Getting and Cleaning Data Course Project

The purpose of this project is to demonstrate your ability to collect, work with, and clean a data set. The goal is to prepare tidy data that can be used
You will be graded by your peers on a series of yes/no questions related to the project. You will be required to submit: 1) a tidy data set as described
a Github repository with your script for performing the analysis, and 3) a code book that describes the variables, the data, and any transformations or
performed to clean up the data called CodeBook.md. You should also include a README.md in the repo with your scripts. This repo explains how all o
and how they are connected.

One of the most exciting areas in all of data science right now is wearable computing - see for example this article . Companies like Fitbit, Nike, and
racing to develop the most advanced algorithms to attract new users. The data linked to from the course website represent data collected from the a
from the Samsung Galaxy S smartphone. A full description is available at the site where the data was obtained:

http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones

Here are the data for the project:

https://d396qusza40orc.cloudfront.net/getdata%2Fprojectfiles%2FUCI%20HAR%20Dataset.zip

You should create one R script called run_analysis.R that does the following.

Merges the training and the test sets to create one data set.
Extracts only the measurements on the mean and standard deviation for each measurement.
Uses descriptive activity names to name the activities in the data set
Appropriately labels the data set with descriptive variable names.
From the data set in step 4, creates a second, independent tidy data set with the average of each variable for each activity and each subject.

Processing Steps

1 Read in source data for activity and subject labels .
Read in source data for subjects and activities for each observation for both test and training

2 Read in source data for observations for test and training
Assign feature labels to the appropriate column names of test and train data sets
Use cbind function to add cols for activity and subject to the test and traning data sets

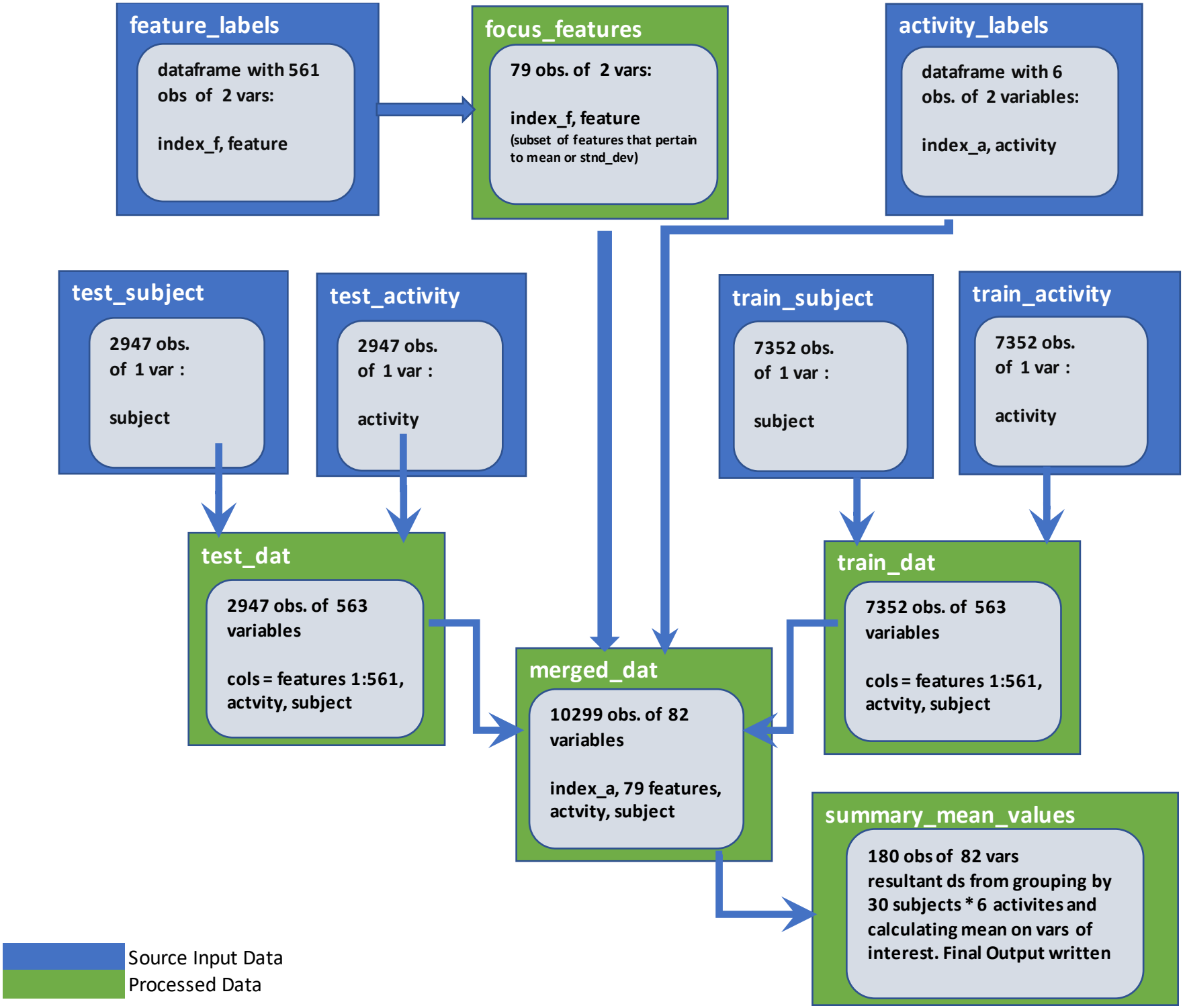
3 Identify features of interest by grepping for features with "mean" or "std" in the feature_label descriptor

4 Subset for features of interest and Merge test and training data using rbind

5 Add Activity Descriptors to merged data using merge command

5 Group by Subject and Activity

6 Calculate mean across summary grouped dataset


feature_labels
dataframe with 561 obs of 2 vars:
index_f, feature
focus_features
79 obs. of 2 vars:
index_f, feature
(subset of features that pertain to mean or stnd_dev)
activity_labels
dataframe with 6 obs. of 2 variables:
index_a, activity
test_subject
2947 obs. of 1 var :
subject
test_activity
2947 obs. of 1 var :
activity
train_subject
7352 obs. of 1 var :
subject
train_activity
7352 obs. of 1 var :
activity
test_dat
2947 obs. of 563 variables
cols = features 1:561, actvity, subject
train_dat
7352 obs. of 563 variables
cols = features 1:561, actvity, subject
merged_dat
10299 obs. of 82 variables
index_a, 79 features, actvity, subject
summary_mean_values
180 obs of 82 vars
resultant ds from grouping by 30 subjects * 6 activites and calculating mean on vars of interest. Final Output written
Source Input Data
Processed Data

Source Data Files

Core Data Files with Observations
test_activity
train_activity

File Description

* when orginally created from source input files each column in these data files is a recorded value for one of the features in features_labels described below. Each row provides OBSERVATIONS on these 561 variables at a particular point in time for a particular person performing a specific activity

Identifier for WHO is being recorded
test_subject
train_subject

Identifer 1:30 that identifies WHO's measurement has been recorded in the observation

Identifier for ACTIVITY being performed
test_activity
train_activity

Activity 1:6 that identifies what activity was being performed when observation was being recorded

activity_labels	
1	WALKING
2	WALKING_UPSTAIRS
3	WALKING_DOWNSTAIRS
4	SITTING
5	STANDING
6	LAYING

The activity_labels file is a look up table that identifes the ACTIVITY(walking,running etc)

	feature_labels
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

The features_labels file is a look up table for the descriptors of WHAT is being observed. The features selected for the datasets 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

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
309	fBodyAcc-bandsEnergy()-49,56
310	fBodyAcc-bandsEnergy()-57,64
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
326	fBodyAcc-bandsEnergy()-17,32
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
337	fBodyAcc-bandsEnergy()-49,56
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
388	fBodyAccJerk-bandsEnergy()-49,56
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)