

DSAA Course Project

FitBit: Heart Rate Monitoring during exercise

Background

Fitness tracking is gaining massive popularity due to the advent of wearable devices that can track your vital signs. Heart rate monitoring is one such feature in many devices such as smart-watches and wristbands. The heart rate is estimated in real time and can guide exercises to adjust their workload and training programs, which is especially useful in rehabilitation.

Most of the recording is done using photoplethysmographic (PPG) signals which are recorded from the wearer's wrist. The PPG signal is recorded using embedded pulse oximeters. A pulse oximeter records a signal by illuminating the skin with an LED and measuring the intensity changes as the light reflects off the exercises during the wearer's skin, forming a PPG signal. Each cycle of the PPG signal corresponds to a cardiac cycle, thus the heart rate can be estimated from the periodicity of the PPG signal.

Submission Format

For this problem, the dataset is in the form of `.mat` files, so matlab is preferred. However we are also allowing python for this project.

- Your output folder should contain a bash script `'team_XX.sh'`, a detailed report `'report_team_XX.pdf'`, and any other matlab/python file. See below for details.
- Your script should run your matlab / python file without a GUI on the terminal. The time limit per script is 20 minutes.
- Your script will be run as `'team_XX.sh <path/to/train/file.mat> <path/to/test/file.mat>'`. Note that the format of the training and testing data is slightly different. Please go through the README for full details.
- Your script should output a single `'output_team_XX.mat'` file containing a single variable `'pred'`, which is a column vector of your predictions. Please take care to ensure that there are no size mismatches.

Sample bash script for python:

```
#!/bin/bash
python your_script.py $1 $2
```

Sample bash script for matlab:

```
#!/bin/bash
matlab -nosplash -nodesktop -nodisplay -nojvm -r 'yourfunction($1, $2);
quit;'
```

Unless you call `quit` from within `your-function()`, writing it at the end is important. Otherwise the matlab interpreter will not shut down and you will be judged with a timeout.

Dataset Details

The format of the data is given in the README file. Please go through it thoroughly.