**CODE BOOK**

**Introduction**

The experiments have been 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) wearing a smartphone (Samsung Galaxy S II) on the waist. Using its embedded accelerometer and gyroscope, we captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50Hz. The experiments have been video-recorded to label the data manually. The obtained dataset has been randomly partitioned into two sets, where 70% of the volunteers was selected for generating the training data and 30% the test data.

The sensor signals (accelerometer and gyroscope) were pre-processed by applying noise filters and then sampled in fixed-width sliding windows of 2.56 sec and 50% overlap (128 readings/window). 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 from the time and frequency domain.

Attribute Information:

For each record in the dataset it is provided:

* Triaxial acceleration from the accelerometer (total acceleration) and the estimated body acceleration.
* Triaxial Angular velocity from the gyroscope.
* A 561-feature vector with time and frequency domain variables.
* Its activity label.
* An identifier of the subject who carried out the experiment.

**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:

mean(): Mean value

std(): Standard deviation

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 to 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

The complete list of variables of each feature vector is as follows: -

1. tBodyAcc-mean()-X
2. tBodyAcc-mean()-Y
3. tBodyAcc-mean()-Z
4. tBodyAcc-std()-X
5. tBodyAcc-std()-Y
6. tBodyAcc-std()-Z
7. tBodyAcc-mad()-X
8. tBodyAcc-mad()-Y
9. tBodyAcc-mad()-Z
10. tBodyAcc-max()-X
11. tBodyAcc-max()-Y
12. tBodyAcc-max()-Z
13. tBodyAcc-min()-X
14. tBodyAcc-min()-Y
15. tBodyAcc-min()-Z
16. tBodyAcc-sma()
17. tBodyAcc-energy()-X
18. tBodyAcc-energy()-Y
19. tBodyAcc-energy()-Z
20. tBodyAcc-iqr()-X
21. tBodyAcc-iqr()-Y
22. tBodyAcc-iqr()-Z
23. tBodyAcc-entropy()-X
24. tBodyAcc-entropy()-Y
25. tBodyAcc-entropy()-Z
26. tBodyAcc-arCoeff()-X,1
27. tBodyAcc-arCoeff()-X,2
28. tBodyAcc-arCoeff()-X,3
29. tBodyAcc-arCoeff()-X,4
30. tBodyAcc-arCoeff()-Y,1
31. tBodyAcc-arCoeff()-Y,2
32. tBodyAcc-arCoeff()-Y,3
33. tBodyAcc-arCoeff()-Y,4
34. tBodyAcc-arCoeff()-Z,1
35. tBodyAcc-arCoeff()-Z,2
36. tBodyAcc-arCoeff()-Z,3
37. tBodyAcc-arCoeff()-Z,4
38. tBodyAcc-correlation()-X,Y
39. tBodyAcc-correlation()-X,Z
40. tBodyAcc-correlation()-Y,Z
41. tGravityAcc-mean()-X
42. tGravityAcc-mean()-Y
43. tGravityAcc-mean()-Z
44. tGravityAcc-std()-X
45. tGravityAcc-std()-Y
46. tGravityAcc-std()-Z
47. tGravityAcc-mad()-X
48. tGravityAcc-mad()-Y
49. tGravityAcc-mad()-Z
50. tGravityAcc-max()-X
51. tGravityAcc-max()-Y
52. tGravityAcc-max()-Z
53. tGravityAcc-min()-X
54. tGravityAcc-min()-Y
55. tGravityAcc-min()-Z
56. tGravityAcc-sma()
57. tGravityAcc-energy()-X
58. tGravityAcc-energy()-Y
59. tGravityAcc-energy()-Z
60. tGravityAcc-iqr()-X
61. tGravityAcc-iqr()-Y
62. tGravityAcc-iqr()-Z
63. tGravityAcc-entropy()-X
64. tGravityAcc-entropy()-Y
65. tGravityAcc-entropy()-Z
66. tGravityAcc-arCoeff()-X,1
67. tGravityAcc-arCoeff()-X,2
68. tGravityAcc-arCoeff()-X,3
69. tGravityAcc-arCoeff()-X,4
70. tGravityAcc-arCoeff()-Y,1
71. tGravityAcc-arCoeff()-Y,2
72. tGravityAcc-arCoeff()-Y,3
73. tGravityAcc-arCoeff()-Y,4
74. tGravityAcc-arCoeff()-Z,1
75. tGravityAcc-arCoeff()-Z,2
76. tGravityAcc-arCoeff()-Z,3
77. tGravityAcc-arCoeff()-Z,4
78. tGravityAcc-correlation()-X,Y
79. tGravityAcc-correlation()-X,Z
80. tGravityAcc-correlation()-Y,Z
81. tBodyAccJerk-mean()-X
82. tBodyAccJerk-mean()-Y
83. tBodyAccJerk-mean()-Z
84. tBodyAccJerk-std()-X
85. tBodyAccJerk-std()-Y
86. tBodyAccJerk-std()-Z
87. tBodyAccJerk-mad()-X
88. tBodyAccJerk-mad()-Y
89. tBodyAccJerk-mad()-Z
90. tBodyAccJerk-max()-X
91. tBodyAccJerk-max()-Y
92. tBodyAccJerk-max()-Z
93. tBodyAccJerk-min()-X
94. tBodyAccJerk-min()-Y
95. tBodyAccJerk-min()-Z
96. tBodyAccJerk-sma()
97. tBodyAccJerk-energy()-X
98. tBodyAccJerk-energy()-Y
99. tBodyAccJerk-energy()-Z
100. tBodyAccJerk-iqr()-X
101. tBodyAccJerk-iqr()-Y
102. tBodyAccJerk-iqr()-Z
103. tBodyAccJerk-entropy()-X
104. tBodyAccJerk-entropy()-Y
105. tBodyAccJerk-entropy()-Z
106. tBodyAccJerk-arCoeff()-X,1
107. tBodyAccJerk-arCoeff()-X,2
108. tBodyAccJerk-arCoeff()-X,3
109. tBodyAccJerk-arCoeff()-X,4
110. tBodyAccJerk-arCoeff()-Y,1
111. tBodyAccJerk-arCoeff()-Y,2
112. tBodyAccJerk-arCoeff()-Y,3
113. tBodyAccJerk-arCoeff()-Y,4
114. tBodyAccJerk-arCoeff()-Z,1
115. tBodyAccJerk-arCoeff()-Z,2
116. tBodyAccJerk-arCoeff()-Z,3
117. tBodyAccJerk-arCoeff()-Z,4
118. tBodyAccJerk-correlation()-X,Y
119. tBodyAccJerk-correlation()-X,Z
120. tBodyAccJerk-correlation()-Y,Z
121. tBodyGyro-mean()-X
122. tBodyGyro-mean()-Y
123. tBodyGyro-mean()-Z
124. tBodyGyro-std()-X
125. tBodyGyro-std()-Y
126. tBodyGyro-std()-Z
127. tBodyGyro-mad()-X
128. tBodyGyro-mad()-Y
129. tBodyGyro-mad()-Z
130. tBodyGyro-max()-X
131. tBodyGyro-max()-Y
132. tBodyGyro-max()-Z
133. tBodyGyro-min()-X
134. tBodyGyro-min()-Y
135. tBodyGyro-min()-Z
136. tBodyGyro-sma()
137. tBodyGyro-energy()-X
138. tBodyGyro-energy()-Y
139. tBodyGyro-energy()-Z
140. tBodyGyro-iqr()-X
141. tBodyGyro-iqr()-Y
142. tBodyGyro-iqr()-Z
143. tBodyGyro-entropy()-X
144. tBodyGyro-entropy()-Y
145. tBodyGyro-entropy()-Z
146. tBodyGyro-arCoeff()-X,1
147. tBodyGyro-arCoeff()-X,2
148. tBodyGyro-arCoeff()-X,3
149. tBodyGyro-arCoeff()-X,4
150. tBodyGyro-arCoeff()-Y,1
151. tBodyGyro-arCoeff()-Y,2
152. tBodyGyro-arCoeff()-Y,3
153. tBodyGyro-arCoeff()-Y,4
154. tBodyGyro-arCoeff()-Z,1
155. tBodyGyro-arCoeff()-Z,2
156. tBodyGyro-arCoeff()-Z,3
157. tBodyGyro-arCoeff()-Z,4
158. tBodyGyro-correlation()-X,Y
159. tBodyGyro-correlation()-X,Z
160. tBodyGyro-correlation()-Y,Z
161. tBodyGyroJerk-mean()-X
162. tBodyGyroJerk-mean()-Y
163. tBodyGyroJerk-mean()-Z
164. tBodyGyroJerk-std()-X
165. tBodyGyroJerk-std()-Y
166. tBodyGyroJerk-std()-Z
167. tBodyGyroJerk-mad()-X
168. tBodyGyroJerk-mad()-Y
169. tBodyGyroJerk-mad()-Z
170. tBodyGyroJerk-max()-X
171. tBodyGyroJerk-max()-Y
172. tBodyGyroJerk-max()-Z
173. tBodyGyroJerk-min()-X
174. tBodyGyroJerk-min()-Y
175. tBodyGyroJerk-min()-Z
176. tBodyGyroJerk-sma()
177. tBodyGyroJerk-energy()-X
178. tBodyGyroJerk-energy()-Y
179. tBodyGyroJerk-energy()-Z
180. tBodyGyroJerk-iqr()-X
181. tBodyGyroJerk-iqr()-Y
182. tBodyGyroJerk-iqr()-Z
183. tBodyGyroJerk-entropy()-X
184. tBodyGyroJerk-entropy()-Y
185. tBodyGyroJerk-entropy()-Z
186. tBodyGyroJerk-arCoeff()-X,1
187. tBodyGyroJerk-arCoeff()-X,2
188. tBodyGyroJerk-arCoeff()-X,3
189. tBodyGyroJerk-arCoeff()-X,4
190. tBodyGyroJerk-arCoeff()-Y,1
191. tBodyGyroJerk-arCoeff()-Y,2
192. tBodyGyroJerk-arCoeff()-Y,3
193. tBodyGyroJerk-arCoeff()-Y,4
194. tBodyGyroJerk-arCoeff()-Z,1
195. tBodyGyroJerk-arCoeff()-Z,2
196. tBodyGyroJerk-arCoeff()-Z,3
197. tBodyGyroJerk-arCoeff()-Z,4
198. tBodyGyroJerk-correlation()-X,Y
199. tBodyGyroJerk-correlation()-X,Z
200. tBodyGyroJerk-correlation()-Y,Z
201. tBodyAccMag-mean()
202. tBodyAccMag-std()
203. tBodyAccMag-mad()
204. tBodyAccMag-max()
205. tBodyAccMag-min()
206. tBodyAccMag-sma()
207. tBodyAccMag-energy()
208. tBodyAccMag-iqr()
209. tBodyAccMag-entropy()
210. tBodyAccMag-arCoeff()1
211. tBodyAccMag-arCoeff()2
212. tBodyAccMag-arCoeff()3
213. tBodyAccMag-arCoeff()4
214. tGravityAccMag-mean()
215. tGravityAccMag-std()
216. tGravityAccMag-mad()
217. tGravityAccMag-max()
218. tGravityAccMag-min()
219. tGravityAccMag-sma()
220. tGravityAccMag-energy()
221. tGravityAccMag-iqr()
222. tGravityAccMag-entropy()
223. tGravityAccMag-arCoeff()1
224. tGravityAccMag-arCoeff()2
225. tGravityAccMag-arCoeff()3
226. tGravityAccMag-arCoeff()4
227. tBodyAccJerkMag-mean()
228. tBodyAccJerkMag-std()
229. tBodyAccJerkMag-mad()
230. tBodyAccJerkMag-max()
231. tBodyAccJerkMag-min()
232. tBodyAccJerkMag-sma()
233. tBodyAccJerkMag-energy()
234. tBodyAccJerkMag-iqr()
235. tBodyAccJerkMag-entropy()
236. tBodyAccJerkMag-arCoeff()1
237. tBodyAccJerkMag-arCoeff()2
238. tBodyAccJerkMag-arCoeff()3
239. tBodyAccJerkMag-arCoeff()4
240. tBodyGyroMag-mean()
241. tBodyGyroMag-std()
242. tBodyGyroMag-mad()
243. tBodyGyroMag-max()
244. tBodyGyroMag-min()
245. tBodyGyroMag-sma()
246. tBodyGyroMag-energy()
247. tBodyGyroMag-iqr()
248. tBodyGyroMag-entropy()
249. tBodyGyroMag-arCoeff()1
250. tBodyGyroMag-arCoeff()2
251. tBodyGyroMag-arCoeff()3
252. tBodyGyroMag-arCoeff()4
253. tBodyGyroJerkMag-mean()
254. tBodyGyroJerkMag-std()
255. tBodyGyroJerkMag-mad()
256. tBodyGyroJerkMag-max()
257. tBodyGyroJerkMag-min()
258. tBodyGyroJerkMag-sma()
259. tBodyGyroJerkMag-energy()
260. tBodyGyroJerkMag-iqr()
261. tBodyGyroJerkMag-entropy()
262. tBodyGyroJerkMag-arCoeff()1
263. tBodyGyroJerkMag-arCoeff()2
264. tBodyGyroJerkMag-arCoeff()3
265. tBodyGyroJerkMag-arCoeff()4
266. fBodyAcc-mean()-X
267. fBodyAcc-mean()-Y
268. fBodyAcc-mean()-Z
269. fBodyAcc-std()-X
270. fBodyAcc-std()-Y
271. fBodyAcc-std()-Z
272. fBodyAcc-mad()-X
273. fBodyAcc-mad()-Y
274. fBodyAcc-mad()-Z
275. fBodyAcc-max()-X
276. fBodyAcc-max()-Y
277. fBodyAcc-max()-Z
278. fBodyAcc-min()-X
279. fBodyAcc-min()-Y
280. fBodyAcc-min()-Z
281. fBodyAcc-sma()
282. fBodyAcc-energy()-X
283. fBodyAcc-energy()-Y
284. fBodyAcc-energy()-Z
285. fBodyAcc-iqr()-X
286. fBodyAcc-iqr()-Y
287. fBodyAcc-iqr()-Z
288. fBodyAcc-entropy()-X
289. fBodyAcc-entropy()-Y
290. fBodyAcc-entropy()-Z
291. fBodyAcc-maxInds-X
292. fBodyAcc-maxInds-Y
293. fBodyAcc-maxInds-Z
294. fBodyAcc-meanFreq()-X
295. fBodyAcc-meanFreq()-Y
296. fBodyAcc-meanFreq()-Z
297. fBodyAcc-skewness()-X
298. fBodyAcc-kurtosis()-X
299. fBodyAcc-skewness()-Y
300. fBodyAcc-kurtosis()-Y
301. fBodyAcc-skewness()-Z
302. fBodyAcc-kurtosis()-Z
303. fBodyAcc-bandsEnergy()-1,8
304. fBodyAcc-bandsEnergy()-9,16
305. fBodyAcc-bandsEnergy()-17,24
306. fBodyAcc-bandsEnergy()-25,32
307. fBodyAcc-bandsEnergy()-33,40
308. fBodyAcc-bandsEnergy()-41,48
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311. fBodyAcc-bandsEnergy()-1,16
312. fBodyAcc-bandsEnergy()-17,32
313. fBodyAcc-bandsEnergy()-33,48
314. fBodyAcc-bandsEnergy()-49,64
315. fBodyAcc-bandsEnergy()-1,24
316. fBodyAcc-bandsEnergy()-25,48
317. fBodyAcc-bandsEnergy()-1,8
318. fBodyAcc-bandsEnergy()-9,16
319. fBodyAcc-bandsEnergy()-17,24
320. fBodyAcc-bandsEnergy()-25,32
321. fBodyAcc-bandsEnergy()-33,40
322. fBodyAcc-bandsEnergy()-41,48
323. fBodyAcc-bandsEnergy()-49,56
324. fBodyAcc-bandsEnergy()-57,64
325. fBodyAcc-bandsEnergy()-1,16
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327. fBodyAcc-bandsEnergy()-33,48
328. fBodyAcc-bandsEnergy()-49,64
329. fBodyAcc-bandsEnergy()-1,24
330. fBodyAcc-bandsEnergy()-25,48
331. fBodyAcc-bandsEnergy()-1,8
332. fBodyAcc-bandsEnergy()-9,16
333. fBodyAcc-bandsEnergy()-17,24
334. fBodyAcc-bandsEnergy()-25,32
335. fBodyAcc-bandsEnergy()-33,40
336. fBodyAcc-bandsEnergy()-41,48
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338. fBodyAcc-bandsEnergy()-57,64
339. fBodyAcc-bandsEnergy()-1,16
340. fBodyAcc-bandsEnergy()-17,32
341. fBodyAcc-bandsEnergy()-33,48
342. fBodyAcc-bandsEnergy()-49,64
343. fBodyAcc-bandsEnergy()-1,24
344. fBodyAcc-bandsEnergy()-25,48
345. fBodyAccJerk-mean()-X
346. fBodyAccJerk-mean()-Y
347. fBodyAccJerk-mean()-Z
348. fBodyAccJerk-std()-X
349. fBodyAccJerk-std()-Y
350. fBodyAccJerk-std()-Z
351. fBodyAccJerk-mad()-X
352. fBodyAccJerk-mad()-Y
353. fBodyAccJerk-mad()-Z
354. fBodyAccJerk-max()-X
355. fBodyAccJerk-max()-Y
356. fBodyAccJerk-max()-Z
357. fBodyAccJerk-min()-X
358. fBodyAccJerk-min()-Y
359. fBodyAccJerk-min()-Z
360. fBodyAccJerk-sma()
361. fBodyAccJerk-energy()-X
362. fBodyAccJerk-energy()-Y
363. fBodyAccJerk-energy()-Z
364. fBodyAccJerk-iqr()-X
365. fBodyAccJerk-iqr()-Y
366. fBodyAccJerk-iqr()-Z
367. fBodyAccJerk-entropy()-X
368. fBodyAccJerk-entropy()-Y
369. fBodyAccJerk-entropy()-Z
370. fBodyAccJerk-maxInds-X
371. fBodyAccJerk-maxInds-Y
372. fBodyAccJerk-maxInds-Z
373. fBodyAccJerk-meanFreq()-X
374. fBodyAccJerk-meanFreq()-Y
375. fBodyAccJerk-meanFreq()-Z
376. fBodyAccJerk-skewness()-X
377. fBodyAccJerk-kurtosis()-X
378. fBodyAccJerk-skewness()-Y
379. fBodyAccJerk-kurtosis()-Y
380. fBodyAccJerk-skewness()-Z
381. fBodyAccJerk-kurtosis()-Z
382. fBodyAccJerk-bandsEnergy()-1,8
383. fBodyAccJerk-bandsEnergy()-9,16
384. fBodyAccJerk-bandsEnergy()-17,24
385. fBodyAccJerk-bandsEnergy()-25,32
386. fBodyAccJerk-bandsEnergy()-33,40
387. fBodyAccJerk-bandsEnergy()-41,48
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389. fBodyAccJerk-bandsEnergy()-57,64
390. fBodyAccJerk-bandsEnergy()-1,16
391. fBodyAccJerk-bandsEnergy()-17,32
392. fBodyAccJerk-bandsEnergy()-33,48
393. fBodyAccJerk-bandsEnergy()-49,64
394. fBodyAccJerk-bandsEnergy()-1,24
395. fBodyAccJerk-bandsEnergy()-25,48
396. fBodyAccJerk-bandsEnergy()-1,8
397. fBodyAccJerk-bandsEnergy()-9,16
398. fBodyAccJerk-bandsEnergy()-17,24
399. fBodyAccJerk-bandsEnergy()-25,32
400. fBodyAccJerk-bandsEnergy()-33,40
401. fBodyAccJerk-bandsEnergy()-41,48
402. fBodyAccJerk-bandsEnergy()-49,56
403. fBodyAccJerk-bandsEnergy()-57,64
404. fBodyAccJerk-bandsEnergy()-1,16
405. fBodyAccJerk-bandsEnergy()-17,32
406. fBodyAccJerk-bandsEnergy()-33,48
407. fBodyAccJerk-bandsEnergy()-49,64
408. fBodyAccJerk-bandsEnergy()-1,24
409. fBodyAccJerk-bandsEnergy()-25,48
410. fBodyAccJerk-bandsEnergy()-1,8
411. fBodyAccJerk-bandsEnergy()-9,16
412. fBodyAccJerk-bandsEnergy()-17,24
413. fBodyAccJerk-bandsEnergy()-25,32
414. fBodyAccJerk-bandsEnergy()-33,40
415. fBodyAccJerk-bandsEnergy()-41,48
416. fBodyAccJerk-bandsEnergy()-49,56
417. fBodyAccJerk-bandsEnergy()-57,64
418. fBodyAccJerk-bandsEnergy()-1,16
419. fBodyAccJerk-bandsEnergy()-17,32
420. fBodyAccJerk-bandsEnergy()-33,48
421. fBodyAccJerk-bandsEnergy()-49,64
422. fBodyAccJerk-bandsEnergy()-1,24
423. fBodyAccJerk-bandsEnergy()-25,48
424. fBodyGyro-mean()-X
425. fBodyGyro-mean()-Y
426. fBodyGyro-mean()-Z
427. fBodyGyro-std()-X
428. fBodyGyro-std()-Y
429. fBodyGyro-std()-Z
430. fBodyGyro-mad()-X
431. fBodyGyro-mad()-Y
432. fBodyGyro-mad()-Z
433. fBodyGyro-max()-X
434. fBodyGyro-max()-Y
435. fBodyGyro-max()-Z
436. fBodyGyro-min()-X
437. fBodyGyro-min()-Y
438. fBodyGyro-min()-Z
439. fBodyGyro-sma()
440. fBodyGyro-energy()-X
441. fBodyGyro-energy()-Y
442. fBodyGyro-energy()-Z
443. fBodyGyro-iqr()-X
444. fBodyGyro-iqr()-Y
445. fBodyGyro-iqr()-Z
446. fBodyGyro-entropy()-X
447. fBodyGyro-entropy()-Y
448. fBodyGyro-entropy()-Z
449. fBodyGyro-maxInds-X
450. fBodyGyro-maxInds-Y
451. fBodyGyro-maxInds-Z
452. fBodyGyro-meanFreq()-X
453. fBodyGyro-meanFreq()-Y
454. fBodyGyro-meanFreq()-Z
455. fBodyGyro-skewness()-X
456. fBodyGyro-kurtosis()-X
457. fBodyGyro-skewness()-Y
458. fBodyGyro-kurtosis()-Y
459. fBodyGyro-skewness()-Z
460. fBodyGyro-kurtosis()-Z
461. fBodyGyro-bandsEnergy()-1,8
462. fBodyGyro-bandsEnergy()-9,16
463. fBodyGyro-bandsEnergy()-17,24
464. fBodyGyro-bandsEnergy()-25,32
465. fBodyGyro-bandsEnergy()-33,40
466. fBodyGyro-bandsEnergy()-41,48
467. fBodyGyro-bandsEnergy()-49,56
468. fBodyGyro-bandsEnergy()-57,64
469. fBodyGyro-bandsEnergy()-1,16
470. fBodyGyro-bandsEnergy()-17,32
471. fBodyGyro-bandsEnergy()-33,48
472. fBodyGyro-bandsEnergy()-49,64
473. fBodyGyro-bandsEnergy()-1,24
474. fBodyGyro-bandsEnergy()-25,48
475. fBodyGyro-bandsEnergy()-1,8
476. fBodyGyro-bandsEnergy()-9,16
477. fBodyGyro-bandsEnergy()-17,24
478. fBodyGyro-bandsEnergy()-25,32
479. fBodyGyro-bandsEnergy()-33,40
480. fBodyGyro-bandsEnergy()-41,48
481. fBodyGyro-bandsEnergy()-49,56
482. fBodyGyro-bandsEnergy()-57,64
483. fBodyGyro-bandsEnergy()-1,16
484. fBodyGyro-bandsEnergy()-17,32
485. fBodyGyro-bandsEnergy()-33,48
486. fBodyGyro-bandsEnergy()-49,64
487. fBodyGyro-bandsEnergy()-1,24
488. fBodyGyro-bandsEnergy()-25,48
489. fBodyGyro-bandsEnergy()-1,8
490. fBodyGyro-bandsEnergy()-9,16
491. fBodyGyro-bandsEnergy()-17,24
492. fBodyGyro-bandsEnergy()-25,32
493. fBodyGyro-bandsEnergy()-33,40
494. fBodyGyro-bandsEnergy()-41,48
495. fBodyGyro-bandsEnergy()-49,56
496. fBodyGyro-bandsEnergy()-57,64
497. fBodyGyro-bandsEnergy()-1,16
498. fBodyGyro-bandsEnergy()-17,32
499. fBodyGyro-bandsEnergy()-33,48
500. fBodyGyro-bandsEnergy()-49,64
501. fBodyGyro-bandsEnergy()-1,24
502. fBodyGyro-bandsEnergy()-25,48
503. fBodyAccMag-mean()
504. fBodyAccMag-std()
505. fBodyAccMag-mad()
506. fBodyAccMag-max()
507. fBodyAccMag-min()
508. fBodyAccMag-sma()
509. fBodyAccMag-energy()
510. fBodyAccMag-iqr()
511. fBodyAccMag-entropy()
512. fBodyAccMag-maxInds
513. fBodyAccMag-meanFreq()
514. fBodyAccMag-skewness()
515. fBodyAccMag-kurtosis()
516. fBodyBodyAccJerkMag-mean()
517. fBodyBodyAccJerkMag-std()
518. fBodyBodyAccJerkMag-mad()
519. fBodyBodyAccJerkMag-max()
520. fBodyBodyAccJerkMag-min()
521. fBodyBodyAccJerkMag-sma()
522. fBodyBodyAccJerkMag-energy()
523. fBodyBodyAccJerkMag-iqr()
524. fBodyBodyAccJerkMag-entropy()
525. fBodyBodyAccJerkMag-maxInds
526. fBodyBodyAccJerkMag-meanFreq()
527. fBodyBodyAccJerkMag-skewness()
528. fBodyBodyAccJerkMag-kurtosis()
529. fBodyBodyGyroMag-mean()
530. fBodyBodyGyroMag-std()
531. fBodyBodyGyroMag-mad()
532. fBodyBodyGyroMag-max()
533. fBodyBodyGyroMag-min()
534. fBodyBodyGyroMag-sma()
535. fBodyBodyGyroMag-energy()
536. fBodyBodyGyroMag-iqr()
537. fBodyBodyGyroMag-entropy()
538. fBodyBodyGyroMag-maxInds
539. fBodyBodyGyroMag-meanFreq()
540. fBodyBodyGyroMag-skewness()
541. fBodyBodyGyroMag-kurtosis()
542. fBodyBodyGyroJerkMag-mean()
543. fBodyBodyGyroJerkMag-std()
544. fBodyBodyGyroJerkMag-mad()
545. fBodyBodyGyroJerkMag-max()
546. fBodyBodyGyroJerkMag-min()
547. fBodyBodyGyroJerkMag-sma()
548. fBodyBodyGyroJerkMag-energy()
549. fBodyBodyGyroJerkMag-iqr()
550. fBodyBodyGyroJerkMag-entropy()
551. fBodyBodyGyroJerkMag-maxInds
552. fBodyBodyGyroJerkMag-meanFreq()
553. fBodyBodyGyroJerkMag-skewness()
554. fBodyBodyGyroJerkMag-kurtosis()
555. angle(tBodyAccMean,gravity)
556. angle(tBodyAccJerkMean),gravityMean)
557. angle(tBodyGyroMean,gravityMean)
558. angle(tBodyGyroJerkMean,gravityMean)
559. angle(X,gravityMean)
560. angle(Y,gravityMean)
561. angle(Z,gravityMean)

**Data**

The files uploaded in github for this assignment are: -

1. README.md
2. Codebook.md
3. Run\_analysis.R

**Transformations**

1. Downloaded the original dataset from <https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip>
2. Load the following datasets in R: -

|  |  |
| --- | --- |
| **Data Frame** | **Original File Name** |
| activity\_labels\_raw | activity\_labels.txt |
| features\_raw | features.txt |
| x\_test\_raw | X\_test.txt |
| y\_test\_raw | y\_test.txt |
| Subject\_test\_raw | subject\_test.txt |
| x\_train\_raw | X\_train.txt |
| y\_train\_raw | y\_train.txt |
| Subject\_train\_raw | subject\_train.txt |

1. Merge the training and test data tables into one, namely ‘x\_test\_train’. This table has 10,299 observations and 561 variables.
2. Extracted only measurements with either ‘mean’ or ‘std’ and saved to a new table ‘mean\_std’
3. Inserted the following variables in the above data frame: ‘subject’, ‘type\_act’ and ‘activity\_description’.
4. Then we labels the remaining variables.
5. Finally, we summarize the table by grouping the table by subject,Type\_Activity and activity description. For each of this group, we provide the mean for each variable.

**License**

Use of this dataset in publications must be acknowledged by referencing the following publication [1]

[1] Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. Human Activity Recognition on Smartphones using a Multiclass Hardware-Friendly Support Vector Machine. International Workshop of Ambient Assisted Living (IWAAL 2012). Vitoria-Gasteiz, Spain. Dec 2012

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Jorge L. Reyes-Ortiz, Alessandro Ghio, Luca Oneto, Davide Anguita. November 2012.