Image Stitching

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Project Description

There are several steps(shown below) including feature detection, feature description, feature matching, alignment and blending, we use *MSOP(Multi-Image Matching using Multi-Scale Oriented Patches (http://matthewalunbrown.com/papers/cvpr05.pdf))* as Feature Descriptor and use *KNN(k nearest neighbor)* with *RANSAC* to do the Feature Matching. We also implemented Alignment and Blending for images to show our result.

Algorithms

Feature Descriptor

We implemented the *MSOP* to do the feature dectection and also use *non maximumal suppression* to make sure our features are well distributed.
Here are some example:

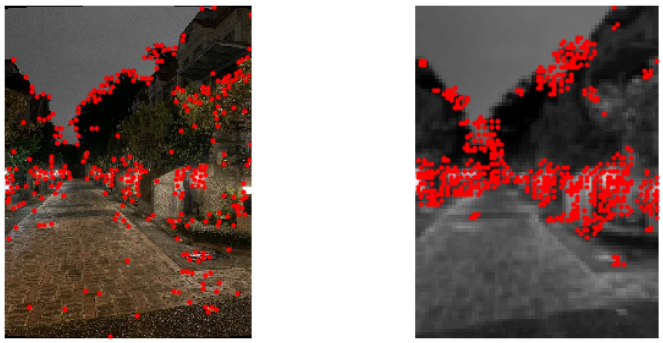


figure 1: image pyramid's feature map detect by harris corner detector

Feature Matching

In this part, we use K nearest neighbor with `k = 2` to find their matching. To make sure we choose the good matching pairs, we also implemented ***David Lowe's ratio test*** shown in function `feature_matching()` in `utils/stitch.py`.
Here are some example:

figure 2: feature matching in differnent level of pyramid

Alignment and Blending

After we have the matching pair, we can caluculate the tanslation between image. To get the best motion models, we implemented ***RANSAC*** shown in function `pairwise_alignment(...)` in `utils/stitch.py` . Then, we can do the blending, the result is not quite good until we modified the blending weighted in different dimension according to the magnitude of its motion parameter.

Usages

There are *python file(`main.py`)* and *ipython notebook(`Stitching.ipynb`)* for you to choose.

Prepare Images and Meta Data

Put your images in a single folder and prepare your meta data file. The meta file should contains filename and focal length separated with spaces.(see `./images/yard-002/pano.txt`)

Start

here is an example to run the code.

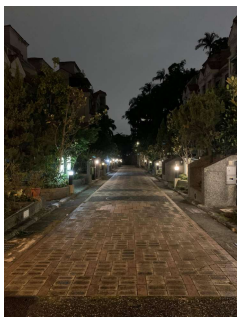
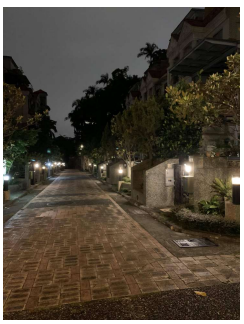
```
python3 main.py --img-dir ./images/yard-001/ --meta-path ./images/yard-001/pano.txt
```

to see more parameters

```
python3 main.py --help
```

Results

Original Image

....				....
				
	image010	**image011**	**image012**	

Stitching Image

tags: `NTU` `Homework` `vfx`

Acknowledgements and Links

- Digital Visual Effects (https://www.csie.ntu.edu.tw/~cyy/courses/vfx/20spring/overview/)
- Github Code (https://github.com/qa276390/image-stitching-msop) for this Project