

COL-780 Assignment 2

November 18, 2020

Image mosaicing is the process of piecing together multiple images of the same scene into a larger image. In this assignment, you will generate a mosaic by stitching together multiple images of a scene containing a moving object. Standard compositing techniques blend all information and produce a blurred image in the presence of moving objects. You must produce a focused image, by stitching along an optimal seam.

For example, Figure 1 shows a sequence of images from a construction scene that need to be stitched. Figure 2 shows the mosaic created by compositing the images using a blending function. The moving objects in the scene are blurred. In contrast, Figure 3 shows the mosaic created by stitching along optimal cuts.



Figure 1: Source images to be joined



Figure 2: Moving objects become ghosts when compositing images



Figure 3: Stitching images along optimal seams avoids ghosting

In this assignment, you will be required to join together only 2 images to create a mosaic. Following is the pipeline for creating mosaics:

1. Extract feature points using a descriptor of your choice available in OpenCV.
2. Estimate homography from the extracted features.
3. After the images have been registered, stitch them together. For handling moving objects without ghosting, the final mosaic should comprise of a set of regions, where each region comes from a single source image. These regions can be found using dynamic programming or graph-cuts [1].
4. **Bonus:** Blend the images along the seam using Pyramid Blending.

Submission Instructions

Code

Write a python script which accepts as input a string specifying the path to a folder containing the pair of images to be stitched. The output image must be generated in the directory containing your code. Name the script `createmosaic.py`. Thus, the format for executing the script should be:

```
python createmosaic.py --input_path <input_folder>
```

where `input_folder` has the following directory structure:

```
- input_folder
  - img1.png
  - img2.png
```

- You are allowed to use OpenCV and Numpy packages. Use Python 3.7.
- For implementing Graph-cut, you are allowed to use existing implementations of max-flow, for example item 6 in [2].

Report

- Include a brief description of your method.
- Include mosaics generated for the in-sample data provided.
- Click 10 image pairs like the ones provided — 5 in which your stitching performs very well, and 5 where it fails miserably. Mention the reasons you think that are responsible for this variation. Include the panoramas in the report. Note that these images must be clicked by you, and not downloaded from the internet.

Submission format

- This is an individual assignment.
- Your submission folder should contain the following:
 - Your python script `createmosaic.py`
 - Your report
 - Mosaics generated for the in-sample data provided.
 - Your captured image pairs, and the mosaics generated on these pairs.
- Zip this folder with the format <EntryNumber>.zip and upload on Moodle.

Evaluation Criteria

Your evaluation (out of 10) will be based on:

- 2 marks - Correctness of computed transformations
- 3 marks - Correct handling of moving objects
- 2 marks - Performance on out-sample images

- 2 marks - Report + Viva
- 1 mark - Performace on image pairs clicked by you
- 1 mark - Bonus (for Pyramid Blending)

References

- [1] Kwatra, Vivek, et al. "Graphcut textures: image and video synthesis using graph cuts." ACM Transactions on Graphics (ToG) 22.3 (2003): 277-286.
- [2] <https://pub.ist.ac.at/vnk/software.html>