# Computer Vision: Problem set 3 (Section II)

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## 2  Programming problem: image mosaics

1. Apply your system to the provided pair of images. The correspondences between the two images and output mosaic are shown in Figure 1.
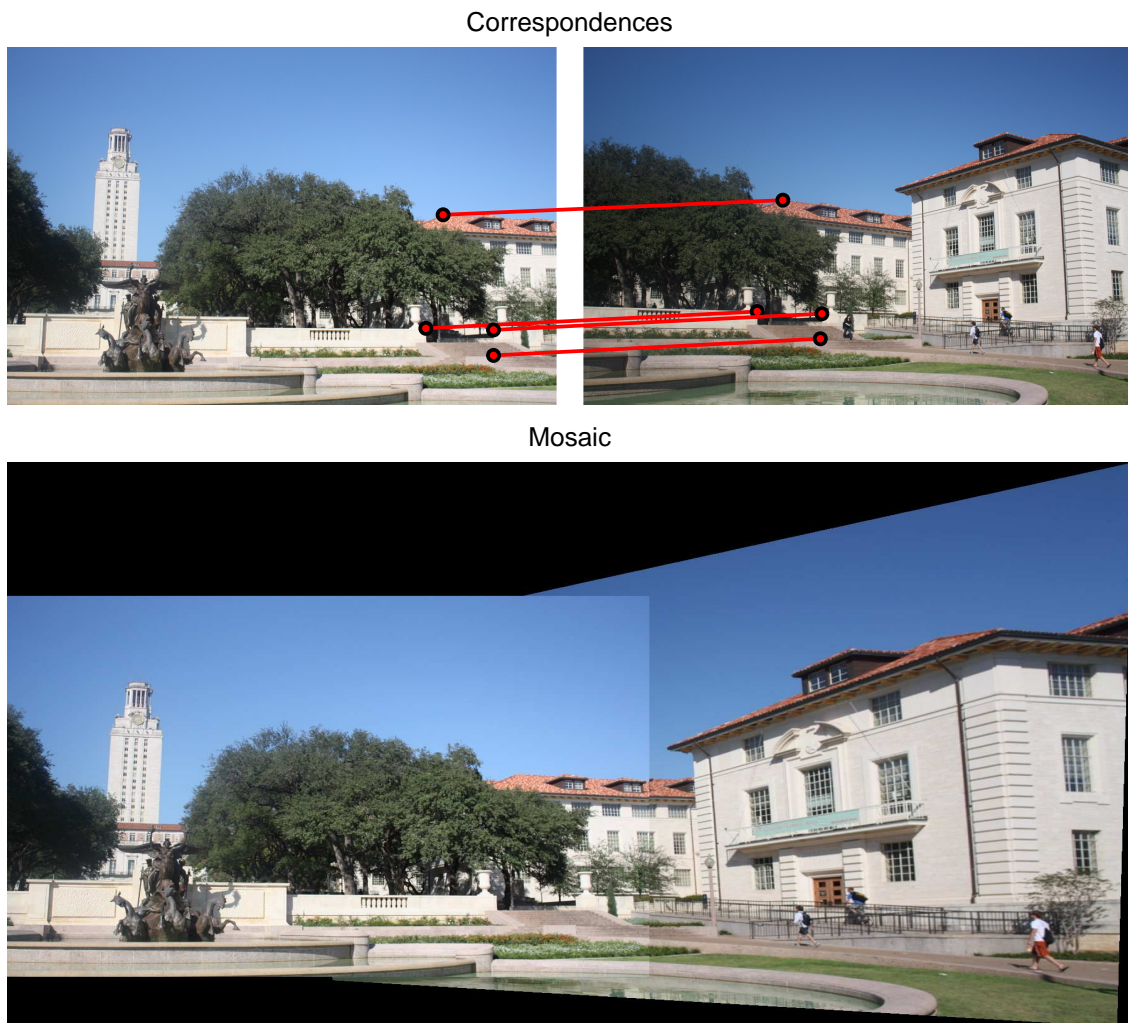


Figure 1: Correspondences and mosaic result of the provided pair of images.

2. Two additional examples of image stitching is given in Figures 2 and 3.
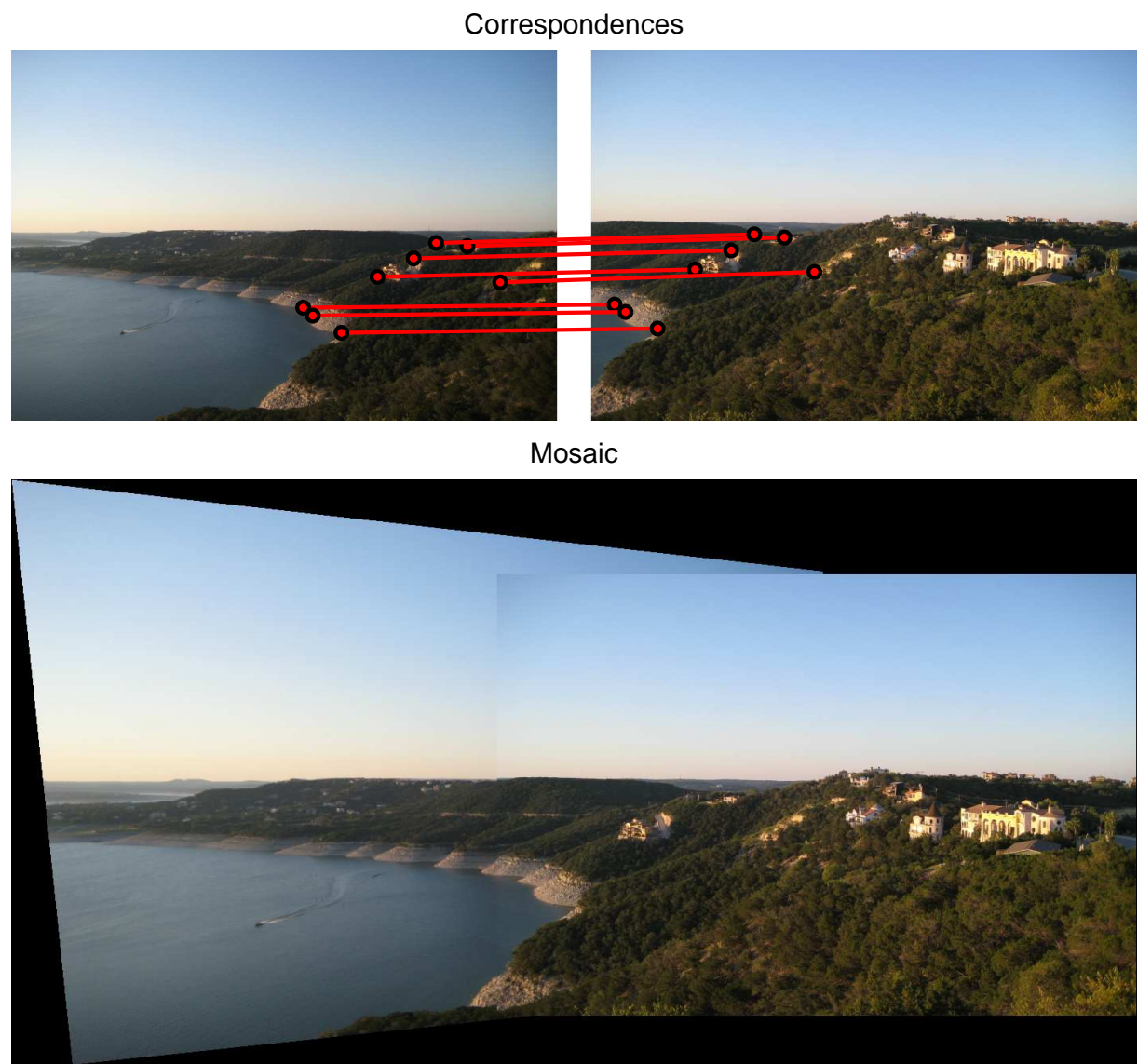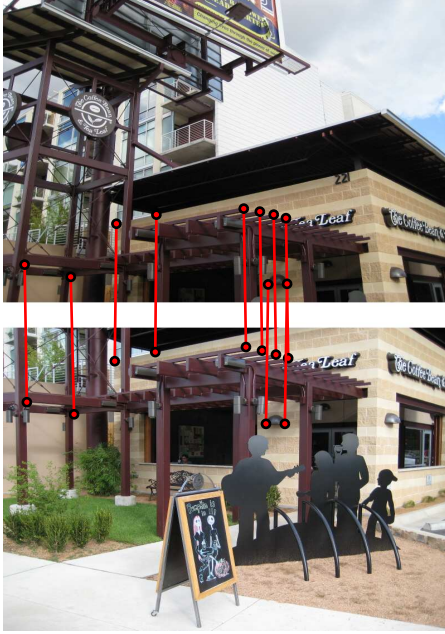
Correspondences



Mosaic



Figure 2: Correspondences and mosaic result of first example.

(a) Correspondences

(b) Mosaic

Figure 3: Correspondences and mosaic result of second example.

3. Warp one image into a 'frame' region in the second image. This is done by mapping the four corners of an image to the clicked points of another 'frame' image. Two examples are given in Figure 4.

(a) Richard Stallman and Bill Gates



(b) Transformers

Figure 4: Inserting an image to a frame in another image.

# 3   Extra credit

1. We implement RANSAC for robustly estimating the homography matrix from noisy correspondences. This is particularily useful since least squares fitting is sensitive to outliers. Figure 5 shows the correspondences, where the blue lines indicate noisy correspondences. As we can see in Figures 6(a) and 6(b), RANSAC gives a more accurate homography matrix resulting in a correct image stitch.
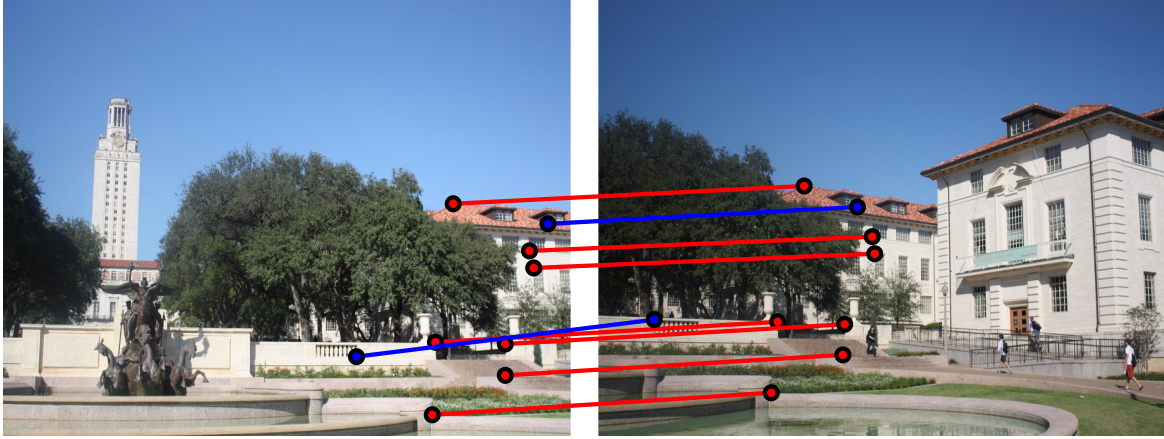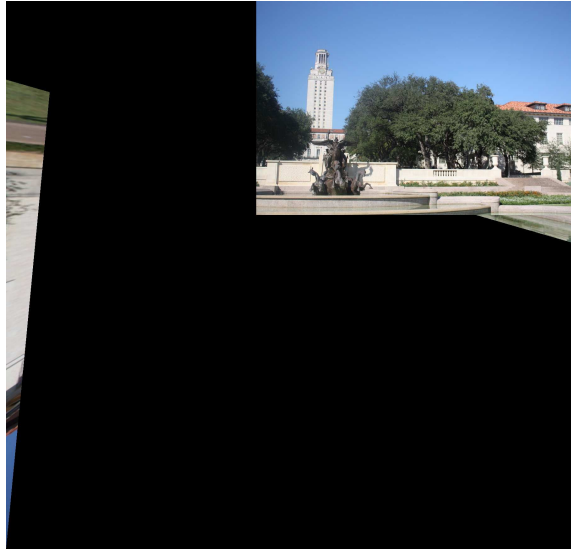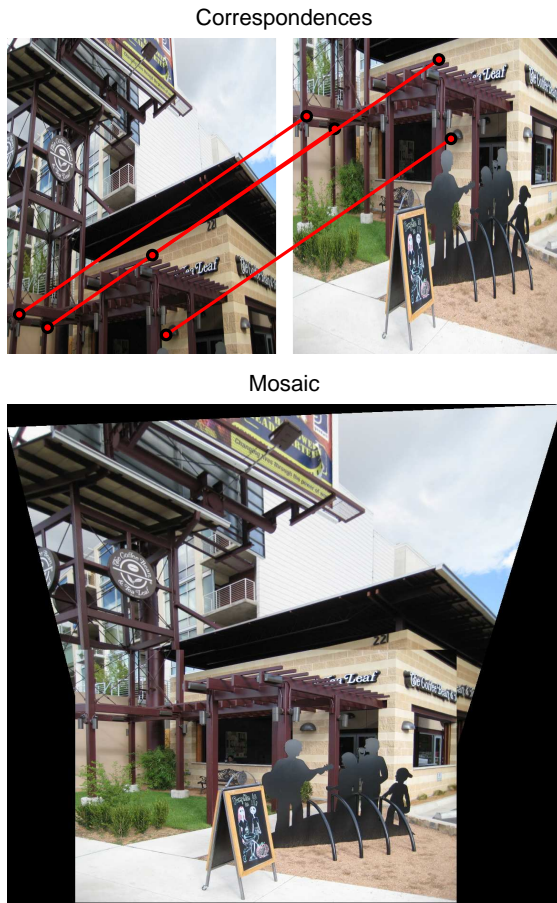


Figure 5: Correspondences

(a) Original non-RANSAC



(b) RANSAC

Figure 6: RANSAC for robust fitting of homography matrix.

2. We refine the initial correspondence automatically by searching small patches near the clicked points for a good alignment, as measured by SSD between the pixels. Figure 7 shows an example when this refinement improves the mosaic alignment.



(a) Initial correspondences

(b) Refined output

Figure 7: Refining initial correspondence automatically.

3. We rectify an image with some known planar surface and show the virtual fronto-parallel view. The clicked points of an image is mapped to corners of some rectangular shape. In Figure 8, we rectify the marked red region in each image.

4. A short video in the style of the HP commercials is given in the file 'pset3.wmv'.

Original

Rectified

(a) Example 1



Original

Rectified
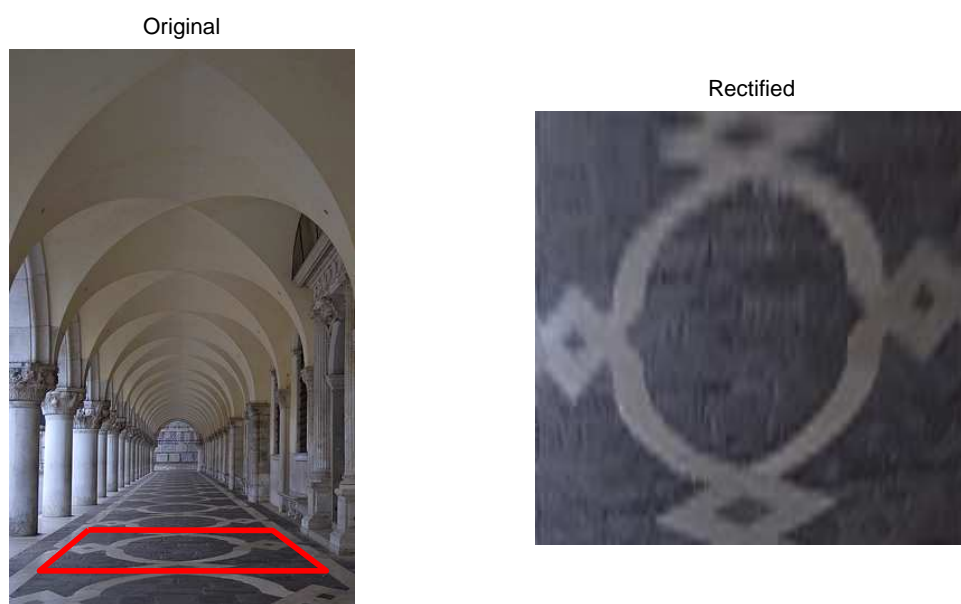
(b) Example 2

Figure 8: Rectifying images.