This homework is about matching interest points and contours. You will, first, identify points and contours in a given set of images, then, associate descriptors to these detections, and finally, match the corresponding descriptors in all pairs of images.

In particular, use the four images from HW1, which will give six image pairs. Detect in these images Canny edges, and represent each Canny edge as a sequence of regularly sampled points (choose a suitable sampling strategy). Characterize shape points by the shape context descriptor. Also, detect in the images DoG points, and associate with each DoG point the SIFT descriptor. For matching a specific pair of images, use the same feature and descriptor type. As a cost of matching two points, use the Euclidean distance between their associated descriptors. Also, when accounting for similarity of spatial layouts of points, use relative pixel distances between pairs of points. For matching edges, use Dynamic Time Warping. For matching interest points, use the following formulations: (1) Linear Assignment with one-to-one matching constraint, and (2) Spectral Clustering.

- (20pts) Your report should be concise, and in the format given at the class website (http://web.engr.oregonstate.edu/~sinisa/courses/OSU/CS556/CS556Homework.html).

- (80pts) The results section should include the following:
  - (30pts) Qualitative evaluation: Show $6 \cdot 3 = 18$ figures for six pairs of images and their corresponding matching results using 3 different matching formulations (one for edges, and two for interest points). Each figure should clearly mark 10 best matches from the two images (point pairs or edge pairs), as illustrated in Fig. 1.
  
  - (50pts) Quantitative evaluation
    * (40pts) Visually inspect the above 18 matching results. For each matching result, estimate true positives (TP) and false positives (FP) among the selected 10 best matches.
    * (10pts) Discuss your results in terms of advantages and disadvantages of each feature type, and matching formulation.

**IMPORTANT:**
In your report, all figures must have captions. Each missing caption will be penalized with 5 points.
Fig. 1. An example of how to show an image pair, and their best matching points.