**How the data are organized:**

There are two folders containing data—the first is labeled with the number 2 and the second is labeled with the number 3.

Folder 2:

-This folder contains the original, unaltered data. This folder contains multiple sub-folders insider of it. I only need to analyze every fourth sub-folder. That is, if there are 8 sub-folders inside of this folder, only analyze Sub-folder 1 and Sub-folder 5.

- Inside of each sub-folder, there is data from three cameras (two infrared (FLIR and ICI) and one color (Logitech) ). When the images were taken, the camera took three images altogether. So we have three images associated with each of the three cameras. There is also RAW-file data (this contains the initial digital value from the thermal camera (no physical meaning)) and TMP-file data (skin temperature data). Note, the RAW file is not important. I only need the TMP-file data.

-Because the FLIR images contain about ¼ of the pixel number of pixels as the ICI images, the ICI images were cropped to have same number of pixels as the FLIR images.

-File label interpretations:

The files are labeled according to a specific scheme. Here is an example of a file label:

20151117-1-2-3

[Interpretation: This image was taken on Novermber 11, 2015.

The “-1” means Subject 1

The “-2” means Round 2

The “-3” means indicates that this is the third image taken in the round]

For each round there are four subjects. For each subject, three images were taken. They are almost identical, and to reduce noise, these images were averaged. After averaging, a simple equation was applied to the averaged image, and then it was cropped.

Folder 3:

- This folder contains all of the cropped template images.

- There are no sub-folders in this folder, but each file in this folder corresponds with a file in Folder 2.

- In this folder, half the data correspond with FLIR images and half with ICI images. I only need to analyze the ICI images. The files are stored as .mat files, which contain info, but I only need to pay attention to “tmp” part of data. This is the cropped image.

**Issue**:

Initially the data had been analyzed using averaging in order to remove noise. But we want to see how the results are affected if averaging is not done and noise is still present in the images. The problem is we do not know where the template was taken, so we cannot find which part of the noise image we should compare with the averaged template image. Thus, we need to figure out the original position of the template image so that we are able to extract a template from the same location in the original noisy image to compare them. (Note : This only needs to be done for images in the first round. We can ignore images from rounds 2, 3, and 4).

**Steps to be taken:**

1. Average three original images.

2. Apply inverse function to the template image.

3. Perform template matching between the results from the first two steps (i.e. the averaged template image and the averaged original image).

4. Use the location parameters obtained from Step 3 to extract a new template image from each of the three original images.

5. Store the new template obtained from Step 4 in a new variable named “tmp1” in the original .mat file in the output folder.

6. Write a code that applies steps 1-5, looping over all the data, but only focuses on Round 1.