Codebook for the Human Activity Recognition Smartphone (Trimmed) Dataset

The original dataset was developed from work originally posted at http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones and involved experiments done with human subjects to study the acceleration and angular movements of subjects performing various physical activities.

As part of our exercise we were asked to combine TEST and TRAINING data and organize it alongside the Subject (identified only by an ID) and exercise activity, which was further explained. We then gathered various observations from the physical activities. Most of the measures were collected for X, Y, and Z dimensions.

The features selected for this database come from the accelerometer and gyroscope 3-axial raw signals tAcc-XYZ and tGyro-XYZ. The acceleration signal was then separated into body and gravity acceleration signals (tBodyAcc-XYZ and tGravityAcc-XYZ) using another low pass Butterworth filter with a corner frequency of 0.3 Hz. [1]

Subsequently, the body linear acceleration and angular velocity were derived in time to obtain Jerk signals (tBodyAccJerk-XYZ and tBodyGyroJerk-XYZ). Also the magnitude of these three-dimensional signals were calculated using the Euclidean norm (tBodyAccMag, tGravityAccMag, tBodyAccJerkMag, tBodyGyroMag, tBodyGyroJerkMag). [1]

Finally a Fast Fourier Transform (FFT) was applied to some of these signals producing fBodyAcc-XYZ, fBodyAccJerk-XYZ, fBodyGyro-XYZ, fBodyAccJerkMag, fBodyGyroMag, fBodyGyroJerkMag. (Note the 'f' to indicate frequency domain signals). [1]

These signals were used to estimate variables of the feature vector for each pattern:

'-XYZ' is used to denote 3-axial signals in the X, Y and Z directions.

SubjectID (integer)

Identifies the subject associated with the observation

Activity (integer, range 1:6)

Identifies which of six activities the subject was performing

Body Acceleration (numeric, means and standard deviations for X, Y, and Z dimensions)

```
tBodyAccMeanX
tBodyAccMeanY
tBodyAccMeanZ
tBodyAccstdX
tBodyAccstdY
tBodyAccstdZ
```

Gravitational Acceleration (numeric, means and standard deviations for X, Y, and Z dimensions)

```
tGravityAccMeanX
tGravityAccMeanY
tGravityAccMeanZ
```

tGravityAccstdX
tGravityAccstdY
tGravityAccstdZ

Magnitudes of the signal calculated using Euclidean norm (numeric, means and standard deviations for X, Y, and Z dimensions) [2]

tBodyAccJerkMeanX
tBodyAccJerkMeanY
tBodyAccJerkMeanZ
tBodyAccJerkstdX
tBodyAccJerkstdY
tBodyAccJerkstdZ

tBodyGyroMeanX
tBodyGyroMeanY
tBodyGyroMeanZ
tBodyGyrostdX
tBodyGyrostdY
tBodyGyrostdZ

tBodyGyroJerkMeanX
tBodyGyroJerkMeanY
tBodyGyroJerkMeanZ
tBodyGyroJerkstdX
tBodyGyroJerkstdY
tBodyGyroJerkstdZ

tBodyAccMagMean
tBodyAccMagstd

tGravityAccMagMean
tGravityAccMagstd

tBodyAccJerkMagMean
tBodyAccJerkMagstd

tBodyGyroMagMean
tBodyGyroMagstd

tBodyGyroJerkMagMean
tBodyGyroJerkMagstd

New calculations produced using an FFT (numeric, mean and standard deviation for X, Y, and Z dimensions) [3]

fBodyAccMeanX
fBodyAccMeanY
fBodyAccMeanZ
fBodyAccstdX
fBodyAccstdY
fBodyAccstdZ

fBodyAccMeanFreqX
fBodyAccMeanFreqY

fBodyAccMeanFreqZ

fBodyAccJerkMeanX
fBodyAccJerkMeanY
fBodyAccJerkMeanZ
fBodyAccJerkstdX
fBodyAccJerkstdY
fBodyAccJerkstdZ

fBodyAccJerkMeanFreqX
fBodyAccJerkMeanFreqY
fBodyAccJerkMeanFreqZ

fBodyGyroMeanX
fBodyGyroMeanY
fBodyGyroMeanZ
fBodyGyrostdX
fBodyGyrostdY
fBodyGyrostdZ

fBodyGyroMeanFreqX
fBodyGyroMeanFreqY
fBodyGyroMeanFreqZ

fBodyAccMagMean
fBodyAccMagstd
fBodyAccMagMeanFreq

fBodyBodyAccJerkMagMean
fBodyBodyAccJerkMagstd
fBodyBodyAccJerkMagMeanFreq

fBodyBodyGyroMagMean
fBodyBodyGyroMagstd
fBodyBodyGyroMagMeanFreq

fBodyBodyGyroJerkMagMean
fBodyBodyGyroJerkMagstd
fBodyBodyGyroJerkMagMeanFreq

[1] Scientific descriptions of the experiment were taken from the original README supplied to the student. They are copied here to provide broader context on the variables.

[2] For more information on Euclidean distances, see https://en.wikipedia.org/wiki/Euclidean_distance

[3] For more information about Fast Fourier Transforms, see https://en.wikipedia.org/wiki/Fast_Fourier_transform