CS 378 Computer Vision Problem set 3
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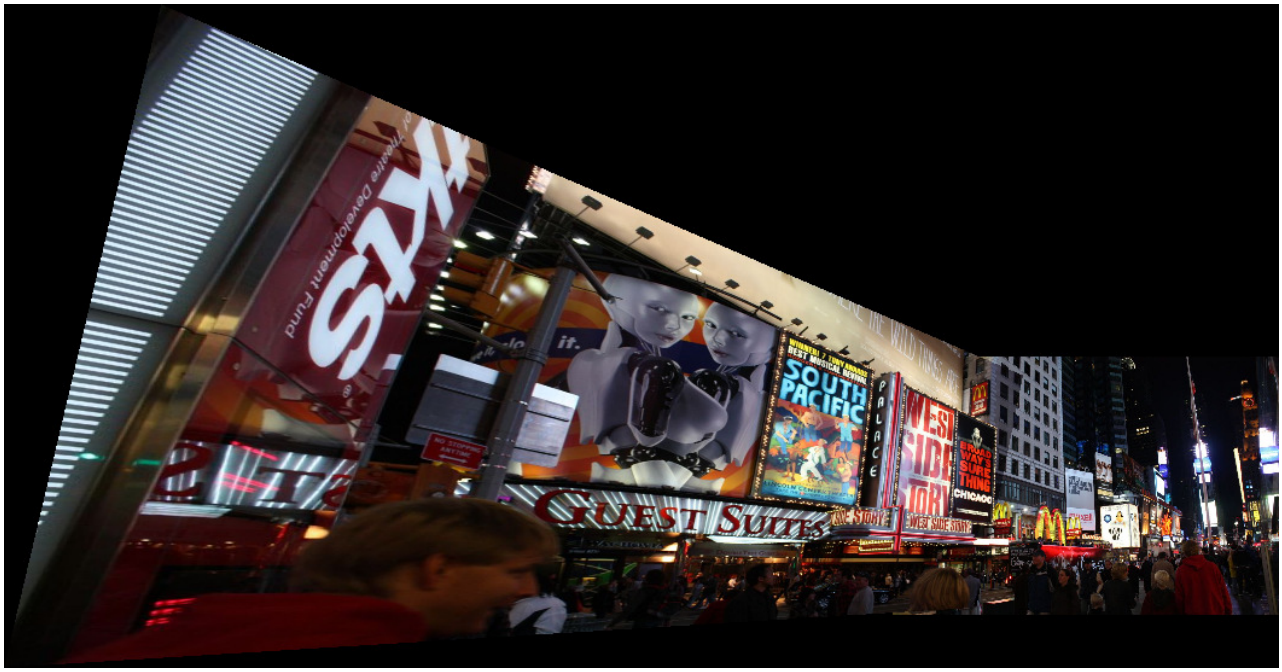
Image1: uttower1.jpg, Image2:uttower2.jpg, Top Image: Image2

Red marks and lines are set manually.Green marks and lines are verification using the homography matrix.

The output result is really good using these four pairs of corresponding points. And the result looks better when the wrapped image1 is at the bottom. We can see the roof of the building is in a straight line and the edge of the fountain is connected perfectly too. This resulting image would be much better if we adjust the brightness of wrapped image to be more uniform.

Image1: time3.jpg, Image2:time4.jpg, Top Image: Image1

Red marks and lines are set manually.Green marks and lines are verification using the homography matrix.



The output image using these four pairs of corresponding points is really succesful. We can see that the white light under the McDonald sign at the edge where the two images connect is perfectly aligned. Also the windows on the gray building at the edge where the images connect are aligned pretty well to form the original window shapes. The mosaic result of these two Time Square images are really sensitive to the chosen corresponding points since there are lots of straight lines at the edge where the two images connect together.

Image1: liberty1.jpg, Image2:liberty2.jpg, Top Image: Image1

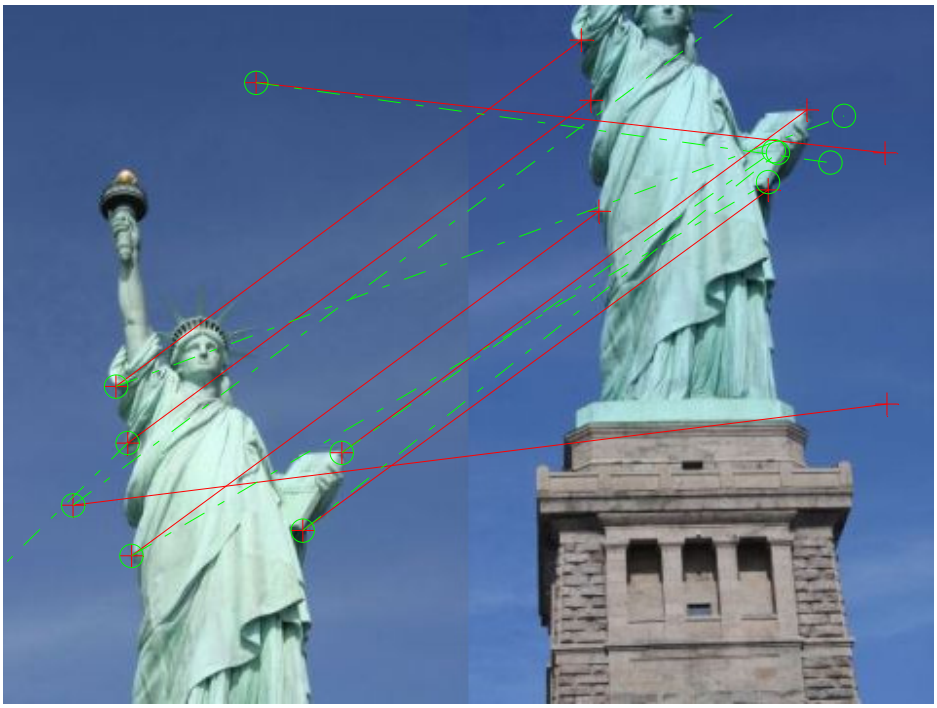
Pairs of corresponding points other than the ones shown here also produces good results for these two images. The Statue of Liberty is aligned pretty well in the output image. However, the brightness of the two images are somewhat different..

Image1: tower.jpg, Image2:time2.jpg, Top Image: Image1

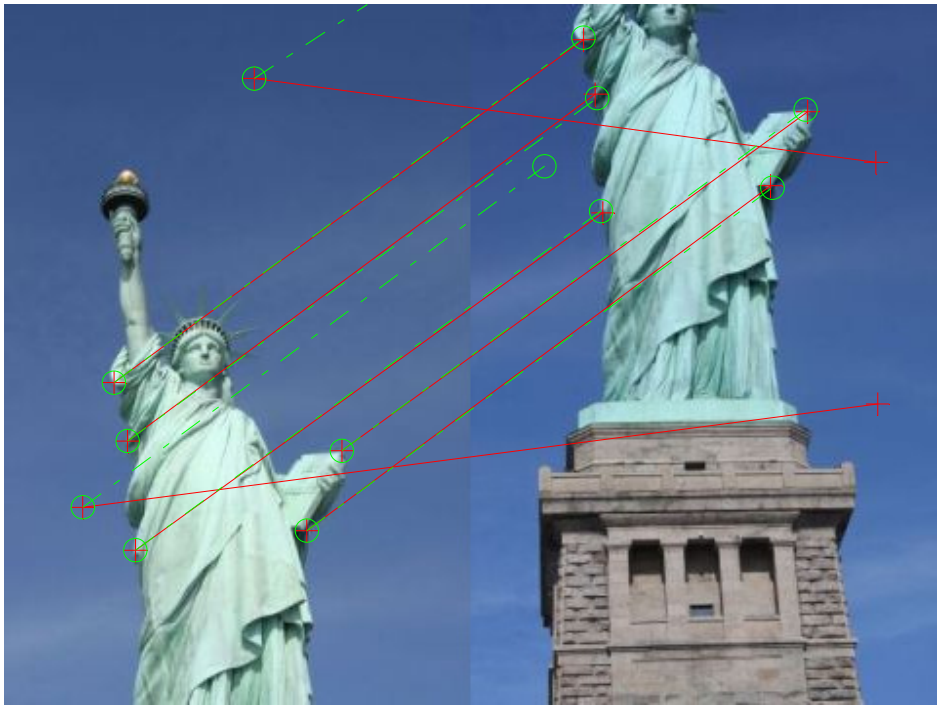
Replace the billboard of the Maxell commercial with a image of my kitten.

Optional 1

In my RANSAC function, it randomly selects 4 out of the 6 selected pairs of corresponding points to calculate the homography matrix. And by using this homography matrix on the points in the first image we can calculate corresponding points in the second image. If the distance between the calculated corresponding points and the manually assigned corresponding points is smaller than the threshold, then we count this pair of points as inliers. After several iterations, we select the homography matrix that produces the most inliers as our homography matrix.



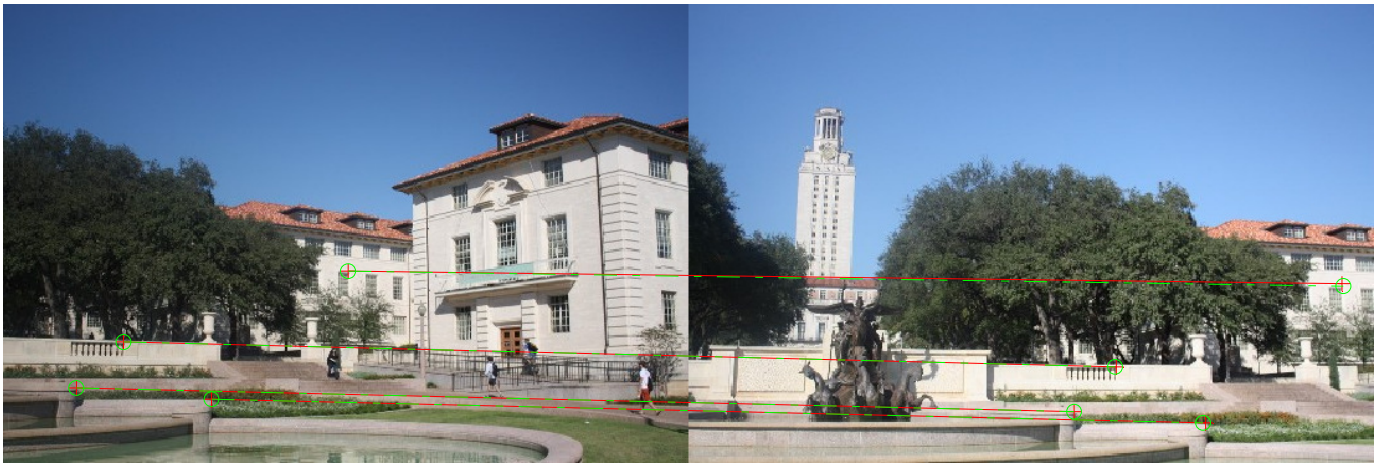
The green points and lines indicate the corresponding points the user has chosen. The resulting image on the left looks bad since some of the manually selected corresponding points are not correct. We can see from the top picture that the algorithm tries to accommodate all the selected corresponding points regardless of whether they are correct or not. As expected, this produces a really bad mosaic.



This is the result after RANSAC is applied. We can see from the top picture that all the correct corresponding points are aligned correctly and the incorrect points are ignored.

Optional 2

Search a 5x5 grid around the point user selected. For each point in this grid, we do a window-based comparison with the point as the center of the window. The window size we use is 13x13. We compute the least square distance between the windows and the window of the original point and find the window with the smallest distance. The center of this window will now be the new corresponding point.



This is an enlarged image of the right image above. The red points are the original points selected by the user. The green point is the newly found points. We can see there is some small adjustments.

The bottom image is the result after refining the point correspondences. It looks a lot better than the results of using the original user selected points shown in the image above.

Optional 3

The selected frame (marked with red points in the first image) is mapped to [0 0; 0 100;130 0;130 100] so that we can see all the frames form the front.