codebook

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Getting and Cleaning Data: Project Codebook

Study Design

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The experiments for this data were carried out with a group of 30 volunteers within an age bracket of 19-48 years. Each person performed six activities; walking, walking upstairs, walking downstairs, sitting, standing, laying. The performed these activities while wearing a Samsung SII on their waist. Using the phones embedded accelerometer and gyroscope, researchers captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50 Hz. The experiment was video recorded to label the data manually. The obtained dataset was randomly partitioned into 2 sets, where 70% of volunteers were selected for generating training data and 30% to test the data.

The sensor signals(accelerometer and gyroscope) were pre-processed by applying noise filters and then sampled in fixed-width sliding windos of 2.56 sec and 50% overlap. The sensor acceleration signal, which has gravitational and body motion components, was separated using a Butterworth low-pass filter into body acceleration and gravity. The gravitational force is assumed to have only low frequency components, therefore a filter with 0.3 Hz cutoff frequency was used. From each window, a vector of features was obtained by calculating variables form the time and frequency domain. The variable collected are listed below.

For each record it is provided:

```
*triaxal acceleration from the accelerometer(total acceleration) and the estimated body acceleratio
*triaxial angular velocity from the gyroscope
*activity label
*And identifier of the subject who carried out the experiment.
```

Variable Codebook

Activityid, identifies the activity being completed by each subject:

```
* WALKING: subject was walking
* WALKING_UPSTAIRS: subject was walking upstairs
* WALKING_DOWNSTAIRS: subject was walking downstairs
* SITTING: subject was sitting
* STANDING: subject was standing
* LAYING: subject was laying
```

subjectid, identifies the particular subject being evaluated: [1:180]

Average of measurement Variables

All measurements are floating-point values, normalized and bounded within [-1,1].

- Time-domain signals (variables prefixed by `t`), resulting from the capture of accelerometer and gyroscope raw signals.

- Frequency-domain signals (variables prefixed by `f`), resulting from the application of a Fast Fourier Transform (FFT) to some of the time-domain signals.
- Three axial signals denoted with x,y, and z
- Average body acceleration:
  - `tbodyaccmeanx`
  - `tbodyaccmeany`
  - `tbodyaccmeanz`
  - `fbodyaccmeanx`
  - `fbodyaccmeany`
  - `fbodyaccmeanz`
- Standard deviation of body acceleration:
  - `tbodyaccstdx`
  - `tbodyaccstdy`
  - `tbodyaccstdz`
  - `fbodyaccstdx`
  - `fbodyaccstdy`
  - `fbodyaccstdz`
- Average time-domain gravity acceleration:
  - `tgravityaccmeanx`
  - `tgravityaccmeany`
  - `tgravityaccmeanz`
- Standard deviation of the time-domain gravity acceleration:
  - `tgravityaccstdx`
  - `tgravityaccstdy`
  - `tgravityaccstdz`
- Average time-domain and frequency-domain body acceleration jerk:
  - `tbodyaccjerkmeanx`
  - `tbodyaccjerkmeany`
  - `tbodyaccjerkmeanz`
  - `fbodyaccjerkmeanx`
  - `fbodyaccjerkmeany`
  - `fbodyaccjerkmeanz`
- Standard deviation of the time-domain and frequency-domain body acceleration jerk:
  - `tbodyaccjerkstdx`
  - `tbodyaccjerkstdy`
  - `tbodyaccjerkstdz`
  - `fbodyaccjerkstdx`
  - `fbodyaccjerkstdy`
  - `fbodyaccjerkstdz`
- Average time-domain body angular velocity:
  - `tbodygyromeanx`
  - `tbodygyromeany`
  - `tbodygyromeanz`
  - `fbodygyromeanx`
  - `fbodygyromeany`
  - `fbodygyromeanz`

- Standard deviation of the time-domain body angular velocity:
  - `tbodygyrostdx`
  - `tbodygyrostdy`
  - `tbodygyrostdz`
  - `fbodygyrostdx`
  - `fbodygyrostdy`
  - `fbodygyrostdz`
- Average time-domain body angular velocity jerk:
  - `tbodygyrojerkmeanx`
  - `tbodygyrojerkmeany`
  - `tbodygyrojerkmeanz`
- Standard deviation of the time-domain body angular velocity jerk:
  - `tbodygyrojerkstdx`
  - `tbodygyrojerkstdy`
  - `tbodygyrojerkstdz`
- Average and standard deviation of the time-domain magnitude of body acceleration:
  - `tbodyaccmagmean`
  - `tbodyaccmagstd`
- Average and standard deviation of the time-domain magnitude of gravity acceleration:
  - `tgravityaccmagmean`
  - `tgravityaccmagstd`
- Average and standard deviation of the time-domain magnitude of body acceleration jerk:
  - `tbodyaccjerkmagmean`
  - `tbodyaccjerkmagstd`
- Average and standard deviation of the time-domain magnitude of body angular velocity:
  - `tbodygyromagmean`
  - `tbodygyromagstd`
- Average and standard deviation of the time-domain magnitude of body angular velocity jerk:
  - `tbodygyrojerkmagmean`
  - `tbodygyrojerkmagstd`

Frequency-domain only labels signals

- Weighted average of the frequency components of the frequency-domain body acceleration:
  - `fbodyaccmeanfreqx`
  - `fbodyaccmeanfreqy`
  - `fbodyaccmeanfreqz`
- Weighted average of the frequency components of the frequency-domain body acceleration jerk:
  - `fbodyaccjerkmeanfreqx`
  - `fbodyaccjerkmeanfreqy`
  - `fbodyaccjerkmeanfreqz`
- Weighted average of the frequency components of the frequency-domain body angular velocity:
  - `fbodygyromeanfreqx`
  - `fbodygyromeanfreqy`

  - `fbodygyromeanfreqz`

- Average, standard deviation, and weighted average of the frequency components of the frequency-domain magnitude of body acceleration:

  - `fbodyaccmagmean`
  - `fbodyaccmagstd`
  - `fbodyaccmagmeanfreq`

- Average, standard deviation, and weighted average of the frequency components of the frequency-domain magnitude of body acceleration jerk (derivation of the acceleration in time):

  - `fbodyaccjerkmagmean`
  - `fbodyaccjerkmagstd`
  - `fbodyaccjerkmagmeanfreq`

- Average, standard deviation, and weighted average of the frequency components of the frequency-domain magnitude of body angular velocity:

  - `fbodygyromagmean`
  - `fbodygyromagstd`
  - `fbodygyromagmeanfreq`

- Average, standard deviation, and weighted average of the frequency components of the frequency-domain magnitude of body angular velocity jerk:

  - `fbodygyrojerkmagmean`
  - `fbodygyrojerkmagstd`
  - `fbodygyrojerkmagmeanfreq`