CS4363/5363 Computer Vision

Spring 2021

Lab 4

Due Friday, March 26

For this lab you will practice with automated homography construction for image stitching and piecewise affine transformations for image morphing.

1 Image Stitching

Write a program to stitch a set of partially overlapping images into a single image. Your program should not use any human intervention, all image similarities and correspondence points must be found automatically.

Your program must implement the following:

```
merge_images(image_list)
    while length(image_list)>1
        find the images im1 and im2 in image_list that are most similar
        stitch im1 and im2 , let the resulting image be w
        remove im1 and im2 from image_list
        append w to image_list
    return w
```

Test your program using the same dataset you used for the image stitching part of lab 2 and then with another three-image dataset that you generate. Your program should produce results like the ones below.

When merging two images, we recommend warping both images to the average of their control points. Let p_1 be an $n \times 2$ array containing the control points of image 1, and p_2 be an $n \times 2$ array containing the control points of image 2. You could use p_1 as the source points and p_2 as the destination points and warp image 1 to align it with image 2,,or viceversa. However, better result are usually obtained if you use the average of p_1 and p_2 (that is, $d = (p_1 + p_2)/2$, where d is the array containing the destination points) and aligng both images to those points.

2 Image Morphing

The transformations covered in class compute a single homography to map points in a source image to points in a destination image. The *PiecewiseAffineTransform()* provided in the same library divides the image into triangles given the correspondence points and computes an affine transformation for every triangle. This allows to better approximate non-rigid transformations at the cost of requiring many more correspondence points.

Your task consists of implementing face morphing, as explained in the attached powerpoint file. Generate an avi video using the source images and target points provided. Then generate another video using two images of your choice.

Submission

As usual, submit a report describing your work, including (at least) the following items:

1. Problem description(s).
2. Algorithms implemented.
3. Experimental results.
4. Conclusions. What did you learn from this assignment?
5. Appendix: Source code