

# Code Book

The character element in the first row is a combination of the subject and the activity label with the format “subjectnumber\_activityname”. Subjectnumber ranges from 1 to 30 representing 30 volunteers, and activityname has 6 different elements: LAYING, STANDING, SITTING WALKING, WALKING\_DOWNSTAIRS, WALKING\_UPSTAIRS.

Each character represents a group for each subject and each activity. The column names are the names of variables.

The value in i-th row and j-th column represents the mean of the measurements for the j-th variable in the i-th group.

Here are the information about the features, those are the names of variables.

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.

tBodyAcc-XYZ

tGravityAcc-XYZ

tBodyAccJerk-XYZ

tBodyGyro-XYZ

tBodyGyroJerk-XYZ

tBodyAccMag

tGravityAccMag

tBodyAccJerkMag

tBodyGyroMag

tBodyGyroJerkMag

fBodyAcc-XYZ  
fBodyAccJerk-XYZ  
fBodyGyro-XYZ  
fBodyAccMag  
fBodyAccJerkMag  
fBodyGyroMag  
fBodyGyroJerkMag

The set of variables that were estimated from these signals are:

mad(): Median absolute deviation  
max(): Largest value in array  
min(): Smallest value in array  
sma(): Signal magnitude area  
energy(): Energy measure. Sum of the squares divided by the number of values.  
iqr(): Interquartile range  
entropy(): Signal entropy  
arCoeff(): Autorregresion coefficients with Burg order equal to 4  
correlation(): correlation coefficient between two signals  
maxInds(): index of the frequency component with largest magnitude  
meanFreq(): Weighted average of the frequency components to obtain a mean frequency  
skewness(): skewness of the frequency domain signal  
kurtosis(): kurtosis of the frequency domain signal  
bandsEnergy(): Energy of a frequency interval within the 64 bins of the FFT of each window.  
angle(): Angle between two vectors.

Additional vectors obtained by averaging the signals in a signal window sample. These are used on the angle() variable:

gravityMean  
tBodyAccMean  
tBodyAccJerkMean  
tBodyGyroMean  
tBodyGyroJerkMean