CGRA 352 – Assignment 4 Report

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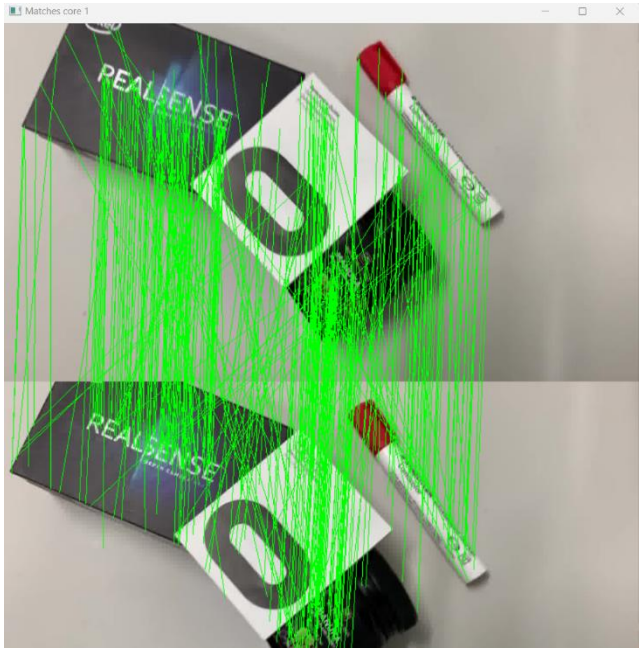
1 CORE – FEATURE MATCHING AND HOMOGAPHY TRANSFORMATION

How to run

For core, all the parts are contained in the function. Make sure the directory is correct for the images. Then run the program. Each core part will have its own image.

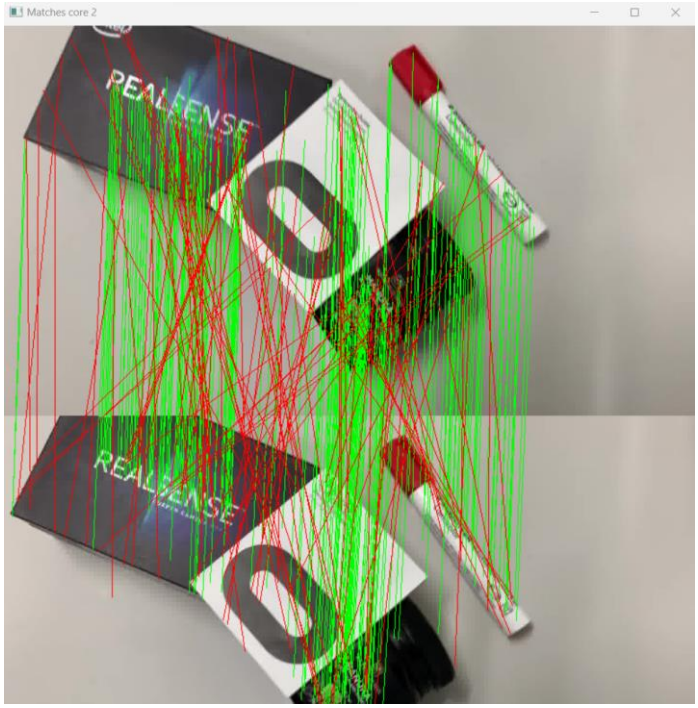
1.1 PART 1 – FEATURE MATCHING

For part 1, I will extract the feature points on the images Frame039.jpg and Frame041.jpg. Then find the matching pairs of feature points on the two images and draw a line between all the matched pairs across the two images.



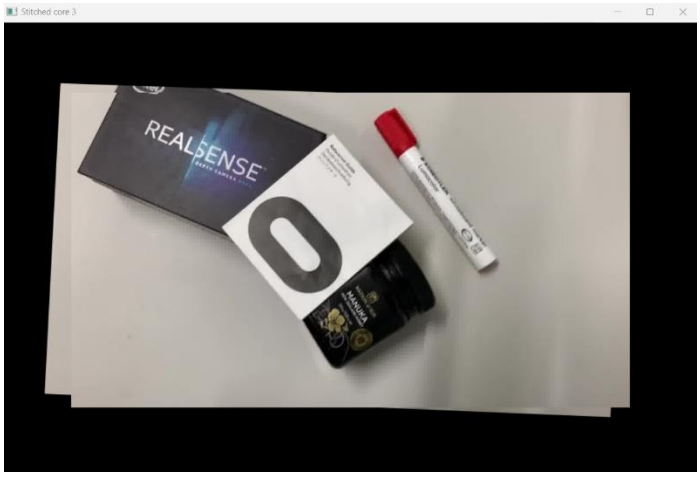
1.2 PART 2 – ESTIMATE HOMOGRAPHY TRANSFORMATION

For part 2, I will Implement a RANSAC-based homography transformation matrix estimation function for estimating the best homography transformation between the given image pair.



1.3 PART 3 – GENERATE AN IMAGE ALIGNED RESULT

For Part 3, I will, like part 2, to estimate the homography transformation between Frame039.jpg and Frame041.jpg. Then use the homography matrix to warp one of the images to align the content to another image.



2 COMPLETION – VIDEO STABILIZATION

How to run

For completion it is slightly more difficult. Create an output folder for the images and make sure the directory for the export images function is to that folder. The stabilized images will pop up into that folder.

2.1 VIDEO STABILIZER

In this section I will investigate how I can stabilize a set of images so that it creates a smooth video sequence. For this I will need to find the similarities between each neighbouring frame and return the stabilized frames.

2.2 FUNCTIONS

2.2.1 loadImages

This function allows me to read all the images from a directory and place them into a Mat vector for easy use in the code.

2.2.2 exportImages

This function allows me to export the stabilized images as pngs at a specific directory.

2.2.3 generate1DGaussian

Generates a gaussian filter.

2.2.4 videoStabilization

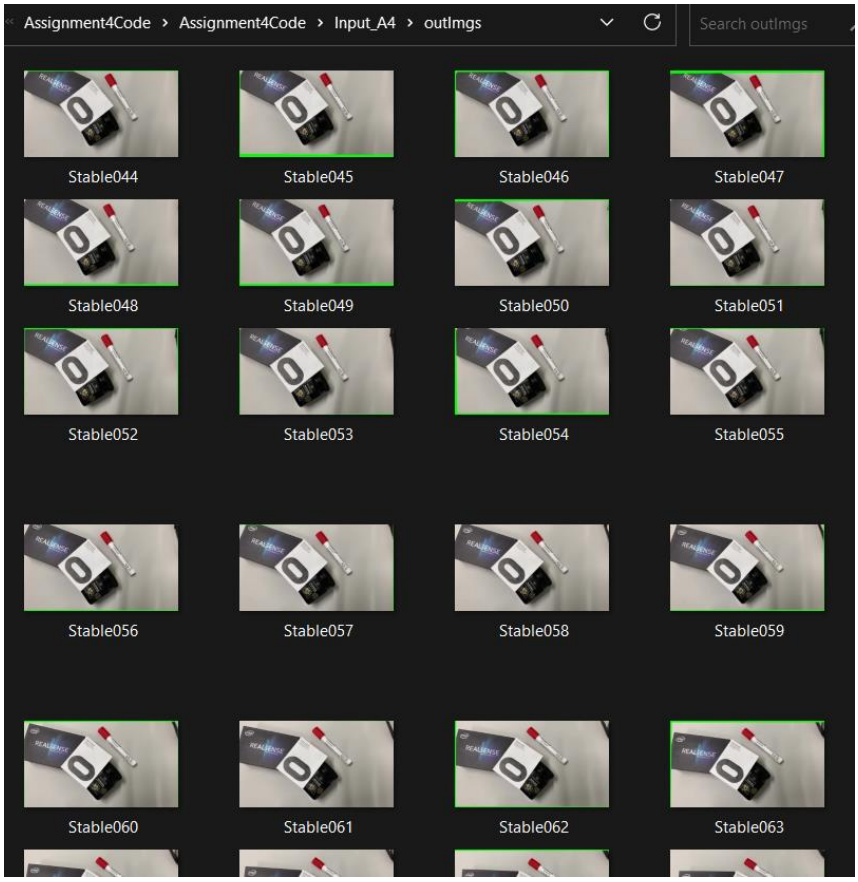
this is the main function of my section. In this function I calculate all the frame adaptions such as DoG, LoG, stabilization.

2.2.5 extraction

Like core 2, this function extracts the homography from two images. Therefore, we can find the differences between neighbouring frames.It is also important to note that all homgraphies will be similar to the initial frame there we use it to measure the motion of frames. I used RANSAC for this for a more confident result.

Once the frames had been successfully stabilized, I outputted the frames into a designated folder on my computer named ‘outImgs’.

2.3 EXAMPLE OUTPUT



3 CHALLENGE – BEST CROPPING WINDOW

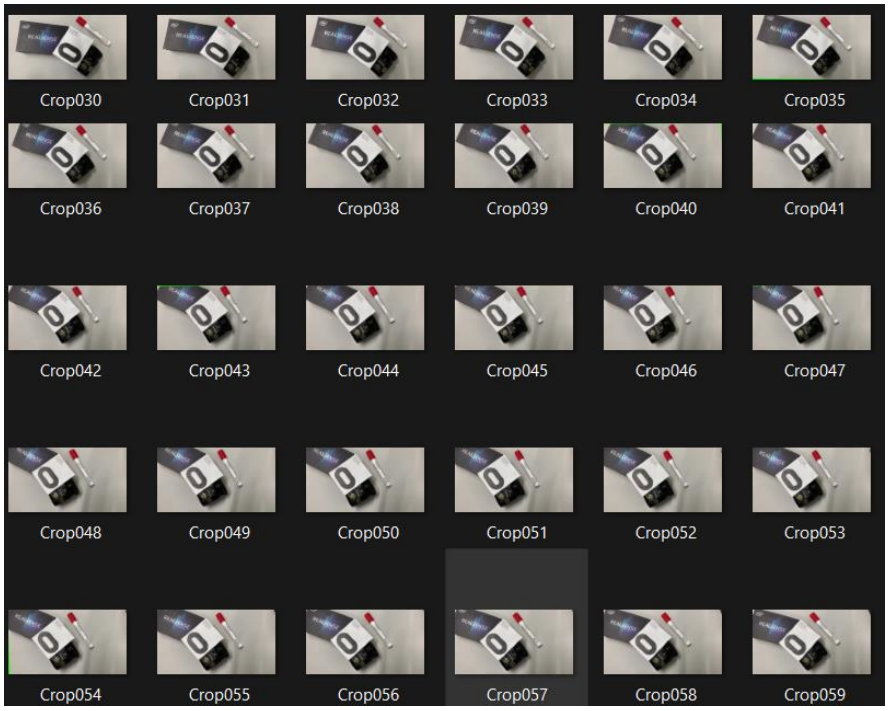
How to run

The same as challenge. However ‘croppedImgs’ is the directory.

3.1 MINCROP

To generate a final stabilized result, I will need to find the best cropping window with the same aspect ratio as the original frames cut off all the invalid black pixels for the whole video. I then outputted the cropped images into a designated folder on my computer named ‘croppedImgs’.

3.2 EXAMPLE OUTPUT



4 REFLECTION

This assignment delved into a very mathematical side of image manipulation. We look into finding feature matches between images to adapting images for a smoother video sequence. There were areas I couldn't finish with challenge having a few images that I wasn't able to remove all the crop.