CODEBOOK

FEATURES from Human Activity Recognition Using Smartphones Data Set as Observed in SUBJECTS in various ACTIVITES

The features selected for this database come from the accelerometer and gyroscope 3-axial raw signals tAcc-XYZ and tGyro-XYZ. These time domain signals (prefix 't' to denote time) were captured at a constant rate of 50 Hz. Then they were filtered using a median filter and a 3rd order low pass Butterworth filter with a corner frequency of 20 Hz to remove noise. Similarly, 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.

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).

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).

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.

Subject
  Source: ProjectData/test/subject_test.txt
        ProjectData/train/subject_train.txt
  1 ... 30 Subject ID

Activity
  Source: ProjectData/activity_lables.txt
  WALKING
  WALKING_UP
  WALKING_DOWN
  SITTING
  STANDING
  LAYING

tBodyAcc.mean.X
  time domain signals
  average of the mean of body acceleration signal in X axis from accelerometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyAcc.mean.Y
  time domain signals
  average of the mean of body acceleration signal in Y axis from accelerometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyAcc.mean.Z

time domain signals
average of the mean of body acceleration signal in Z axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tBodyAcc.std.X
time domain signals
average of the standard deviation of body acceleration signal in X axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tBodyAcc.std.Y
time domain signals
average of the standard deviaton of body acceleration signal in Y axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tBodyAcc.std.Z
time domain signals
average of the standard deviaton of body acceleration signal in Z axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.mean.X
time domain signals
average of the mean of gravity acceleration signal in X axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.mean.Y
time domain signals
average of the mean of gravity acceleration signal in Y axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.mean.Z
time domain signals
average of the mean of gravity acceleration signal in Z axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.std.X
time domain signals
average of the standard deviation of gravity acceleration signal in X axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.std.Y
time domain signals
average of the standard deviation of gravity acceleration signal in Y axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tGravityAcc.std.Z
time domain signals
average of the standard deviation of gravity acceleration signal in Z axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.mean.X
   time domain signals
   average of the mean of body acceleration signal jerk in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.mean.Y
   time domain signals
   average of the mean of body acceleration signal jerk in Y axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.mean.Z
   time domain signals
   average of the mean of body acceleration signal jerk in Z axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.std.X
   time domain signals
   average of the standard deviation of body acceleration signal jerk in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.std.Y
   time domain signals
   average of the standard deviation of body acceleration signal jerk in Y axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerk.std.Z
   time domain signals
   average of the standard deviation of body acceleration signal jerk in Z axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.mean.X
   time domain signals
   average of the mean of body acceleration signal in X axis from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.mean.Y
   time domain signals
   average of the mean of body acceleration signal in Y axis from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.mean.Z
   time domain signals
   average of the mean of body acceleration signal in Z axis from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.std.X
   time domain signals
   average of the standard deviation of body acceleration signal in X axis from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.std.Y
  time domain signals
  average of the standard deviation of body acceleration signal in Y axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyro.std.Z
  time domain signals
  average of the standard deviation of body acceleration signal in Z axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.mean.X
  time domain signals
  average of the mean of body acceleration signal jerk in X axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.mean.Y
  time domain signals
  average of the mean of body acceleration signal jerk in Y axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.mean.Z
  time domain signals
  average of the mean of body acceleration signal jerk in Z axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.std.X
  time domain signals
  average of the standard deviation of body acceleration signal jerk in X axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.std.Y
  time domain signals
  average of the standard deviation of body acceleration signal jerk in Y axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerk.std.Z
  time domain signals
  average of the standard deviation of body acceleration signal jerk in Z axis from gyrometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccMag.mean
  time domain signals
  average of the mean of body acceleration signal magnitude from accelerometer
  -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccMag.std
  time domain signals
  average of the standard deviation of body acceleration signal magnitude from accelerometer

-0.99999999999999 .... 0.99999999999999 Hz

tGravityAccMag.mean
   time domain signals
   average of the mean of gravity acceleration signal magnitude from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tGravityAccMag.std
   time domain signals
   average of the standard deviation of gravity acceleration signal magnitude from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerkMag.mean
   time domain signals
   average of the mean of body acceleration signal jerk magnitude from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyAccJerkMag.std
   time domain signals
   average of the standard deviation of body acceleration signal jerk magnitude from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroMag.mean
   time domain signals
   average of the mean of body acceleration signal magnitude from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroMag.std
   time domain signals
   average of the standard deviation of body acceleration signal magnitude from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerkMag.mean
   time domain signals
   average of the mean of body acceleration signal jerk magnitude from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

tBodyGyroJerkMag.std
   time domain signals
   average of the standard deviation of body acceleration signal jerk magnitude from gyrometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.mean.X
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the mean of body acceleration signal in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.mean.Y
   frequency domain signals - time domain signals with Fast Fourier Transform

average of the mean of body acceleration signal in Y axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.mean.Z
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the mean of bpdy acceleration signal in Z axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.std.X
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the standard deviation of body acceleration body in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.std.Y
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the standard deviation of body acceleration signal in Y axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAcc.std.Z
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the standard deviation of body acceleration signal in Z axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.mean.X
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the mean of body acceleration signal jerk in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.mean.Y
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the mean of body acceleration signal jerk in Y axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.mean.Z
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the mean of body acceleration signal jerk in Z axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.std.X
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the standard deviation of body acceleration signal jerk in X axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.std.Y
   frequency domain signals - time domain signals with Fast Fourier Transform
   average of the standard deviation of body acceleration signal jerk in Y axis from accelerometer
   -0.99999999999999 .... 0.99999999999999 Hz

fBodyAccJerk.std.Z

frequency domain signals - time domain signals with Fast Fourier Transform
average of the standard deviation of body acceleration signal jerk in Z axis from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.mean.X
frequency domain signals - time domain signals with Fast Fourier Transform
average of the mean of body acceleration signal in X axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.mean.Y
frequency domain signals - time domain signals with Fast Fourier Transform
average of the mean of body acceleration signal in Y axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.mean.Z
frequency domain signals - time domain with Fast Fourier Transform
average of the mean ody acceleration signal body in Z axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.std.X
frequency domain signals - time domain signals with Fast Fourier Transform
average of the standard deviation of body acceleration signal in X axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.std.Y
frequency domain signals - time domain signals with Fast Fourier Transform
average of the standard deviation of body acceleration signal in Y axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyGyro.std.Z
frequency domain signals - time domain signals with Fast Fourier Transform
average of the standard deviation of body acceleration signal body in Z axis from gyrometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyAccMag.mean
frequency domain signals - time domain signals with Fast Fourier Transform
average of the mean of body acceleration signal magnitude from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyAccMag.std
frequency domain signals - time domain signals with Fast Fourier Transform
average of the standard deviation of body acceleration signal magnitude from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyAccJerkMag.mean
frequency domain signals - time domain signals with Fast Fourier Transform
average of the mean of body acceleration signal jerk magnitude from accelerometer
-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyAccJerkMag.std

frequency domain signals - time domain signals with Fast Fourier Transform

average of the standard deviation of body acceleration signal jerk magnitude from accelerometer

-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyGyroMag.mean

frequency domain signals - time domain signals with Fast Fourier Transform

average of the mean of body acceleration signal jerk magnitude from gyrometer

-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyGyroMag.std

frequency domain signals - time domain signals with Fast Fourier Transform

average of the standard deviation of body acceleration signal jerk magnitude from gyrometer

-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyGyroJerkMag.mean

frequency domain signals - time domain signals with Fast Fourier Transform

average of the mean of body acceleration signal jerk magnitude from gyrometer

-0.99999999999999 .... 0.99999999999999 Hz

fBodyBodyGyroJerkMag.std

frequency domain signals - time domain signals with Fast Fourier Transform

average of the standard deviation of body acceleration signal jerk magnitude from gyrometer

-0.99999999999999 .... 0.99999999999999 Hz