**RCode for BEAPEngine**

This is the documentation of the R code used by BEAPEngine project. Inside the containing directory of this document, the following files/directories exist:

* applewatch directory: includes the Apple Watch-related codes.
* fitbit directory: includes the Fitbit-related codes.
* SavedModels directory: includes the classification models generated by different classifier algorithms.
* ModelSaver.r file: the R code for generating classification models
* aggregated\_fitbit\_applewatch\_jaeger.csv file: the training data for classification models

# ModelSaver.r

This file contains the R code for generating the classification models from the trained data and save them for later. Inside the code, the training data (“aggregated\_fitbit\_applewatch\_jaeger.csv”) is read into the memory as a data frame and Decission Tree, SVM, Random Forest and Rotation Forest models for the training data are generated.

For each model, the required columns are separated from the main data frame and then the model is generated. The trained data is used for predicting new users’ activity classes.

For the Rotation Forest model, there is no suitable R package that can generate the model for us. Instead, we used “RWeka” package, which creates an interface in R for calling Weka functions. As Rotation Forest is not included in the default Weka packages, first we need to load the package in R:

WPM("load-package", "RotationForest")

Then we can create the interface between R and Weka using “RWeka” library as:

rotation\_forest <- make\_Weka\_classifier("weka/classifiers/meta/RotationForest")

Finally, we can generate the model using the “rotation\_forest” interface.

At the end of each section in the ModelSaver.r code, the generated classification model is saved into the “SavedModels” directory.

# Apple watch and Fitbit directories

Inside “applewatch” and “fitbit” directories, we have two inner directories:

* code: including the R codes, which are called by BEAPEngine.
* data: including the temporary data which are used by BEAPEngine.

## code

Inside this directory, we have the following files including the R codes:

* DataProcessor.R: This code is responsible for processing raw Apple watch/Fitbit data and extract their useful features, such as heart rate, steps, calories, distance and the combined of all. Each feature is stored in a .csv file in the “data/output” directory.
* Predictor.R: This code takes user’s processed data and predicts the activity class labels based on the required model. The name of processed data, which is a .csv file, along with the model name is passed to this R code and the predictions are generated as a .csv file and saved into “data/output” path.

## data

Inside this directory, the temporary data is stored to be processed by different R codes. For example, BEAPEngine saves the user’s uploaded raw Fitbit data into this path and call the “DataProcessor.R” code to process the raw data. Whenever the results are ready and returned to the user, all the uploaded or generated files inside “data” and “data/output” are removed.