image	Object is really present (y/n)	Program detected the object (y/n)
TestImg01		
TestImg02		
TestImg03		
TestImg04		
TestImg05		
TestImg06		
TestImg07		
TestImg08		
TestImg09		
TestImg010		

Report the following values:

3. Number of true positives (TP)

4. Number of true negatives (TN)

5. Overall accuracy

Turn in

The answers to questions 1..5