CS5670 Computer Vision - Assignment 2 Report

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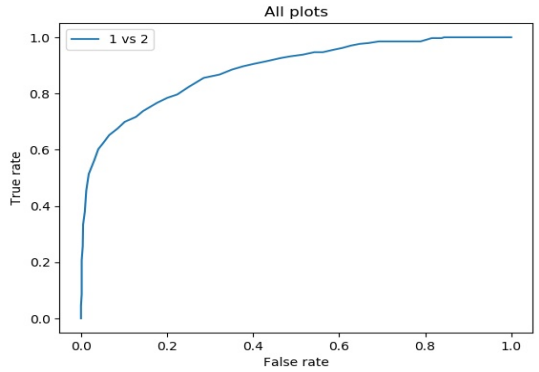
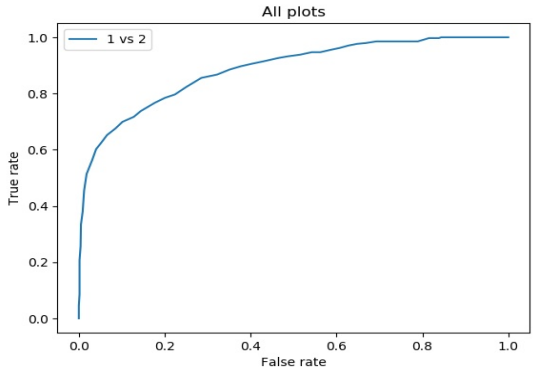
1 Yosemite Dataset Performance

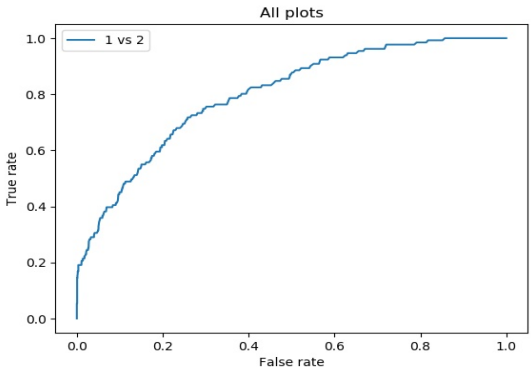
In this assignment, we have tested out the implementation of our feature detector, descriptor and matching algorithms on the Yosemite dateset. In order to compare the performances of different feature descriptors and distance metrics, we have computed the ROC and AUC for four combinations: simple descriptor + SSD, MOPS + SSD, simple descriptor + ratio distance and MOPS + ratio distance. We have obtained the resulting ROCs and AUCs as follows:



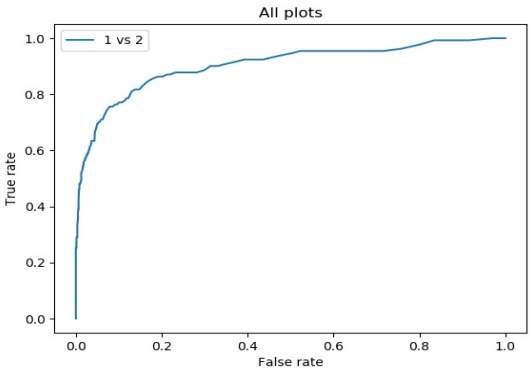
(a) Simple Descriptor + SSD (AUC: 0.8852)



(b) Simple Descriptor + Ratio (AUC: 0.9005)



(c) MOPS Descriptor + SSD (AUC: 0.7987)



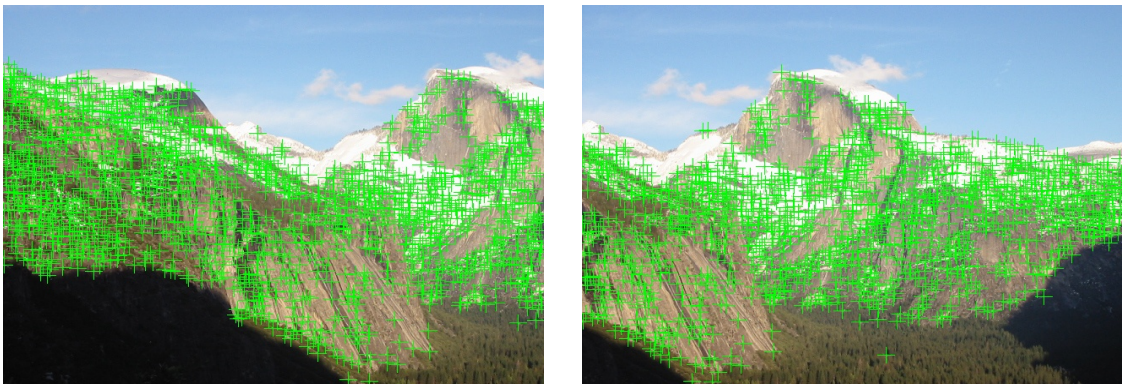
(d) MOPS Descriptor + Ratio (AUC: 0.9039)

Figure 1: ROC and AUC

As we can see, the best performing combination is MOPS + Ratio Distance. Also worth noting is that the performance of MOPS descriptor is much more sensitive to the choice of distance metrics compared to that of the simple descriptor.

2 Harris Image

We visualized the detected features with green plus signs across the two images as following:



(a) Yosemite Image 1 (b) Yosemite Image 2

Figure 2: Harris Images

As we can observe from the highlighted images, the detector detects a large number of features on the mountainside and along the curves of the mountain, especially along the border between the mountain and the forest, and the border between the soil and the snow. However, the detector did not adequately mark the corners along the curve of the mountaintop, which is particularly noticeable in image 1, and the shape of the cloud.

3 Feature Matching on Other Images

In addition to the Yosemite dataset, we also ran our implementation on the two images of the Kyoto shrines. The two images features the same shrine but are captured in different seasons and varies by dimension. The detector did a fairly good job highlighting the contour of the shrine but at the same time falsely matches a number of house features on the background with people's heads at the front. One fact that surprises us is the few number of features it detects from the roof of the shrine, which are some of the most obvious features identified by human eye. But overall we still believe that the detector did a great job matching the structures of the shrine.

Feature Matching