Codebook for wearable computing dataset

Variables

1. subject
   Subject number : 1..30 .Unique identifier assigned to each subject
2. Acitivity
   Activity label: LAYING, SITTING, STANDING, WALKING, WALKING_DOWNSTAIRS, WALKING_UPSTAIRS
3. TimeBodyAccelerometerMean()-X
4. TimeBodyAccelerometerMean()-Y
5. TimeBodyAccelerometerMean()-Z
6. TimeBodyAccelerometerSTD()-X
7. TimeBodyAccelerometerSTD()-Y
8. TimeBodyAccelerometerSTD()-Z
9. TimeGravityAccelerometerMean()-X
10. TimeGravityAccelerometerMean()-Y
11. TimeGravityAccelerometerMean()-Z
12. TimeGravityAccelerometerSTD()-X
13. TimeGravityAccelerometerSTD()-Y
14. TimeGravityAccelerometerSTD()-Z
15. TimeBodyAccelerometerJerkMean()-X
16. TimeBodyAccelerometerJerkMean()-Y
17. TimeBodyAccelerometerJerkMean()-Z
18. TimeBodyAccelerometerJerkSTD()-X
19. TimeBodyAccelerometerJerkSTD()-Y
20. TimeBodyAccelerometerJerkSTD()-Z
21. TimeBodyGyroscopeMean()-X
22. TimeBodyGyroscopeMean()-Y
23. TimeBodyGyroscopeMean()-Z
24. TimeBodyGyroscopeSTD()-X
25. TimeBodyGyroscopeSTD()-Y
26. TimeBodyGyroscopeSTD()-Z
27. TimeBodyGyroscopeJerkMean()-X
28. TimeBodyGyroscopeJerkMean()-Y
29. TimeBodyGyroscopeJerkMean()-Z
30. TimeBodyGyroscopeJerkSTD()-X
31. TimeBodyGyroscopeJerkSTD()-Y
32. TimeBodyGyroscopeJerkSTD()-Z
33. TimeBodyAccelerometerMagnitudeMean()
34. TimeBodyAccelerometerMagnitudeSTD()
35. TimeGravityAccelerometerMagnitudeMean()
36. TimeGravityAccelerometerMagnitudeSTD()
37. TimeBodyAccelerometerJerkMagnitudeMean()
38. TimeBodyAccelerometerJerkMagnitudeSTD()
39. TimeBodyGyroscopeMagnitudeMean()
40. TimeBodyGyroscopeMagnitudeSTD()

41. TimeBodyGyroscopeJerkMagnitudeMean()
42. TimeBodyGyroscopeJerkMagnitudeSTD()
43. FrequencyBodyAccelerometerMean()-X
44. FrequencyBodyAccelerometerMean()-Y
45. FrequencyBodyAccelerometerMean()-Z
46. FrequencyBodyAccelerometerSTD()-X
47. FrequencyBodyAccelerometerSTD()-Y
48. FrequencyBodyAccelerometerSTD()-Z
49. FrequencyBodyAccelerometerMeanFreq()-X
50. FrequencyBodyAccelerometerMeanFreq()-Y
51. FrequencyBodyAccelerometerMeanFreq()-Z
52. FrequencyBodyAccelerometerJerkMean()-X
53. FrequencyBodyAccelerometerJerkMean()-Y
54. FrequencyBodyAccelerometerJerkMean()-Z
55. FrequencyBodyAccelerometerJerkSTD()-X
56. FrequencyBodyAccelerometerJerkSTD()-Y
57. FrequencyBodyAccelerometerJerkSTD()-Z
58. FrequencyBodyAccelerometerJerkMeanFreq()-X
59. FrequencyBodyAccelerometerJerkMeanFreq()-Y
60. FrequencyBodyAccelerometerJerkMeanFreq()-Z
61. FrequencyBodyGyroscopeMean()-X
62. FrequencyBodyGyroscopeMean()-Y
63. FrequencyBodyGyroscopeMean()-Z
64. FrequencyBodyGyroscopeSTD()-X
65. FrequencyBodyGyroscopeSTD()-Y
66. FrequencyBodyGyroscopeSTD()-Z
67. FrequencyBodyGyroscopeMeanFreq()-X
68. FrequencyBodyGyroscopeMeanFreq()-Y
69. FrequencyBodyGyroscopeMeanFreq()-Z
70. FrequencyBodyAccelerometerMagnitudeMean()
71. FrequencyBodyAccelerometerMagnitudeSTD()
72. FrequencyBodyAccelerometerMagnitudeMeanFreq()
73. FrequencyBodyAccelerometerJerkMagnitudeMean()
74. FrequencyBodyAccelerometerJerkMagnitudeSTD()
75. FrequencyBodyAccelerometerJerkMagnitudeMeanFreq()
76. FrequencyBodyGyroscopeMagnitudeMean()
77. FrequencyBodyGyroscopeMagnitudeSTD()
78. FrequencyBodyGyroscopeMagnitudeMeanFreq()
79. FrequencyBodyGyroscopeJerkMagnitudeMean()
80. FrequencyBodyGyroscopeJerkMagnitudeSTD()
81. FrequencyBodyGyroscopeJerkMagnitudeMeanFreq()
82. Angle(TimeBodyAccelerometerMean,Gravity)
83. Angle(TimeBodyAccelerometerJerkMean),GravityMean)
84. Angle(TimeBodyGyroscopeMean,GravityMean)
85. Angle(TimeBodyGyroscopeJerkMean,GravityMean)
86. Angle(X,GravityMean)
87. Angle(Y,GravityMean)
88. Angle(Z,GravityMean)

Data

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.

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

1. mean: Mean value
2. std: Standard deviation

Transformation

All the values are means, aggregated over 30 subjects and 6 activities, hence the resulting dataset is 180 rows by 88 columns.