Individual contributions

Liam (97117877)

I developed the image alignment method we used (after much experimentation) and the first working version of it using OpenCV, Numpy and Python.

Image alignment uses the mean position delta of the keypoints of the two nipples, the centre of the box and its four corners, to construct an affine translation. This is then applied to each image in the sequence on a rolling basis, such that every image is aligned with the aligned version of the image before it. This rolling basis accommodates for motion better and results in better alignment.

I helped coordinate our team to translate this image alignment code into Matlab.

Jonathan (11393269)

General

My personal contribution to the group for this assignment was as the manager of the development tools we would use and ensuring the consistency across the various files used in the project.

I arranged a shared Google Drive folder for the team to use for collaborative documentation. I also organised the GitHub repository used throughout the project's implementation.

For the first section of this assignment I was responsible for the bulk of the editing and formatting, as well as expanding on content provided by my team mates.

Project Implementation

For the project implementation, I contributed in 3 main ways.

The first was as the sole developer of the program's GUI and its integration with the rest of the program. The GUI was developed using MatLab's Simple Application Designer.

The second avenue through which I contributed was the conversion of code from Python to MatLab. One of the group members mocked up a rough solution in Python that we then needed to convert to MatLab. This was done by finding the corresponding functions in MatLab's libraries and refactoring the code.

The final way I contributed to the group was through the development of proof of concept and demonstration functions. These will be used throughout the presentation of the program to demonstrate how specific steps of the process were completed and why certain methods of image recognition were not used.

Martin (13029855)

Assignment 1
My main contribution for the first assignment was the background section of the report. I researched about how the breast superficial temperatures are a great piece of information to detect breast cancer, and why the use of dynamic thermograms. After the researched and selection of the important references and wrote the background section up until its final version.

I also contributed to other minor parts of the report. One of them was the dataset details, for which I needed to download some patient thermal images and heat matrices, determine their size, features of each image and the time interval between one image and the next one. Another was the research for the SURF algorithm, which on paper seemed like a really suitable algorithm to use, but Harris Corner Detection proved to be better in our trial and further tests.

Implementation

I contributed to the implementation in three aspects. The first one was converting a code from Python to Matlab. This code was a solution for the alignment of the image.

The second one was the function that enabled the animation of the aligned images.

Finally, I worked improving other functions that my teammates had written and commenting the code.

Felix

Assignment 1
In the assignment my main contribution was that of background research on image registration techniques and potential error metrics that could be used to evaluate or alignment algorithms. In the research I looked into potential feature detectors that could be used to align the images in the set such as Harris Corner Detection, FAST and BRISK descriptors.

The error detection section of the report required some initial testing and I wrote the matlab code to perform those tests on the dataset and get initial results. For those test I also put together some basic registration methods using Harris Corner Detection and SURF descriptors, these were created with the initial use of Matlab's Registration Estimator tool.

Implementation
I initiated the work on the matlab project and put together the scripts for error estimation using keypoint shift calculation between images, these keypoints are found using Harris Corner Detection together with a naive blob detection function that uses thresholds and region proportions.

I added a threshold calculation function which iterates over a range of thresholds (90-120) to find the one that provides the most relevant results; in this case we needed 3 distinct points

for appropriate alignment.

Finally I provided general optimisation of the alignment function that we produced in this project by analysing the keypoint detection methods and the attributes they were set to use as well as trying out other ways of dynamically calculating the transformation matrices for the images.