Title: Predict human activity based upon the Smartphone dataset with 94.2% accuracy

Introduction:

Smartphone has been one of the most popularly used electronic device among the consumers. During early 2013, the sales of Smartphone exceeded those of traditional phones and as of July 2013, 90 percent of the global handset sales has been attributed to the smart phones (Android and iPhone) (*1*).

As the reach to the Smartphone increases, predicting human activity based upon the Smartphone data is predicted to be very useful. It is aimed to be useful in many scenarios, few of which are

1. Continuous monitoring of numerous physiological signals. Aimed to have appealing use in healthcare applications such as to monitor daily activity of elderly people by exploiting Ambient Intelligence in daily activity (*2*)
2. Automatic customization of the mobile device's behavior based upon a users activity (such as forwarding calls directly to voice mail, if user is sleeping or jogging etc) (*3*)
3. Generating a daily / weekly activity profile to determine if a obese child is performing a healthy amount of exercise (*3*)

Similarly numerous other advantageous applications are expected to be innovated, as the predictive ability increases.Hence the ability to accurately predict the activity based upon the Smartphone data is critical.

Methods:

Data Collection

For our analysis we used the data on all the quantitative measurements from the accelerometer and other supplementary information as provided at

https://spark-public.s3.amazonaws.com/dataanalysis/samsungData.rda

The data were downloaded from the site on November 25, 2013 using the R programming language (*4*).

Exploratory Analysis

The whole Smartphone data set consists of 7352 observations and 563 variables. The data set was then sub divided into two sub dataset.

1. Train data with 5645 observations and 562 variables. (data from subjects 1,3,5,6 included)
2. and test data set with 1707 observations and 562 variables. (data from subjects 27,28,29,30 included)

The exploratory analysis and treatments were performed on the training data set and not on the test set. Rationale is to ensure that the test data set consists of noises and mimics / represents the real world dataas far as possible.

Due to the presence of large no of predictor variable, the graphical exploration is considered insufficient and has been supplemented with the less labor intensive, and human observation error prone exploration using statistical tools. Statical packages such as generalized extreme Studentized deviate (ESD) test for outlier detection (*5*) , Box Cox (*6*) to detect data skewness e.t.c has been used.

The main focus of the analysis was (1) identify missing values, (2) identify unusual features in data (3) verify the quality of the data (4) choose appropriate statistical models

Statistical Modeling

To predict the activity based on the various Smartphone sensor measurement, we used the following two statistical methods

1. Multinomial Logistic regression model (*7*) (R package : nnet (*8*))
2. And Decision Trees (*9*) (R package : tree (*10*))

Multinomial logistic regression are used to model nominal outcome variables. It generalizes logistic regression by allowing more than two discrete outcomes i.e it is used to predict probabilities of diff possible categorical outcomes, based upon different predictor variables. It assumes that the outcome cannot be perfectly predicted from independent variables and that unlike in other regression types, it does not assume statistically independent variables, but assumes low collinearly. (*11*)

Decision trees are the most simplest and most easily understandable data mining models. They use a tree like graph to model the decisions. They consists of nodes, which represent test on

predictor variables and the leaf nodes which represent the outcome variable. And a path from root to leaf represent classification rule, often used for prediction. (*9*)

Model selection was performed on the basis of our exploratory analysis and the information about the experiment and the variables details, obtained from the Smart Lab website (*3*).

Reproducibility

All analyses performed in this manuscript are reproduced in the R markdown file activityPredictors.Rmd [6]. However with file sharing disabled , due to the security concern, the files could not be distributed here with.

However provided we have the rmd file, the research is reproducible. And to reproduce the exact results, the cached version of the data as described in the section "Data Collection" above has to be used, as the data might be updated with time, in future.

Results:

The Smartphone data used in this analysis contains information on the activity of different persons with the Samsung S II attached to their waist. Its sensors captures 3-axial linear acceleration and 3-axial angular velocity at a rate of 50 HZ. The data set consists of activities performed by volunteers (activity), the volunteers who performed the activity(subjects), body movement as measured across the three dimensions x,y,z (tBodyAcc-XYZ), movement measured by the accelerator across three dimension (tACC-XYZ()) and a 561 feature vector with time and frequency domain variables. (*12*)

The movements from the accelerometer across three axis, XYZ, measured in a time domain of 50Hz (i.e. measured at every 1/50 = 0.02 second interval) is denoted by tACC-XYZ(). The movements from the gyroscope was also recorded across the three axis in the time interval of 0.02 seconds(tGyro-XYZ). The acceleration measurement has been decomposed into body(tBodyAcc-XYZ) and gravity(tGravityAcc-XYZ) acceleration signals across three axis x,y,z. Similar body linear(tBodyAccJerk - XYX) and angular velocity(tGyroJerk-XYZ) measurements across, x, y and z and the magnitude(tBodyAccMag, tGravityAccMag, tBodyAccJerkMag, tBodyGyroMag, tBodyGyroJerkMag) have also been included in the data set. (*13*)

For further detailed description of the variables, please refer to Appendix 1

For our analysis, we divided the data sets into two set.

Training set : 5645 observations, 562 variables

Test Set : 1707 observations and 562 variables

The exploratory analysis was conducted on the training set and the following were our observations

Unusual Features	Issues caused by the presence of the features	Solutions
Presence of redundant / auxiliary variable (subject)	Have the possibility to impact the model developed e.g. if some volunteers performs certain activity more often than other activity, then in such cases, it may introduce accidental correlation and might adversely impact predictive model.	The variable was removed. Justification : The variable is redundant and should not play any role in the future predictive model going to be developed. Also ethical issues should be considerd.
Among the 561 variables, about 4 outliers were noticed in about 339 variables.(Method used : Generalized Extreme Standardized deviance Test **(*5*)**. See appendix 2, for variables that were observed to have outliers)	Some statistical models are highly sensitive to the presence of outliers i.e. least squares estimates for regression models (*14*). However, Outliers might be both good and bad data and should be taken special care of. It might be an indication of a bad data. i.e. 200 yrs for a man's age, typo errors or they might be scientifically valid data. Valid in cases such as when they are an indicator of a special part of population that is just starting to be sampled (*15*).	Decision Tree : Included Justification : Decision trees are very good at handling outliers and are not overly sensitive to the outlier data. Regression : Included Justification : 1. The outliers have consistent -1 values, 1 values across diff columns and different observation. Indicates highly likely valid values 2. Lack of domain expertise to completely ignore the outliers. 3. Until the exclusion could be seriously justified, exclusion not considered a good option. 4. Inclusion might even help create more robust models, preventing over fitting of the training model

Variables not centered	Having a different center, is likely to affect the numerical stability of some of the calculation and methods. (*15*)	Decision Trees : Included Justification : 1. Decision trees are very good at handling skewed, un-centered and un-scaled distribution. 2. The transformations will lead to loss of interpretability in the decision tree. Regression : Ignored, after analysis. Justification: Although in general, it is expected that the centering, scaling and skewness transformation would result in numerical stability in logistic regressions, in our case, the transformations when applied led to the loss of accuracy, (Computational observation)
Data Distribution Skewed 416 left skewed, 49 right skewed 96 normal (Box Cox used to detect skewness. See appendix 3, for skewed variables	All analyses(both parametric and non parametric tests) are most of the times adversely affected by the data skewness (*16*).	Tree : Included, Justification 1. It does not posses serious challenges for trees. Regression : Ignored after analysis. Justification :Although, generally data skewness resolution can lead to significant improvement in model performance (*15*), in our case, skewness resolution in contrary, led to decrease in accuracy. (Computational observation)
High Number of confounder variables. (Method Used L: Cor function **(*17*)**) with 0.7 **(*15*) (*18*) (*19*)** as cutoff value. 410 confounding variables. (See Appendix 4 for list of confounding variables)	They often indicate the presence of highly redundant information (*20*), leading to decreased performance of the predictive models. Some predictive models prefer predictors to be uncorrelated to find solution and to improve performance and to improve the numerical stability of the model. (*20*) . They also masks the true effect of a variable on the outcome, due to the presence of another	Trees : Included. Justification Decision trees are very good at handling the high number of confounding variables. And it might even be better to include them, as it can lead to shorter and better decision trees. For each node trees calculate the information gain or some other distinguishing criteria, independent of the other variables and use the one that maximizes it. This process causes them to scale very well and can also lead to shorter and better decision trees Regression : Removed Justification : 1. The removal is performed to increase the numerical stability of the models

	confounding variable (*21*). This hence leads to inaccurate results. E.g. of the confounding example is drowning and the ice cream consumption association. (*22*) .	2. Removal significantly helps to reduce the no of unimportant or redundant variables. 3. The coefficients can become poorly determined and exhibit high variance when high no of correlated variables are included. 4. A wildly large positive coefficient on one variable can be canceled by a similarly large negative coefficient on its correlated cousin, thus reducing predictive performance. (Linear Regression Models) (*23*)

Decision tree was our first choice as the statistical method. For the decision tree, the following was our observed performance,

Data Used	Performance Measure
1. Data Set 1 All predictor varaibles included i.e. i.e. 5629 obs, 562 variables	No. of Terminal Nodes : 8 Deviance : 0.627 = (3535 / 5637) Misclassification Error : 0.1029 Accuracy = 89.8%
2. Data set with correlated variables removed i.e. Data set 2 i.e. 5629 obs, 134 variables	No. of Terminal Nodes : 12 Deviance : 0.9396 Misclassification Error : 0.1695 Accuracy = 83.1%
3. Data shifting on data set from column 2 i.e. 5629 obs, 134 variables	Performance measure as in col 2. No change
4. Data skewness resolved on data set from column 2 i.e. 5629 obs, 134 variables	No change

AS discussed in the unusual data observation section above, we observed that the decision trees are in fact very resistant to skewed, un-centered and un-scaled data. And as discussed, we also observed that the addition of correlated variable in fact led to the increased performance of the model and led to shorter trees.

The decision tree from data set 1 (training data with all variables in it) was then choosen. The decision tree had 8 terminal nodes with residual mean deviance 0.627 , misclassification error rate of 0.103 and accuracy of 89.7%. However to obtain a more generalized tree model (to avoid over fitting), we plotted the misclassification error and the deviance. And then based upon the plots, the tree with 6 terminal nodes (***see figure 1***) was built. It has minimum classification error and minimum deviation and is more generic. However, it had slightly higher residual deviance at 0.72 with very faint classification error rate change to 0.109 from the default tree. The accuracy was 89.1%. This decrease in accuracy was expected as we pruned the tree to create a more generalized tree.

The tree model when applied to the test data performed with the accuracy of 86.9%. The lowered accuracy rate on the e test data was expected, as the models are slightly expected to overestimate their accuracy, when the train and the test data happens to from the same set of data set.

The second statictical model we used was multinomial logistic regression model (*24*). The following performance meaure was obtained

Data Used	Performance Measure
1. Data set 1. All variables included i.e. 5629 observations, 562 variables	Could not be computed
2. Data set 2 with correlated variables removed i.e. 5629 obs, 134 variables	Accuracy on train set 98.2% Accuracy on test set 94.2%
3. Data set 3 with 6 variables obtained from the above decision tree i.e. 5629 obs, 6 variables	Accuracy on train set 86.6%
4. Data set 4 i.e. correlated variable removed, box cox, center and scale transformation applied i.e. 5629 obs, 134 variables	Accuracy on train set 97.9% Accuracy on test set 92.8%
5. Data set 5 i.e correlated variable removed, box cox transformation only applied i.e. 5629 obs, 134 variables	Accuracy on train set 89.9.9% Accuracy on test set 40%

Based upon our observation, we choose the multinomial regression model (*24*) based on data set 2. And the following are the estimates, coefficient values, confidence interval and the error estimates for the model

Coefficients:

multinom(formula = activity ~ ., data = un_cor_dt)

Coefficients:

	(Intercept)	tbodyaccmeanx	tbodyaccmeany	tbodyaccmeanz
sitting	-52.06510	22.257302	32.639215	22.287817
standing	-30.81614	12.351169	-9.736598	18.918335
walk	11.43016	-20.125655	-11.176080	-26.276772
walkdown	14.55302	19.546859	7.048311	-9.358849
walkup	-32.97304	9.605017	-11.030467	-6.172497

	tbodyaccentropyz	tbodyaccarcoeffx4	tbodyaccarcoeffy4
sitting	-7.914472	-0.5432544	-0.006726476
standing	-8.077588	-2.3913270	-2.180545384
walk	13.938854	-12.3743810	-2.278033739
walkdown	4.749631	12.7628059	2.347807268
walkup	-3.940338	-8.3469130	1.609100977

	tbodyaccarcoeffz1	tbodyaccarcoeffz4
sitting	-1.1730640	-0.9341065
standing	0.5635418	-4.1707342
walk	-2.0884987	-7.9361355
walkdown	-2.5374100	-8.9520650
walkup	-2.1532780	0.2445584

	tbodyacccorrelationxy	tbodyacccorrelationxz
sitting	-0.8857976	-2.5260441
standing	-0.4919551	-1.1377729
walk	11.8281559	-0.5246985
walkdown	-14.9072013	-5.1635930
walkup	5.5087164	1.3950967

	tbodyacccorrelationyz	tgravityaccstdx	tgravityaccsma
sitting	0.7770579	-2.711335	22.16785
standing	1.6206880	19.702214	28.05636
walk	7.2099822	2.658363	13.73049
walkdown	-8.8373813	-5.765579	3.72345
walkup	-1.1619824	-39.604315	20.82405

Confidence Interval

```
, , sitting
                    2.5 %     97.5 %
(Intercept)      -72.5407134 -31.589490
tbodyaccmeanx    -0.2610539  44.775659
tbodyaccmeany     12.2311442  53.047286
tbodyaccmeanz     5.3322642  39.243370
, , standing
                          2.5 %     97.5 %
(Intercept)         -59.308097  -2.324183
tbodyaccmeanx        -9.719417  34.421756
tbodyaccmeany       -30.184190  10.710994
tbodyaccmeanz         2.098920  35.737749
, , walk
                          2.5 %    97.5 %
(Intercept)          -7.524929 30.385257
tbodyaccmeanx       -50.252331 10.001021
tbodyaccmeany       -45.625969 23.273810
tbodyaccmeanz       -59.798031  7.244488
, , walkdown
                          2.5 %   97.5 %
(Intercept)          -17.24543 46.35147
tbodyaccmeanx        -43.43146 82.52518
tbodyaccmeany        -47.05071 61.14733
tbodyaccmeanz        -63.39635 44.67865
, , walkup
                            2.5 %     97.5
%
(Intercept)           -65.71458 -
0.2315022
tbodyaccmeanx          -50.20723
69.4172618
tbodyaccmeany          -61.80336
39.7424249
tbodyaccmeanz          -62.43341
50.0884204
```

For full confidence intervbal estimate list , please see Appendix /

For full coefficient estimates , pleaserefer to Appendix 6	

With the multinomial logistic regression, we observed a very high predictive accuracy of 94.2% on the test set. We also observed, the residual deviance of 570.03 and AIC as 1900.

Residual Deviance: 570.0372

AIC: 1900.037

Conclusions:

Our analysis suggests that there is a significant positive association between activity and "fBodyAccJerk.bandsEnergy...1.8", "tGravityAcc.min...X", angle.Y.gravityMean.", tBodyAccMag.std..", "tGravityAcc.arCoeff...Y.1". The analysis indicates, sensor measurement fBodyAccJerk.bandsEnergy1.8 is very crucial. It distinguishes between "walk" and other activities. The tree also indicates that when fBodyAccJerk.bandsEnergy1.8 is greater than -0.98 then the activity is likely “walk” 87% percent of the time. Similarly to distinguish between whether the activity is "walkup", "walk" or "walk down", the other sensor measurement, tBodyAccMag.std needs to be analysed. If the measurement value is observed to be larger than -0.03, then the activity is predicted as "walk down" whereas when less, then the activity is predicted as either "walkup" or "walk". This can again be distinguished by analysing another sensor measurement tGravityAcc.arCoeff.Y.1. The sensor value greater than -0.3 indicates "walk" activity, whereas otherwise indicates "Walk up" activity. Similarly for non "walk" activities, another sensor measurement variable tGravityAcc.min.X has to be analysed. For the sensor measurement value less than 0.096, it indicates “laying” activity. For “not laying” activity i.e. sitting or standing, they can then be predicted using another sensor measurement value Y.gravityMean. The decision tree is very simple, easy to interpret, however it suffers from the problem of lesser accuracy.

The accuracy problem was not observed in logistic regression. It had significantly higher accuracy, about 8 percentage points higher than with the treei.e. 94.2%. The regression model trades off for better accuracy by losing interpretability. The inclusion of 134 variable in the regression equation makes it very difficult to understand the model. However when the 6 sensor measurements from the decision tree were used then the accuracy of 86% on train set was observed. Although this increased and made it possible to interpret the regression models, the

accuracy was lost.The accuracy decreased from 94.2 % on test set to to 86% on train set. The decision tree with 90% accuracy on train set and 87% on train set, outweigh the logistic model with 6 variables in all the three fronts i.e simplicity, interpretability and accuracy. Hence we ignore the logistic regression in favor of the decision tree. However if accuracy is of higher concern then the logistic regresson model with 134 variables with 94.2% accuracy on test set is recommended to be used.

Furthermore provided more time , with further deliberate exploration , careful dimension reduction / selection performed, it might be possible to obtain logistic regression model with fewer variables and with comparably higher and satisfactory accuracy.

Our analysis is an interesting first step. It is based on a limited sample of data of about 5700 observations for model training purpose. A larger collection of data may be more appropriate to develop better models to predict the activities. Furthermore, our analysis may be of interest to people from different aspect of the society, seeking to better understand relationship between activity and the Smartphone sensors. Our analysis would also be interesting to general users, or programmers or business enterpreneurs , who want to use the predictive model to develop various useful applications for the Smartphone users.

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25 NC, U. o. N. C. *Advanced Data slides;* Powepoint presentation.

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Appendix :

1. **Variables Description :** (*13*)

   (*) - '-XYZ' is used to denote 3-axial signals in the X, Y and Z directions. i.e fBodyAcc-XYZ refers to fBodyAcc-X (x axis), fBodyAcc-Y(y axis) and fBodyAcc-Z(z axis) three variables in the data set

1. fBodyAcc-XYZ*	Fast foruier transform applied to the body acceleration across the three axis, x, y and z
2. fBodyAccJerk-XYZ*	Fast fouries transform applied to the body linear acceleration Jerk signals across x-y and z axis
3. fBodyAccGyro-XYZ*	Fast fouries transform applied to the angular velocity derived in time across x-y and z axis
4. fBodyAccJerkMag	Fast fouries transform applied to the body linear acceleration magnitude in time
5. fBodyGyroMag	Fast fouries transform applied to the angular velocity magnitude
6. fBodyGyroJerkMag	Fast fouries transform applied to the angular velocity Jerk Signals strength or magnitude

Additionally for all these above mentioned variables the, following were also calculated and were included in the observations respectively.

mean(): Mean value e.g fBodyBodyGyroJerkMag-mean()

std(): Standard deviation e.g 543 fBodyBodyGyroJerkMag-std()

mad(): Median absolute deviation e.g 544 fBodyBodyGyroJerkMag-mad()

max(): Largest value in array e.g fBodyBodyGyroJerkMag-max()

min(): Smallest value in array e.g 546 fBodyBodyGyroJerkMag-min()

sma(): Signal magnitude area e.g fBodyBodyGyroJerkMag-sma()

energy(): Energy measure. Sum of the squares divided by the number of values. E.g fBodyBodyGyroJerkMag-energy()

iqr(): Interquartile range e.g fBodyBodyGyroJerkMag-iqr()

entropy(): Signal entropy e.g fBodyBodyGyroJerkMag-entropy()

arCoeff(): Autorregresion coefficients with Burg order equal to 4 e.g fBodyBodyGyroJerkMag-maxInds

correlation(): correlation coefficient between two signals e.g

maxInds(): index of the frequency component with largest magnitude

meanFreq(): Weighted average of the frequency components to obtain a mean frequency e.g fBodyBodyGyroJerkMag-meanFreq()

skewness(): skewness of the frequency domain signal e.g fBodyBodyGyroJerkMag-skewness()

kurtosis(): kurtosis of the frequency domain signal e.g fBodyBodyGyroJerkMag-kurtosis()

bandsEnergy(): Energy of a frequency interval within the 64 bins of the FFT of each window.

angle(): Angle between to vectors.

Also the signals were averaged and were included in the observations. They are to be used in the angle variable. The variables are

gravityMean

tBodyAccMean

tBodyAccJerkMean

tBodyGyroMean

tBodyGyroJerkMean

Appendix 2 : Variables with Outliers

[1] "1 Column No : 1 tBodyAcc-mean()-X => Estimated outliers No : 4"
[1] "2 Column No : 2 tBodyAcc-mean()-Y => Estimated outliers No : 4"
[1] "3 Column No : 3 tBodyAcc-mean()-Z => Estimated outliers No : 4"
[1] "4 Column No : 11 tBodyAcc-max()-Y => Estimated outliers No : 4"
[1] "5 Column No : 12 tBodyAcc-max()-Z => Estimated outliers No : 4"
[1] "6 Column No : 15 tBodyAcc-min()-Z => Estimated outliers No : 4"
[1] "7 Column No : 17 tBodyAcc-energy()-X => Estimated outliers No : 4"
[1] "8 Column No : 18 tBodyAcc-energy()-Y => Estimated outliers No : 4"
[1] "9 Column No : 19 tBodyAcc-energy()-Z => Estimated outliers No : 4"
[1] "10 Column No : 20 tBodyAcc-iqr()-X => Estimated outliers No : 4"
[1] "11 Column No : 31 tBodyAcc-arCoeff()-Y,2 => Estimated outliers No : 4"
[1] "12 Column No : 32 tBodyAcc-arCoeff()-Y,3 => Estimated outliers No : 4"
[1] "13 Column No : 33 tBodyAcc-arCoeff()-Y,4 => Estimated outliers No : 4"
[1] "14 Column No : 37 tBodyAcc-arCoeff()-Z,4 => Estimated outliers No : 4"
[1] "15 Column No : 44 tGravityAcc-std()-X => Estimated outliers No : 4"
[1] "16 Column No : 45 tGravityAcc-std()-Y => Estimated outliers No : 4"
[1] "17 Column No : 46 tGravityAcc-std()-Z => Estimated outliers No : 4"
[1] "18 Column No : 47 tGravityAcc-mad()-X => Estimated outliers No : 4"
[1] "19 Column No : 48 tGravityAcc-mad()-Y => Estimated outliers No : 4"
[1] "20 Column No : 49 tGravityAcc-mad()-Z => Estimated outliers No : 4"
[1] "21 Column No : 60 tGravityAcc-iqr()-X => Estimated outliers No : 4"
[1] "22 Column No : 61 tGravityAcc-iqr()-Y => Estimated outliers No : 4"
[1] "23 Column No : 62 tGravityAcc-iqr()-Z => Estimated outliers No : 4"
[1] "24 Column No : 64 tGravityAcc-entropy()-Y => Estimated outliers No : 4"
[1] "25 Column No : 66 tGravityAcc-arCoeff()-X,1 => Estimated outliers No : 4"
[1] "26 Column No : 67 tGravityAcc-arCoeff()-X,2 => Estimated outliers No : 4"
[1] "27 Column No : 68 tGravityAcc-arCoeff()-X,3 => Estimated outliers No : 4"
[1] "28 Column No : 69 tGravityAcc-arCoeff()-X,4 => Estimated outliers No : 4"
[1] "29 Column No : 72 tGravityAcc-arCoeff()-Y,3 => Estimated outliers No : 4"
[1] "30 Column No : 73 tGravityAcc-arCoeff()-Y,4 => Estimated outliers No : 4"
[1] "31 Column No : 81 tBodyAccJerk-mean()-X => Estimated outliers No : 4"
[1] "32 Column No : 82 tBodyAccJerk-mean()-Y => Estimated outliers No : 4"
[1] "33 Column No : 83 tBodyAccJerk-mean()-Z => Estimated outliers No : 4"
[1] "34 Column No : 86 tBodyAccJerk-std()-Z => Estimated outliers No : 4"
[1] "35 Column No : 89 tBodyAccJerk-mad()-Z => Estimated outliers No : 4"
[1] "36 Column No : 90 tBodyAccJerk-max()-X => Estimated outliers No : 4"
[1] "37 Column No : 91 tBodyAccJerk-max()-Y => Estimated outliers No : 4"
[1] "38 Column No : 92 tBodyAccJerk-max()-Z => Estimated outliers No : 4"
[1] "39 Column No : 95 tBodyAccJerk-min()-Z => Estimated outliers No : 4"
[1] "40 Column No : 97 tBodyAccJerk-energy()-X => Estimated outliers No : 4"
[1] "41 Column No : 98 tBodyAccJerk-energy()-Y => Estimated outliers No : 4"
[1] "42 Column No : 99 tBodyAccJerk-energy()-Z => Estimated outliers No : 4"
[1] "43 Column No : 102 tBodyAccJerk-iqr()-Z => Estimated outliers No : 4"
[1] "44 Column No : 107 tBodyAccJerk-arCoeff()-X,2 => Estimated outliers No : 4"
[1] "45 Column No : 108 tBodyAccJerk-arCoeff()-X,3 => Estimated outliers No : 4"
[1] "46 Column No : 109 tBodyAccJerk-arCoeff()-X,4 => Estimated outliers No : 4"
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[1] "50 Column No : 115 tBodyAccJerk-arCoeff()-Z,2 => Estimated outliers No : 4"
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[1] "92 Column No : 175 tBodyGyroJerk-min()-Z => Estimated outliers No : 4"
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[1] "94 Column No : 177 tBodyGyroJerk-energy()-X => Estimated outliers No : 4"

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[1] "301 Column No : 497 fBodyGyro-bandsEnergy()-1,16.2 => Estimated outliers No : 4"

[1] "302 Column No : 498 fBodyGyro-bandsEnergy()-17,32.2 => Estimated outliers No : 4"

[1] "303 Column No : 499 fBodyGyro-bandsEnergy()-33,48.2 => Estimated outliers No : 4"

[1] "304 Column No : 500 fBodyGyro-bandsEnergy()-49,64.2 => Estimated outliers No : 4"

[1] "305 Column No : 501 fBodyGyro-bandsEnergy()-1,24.2 => Estimated outliers No : 4"

[1] "306 Column No : 502 fBodyGyro-bandsEnergy()-25,48.2 => Estimated outliers No : 4"

[1] "307 Column No : 506 fBodyAccMag-max() => Estimated outliers No : 4"

[1] "308 Column No : 507 fBodyAccMag-min() => Estimated outliers No : 4"

[1] "309 Column No : 509 fBodyAccMag-energy() => Estimated outliers No : 4"

[1] "310 Column No : 510 fBodyAccMag-iqr() => Estimated outliers No : 4"

[1] "311 Column No : 512 fBodyAccMag-maxInds => Estimated outliers No : 4"

[1] "312 Column No : 515 fBodyAccMag-kurtosis() => Estimated outliers No : 4"

[1] "313 Column No : 519 fBodyBodyAccJerkMag-max() => Estimated outliers No : 4"

[1] "314 Column No : 520 fBodyBodyAccJerkMag-min() => Estimated outliers No : 4"

[1] "315 Column No : 522 fBodyBodyAccJerkMag-energy() => Estimated outliers No : 4"

[1] "316 Column No : 525 fBodyBodyAccJerkMag-maxInds => Estimated outliers No : 4"

[1] "317 Column No : 526 fBodyBodyAccJerkMag-meanFreq() => Estimated outliers No : 4"

[1] "318 Column No : 528 fBodyBodyAccJerkMag-kurtosis() => Estimated outliers No : 4"

[1] "319 Column No : 529 fBodyBodyGyroMag-mean() => Estimated outliers No : 4"

[1] "320 Column No : 530 fBodyBodyGyroMag-std() => Estimated outliers No : 4"

[1] "321 Column No : 531 fBodyBodyGyroMag-mad() => Estimated outliers No : 4"

[1] "322 Column No : 532 fBodyBodyGyroMag-max() => Estimated outliers No : 4"

[1] "323 Column No : 533 fBodyBodyGyroMag-min() => Estimated outliers No : 4"

[1] "324 Column No : 534 fBodyBodyGyroMag-sma() => Estimated outliers No : 4"

[1] "325 Column No : 535 fBodyBodyGyroMag-energy() => Estimated outliers No : 4"

[1] "326 Column No : 536 fBodyBodyGyroMag-iqr() => Estimated outliers No : 4"

[1] "327 Column No : 538 fBodyBodyGyroMag-maxInds => Estimated outliers No : 4"

[1] "328 Column No : 541 fBodyBodyGyroMag-kurtosis() => Estimated outliers No : 4"

[1] "329 Column No : 542 fBodyBodyGyroJerkMag-mean() => Estimated outliers No : 4"

[1] "330 Column No : 543 fBodyBodyGyroJerkMag-std() => Estimated outliers No : 4"
[1] "331 Column No : 544 fBodyBodyGyroJerkMag-mad() => Estimated outliers No : 4"
[1] "332 Column No : 545 fBodyBodyGyroJerkMag-max() => Estimated outliers No : 4"
[1] "333 Column No : 546 fBodyBodyGyroJerkMag-min() => Estimated outliers No : 4"
[1] "334 Column No : 547 fBodyBodyGyroJerkMag-sma() => Estimated outliers No : 4"
[1] "335 Column No : 548 fBodyBodyGyroJerkMag-energy() => Estimated outliers No : 4"
[1] "336 Column No : 549 fBodyBodyGyroJerkMag-iqr() => Estimated outliers No : 4"
[1] "337 Column No : 551 fBodyBodyGyroJerkMag-maxInds => Estimated outliers No : 4"
[1] "338 Column No : 552 fBodyBodyGyroJerkMag-meanFreq() => Estimated outliers No : 4"
[1] "339 Column No : 554 fBodyBodyGyroJerkMag-kurtosis() => Estimated outliers No : 4"

Appendix 3: Skewed Variables (*15*)

Method Used : BoxCox Tranformation to estimate lambda

Right Skewed variables with estimated lambda values	
angle(Z,gravityMean) ==> 2"	[19] "tBodyGyro-min()-X ==> 2"
[2] "angle(Y,gravityMean) ==> 2"	[20] "tBodyGyro-mean()-Z ==> 1.3"
[3] "fBodyBodyGyroJerkMag-meanFreq() ==> 1.5"	[21] "tBodyAccJerk-arCoeff()-Z,4 ==> 1.4"
[4] "tBodyGyroJerkMag-arCoeff()1 ==> 1.8"	[22] "tBodyAccJerk-arCoeff()-Z,3 ==> 1.5"
[5] "tBodyAccJerkMag-arCoeff()1 ==> 1.4"	[23] "tBodyAccJerk-arCoeff()-Y,4 ==> 1.5"
[6] "tBodyGyroJerk-arCoeff()-Z,3 ==> 1.4"	[24] "tBodyAccJerk-arCoeff()-Y,3 ==> 1.5"
[7] "tBodyGyroJerk-arCoeff()-Y,3 ==> 1.4"	[25] "tBodyAccJerk-arCoeff()-X,4 ==> 1.4"
[8] "tBodyGyroJerk-arCoeff()-Y,2 ==> 1.3"	[26] "tBodyAccJerk-arCoeff()-X,3 ==> 1.3"
[9] "tBodyGyroJerk-arCoeff()-X,4 ==> 1.3"	[27] "tBodyAccJerk-arCoeff()-X,2 ==> 1.3"
[10] "tBodyGyroJerk-arCoeff()-X,3 ==> 1.3"	[28] "tBodyAccJerk-min()-Z ==> 2"
[11] "tBodyGyroJerk-min()-Z ==> 2"	[29] "tBodyAccJerk-min()-Y ==> 2"
[12] "tBodyGyroJerk-min()-Y ==> 2"	[30] "tBodyAccJerk-min()-X ==> 2"
[13] "tBodyGyroJerk-min()-X ==> 2"	[31] "tBodyAccJerk-mean()-Z ==> 1.3"
[14] "tBodyGyroJerk-mean()-X ==> 1.3"	[32] "tGravityAcc-arCoeff()-Z,4 ==> 1.5"
[15] "tBodyGyro-arCoeff()-Z,3 ==> 1.3"	[33] "tGravityAcc-arCoeff()-Z,2 ==> 1.3"
[16] "tBodyGyro-arCoeff()-X,3 ==> 1.5"	[34] "tGravityAcc-arCoeff()-Y,4 ==> 1.6"
[17] "tBodyGyro-min()-Z ==> 2"	[35] "tGravityAcc-arCoeff()-X,4 ==> 2"
[18] "tBodyGyro-min()-Y ==> 2"	[36] "tGravityAcc-arCoeff()-X,2 ==> 1.8"
	[37] "tGravityAcc-energy()-X ==> 1.7"
	[38] "tGravityAcc-min()-X ==> 2"
	[39] "tGravityAcc-max()-X ==> 2"
	[40] "tGravityAcc-mean()-X ==> 2"
	[41] "tBodyAcc-correlation()-Y,Z ==> 1.3"
	[42] "tBodyAcc-arCoeff()-Z,3 ==> 1.5"
	[43] "tBodyAcc-arCoeff()-Y,3 ==> 1.4"

	[44] "tBodyAcc-arCoeff()-X,3 ==> 1.3" [45] "tBodyAcc-min()-Z ==> 2" [46] "tBodyAcc-min()-Y ==> 2" [47] "tBodyAcc-min()-X ==> 2" [48] "tBodyAcc-mean()-Y ==> 1.4" [49] "tBodyAcc-mean()-X ==> 2"

Left Skewed Variables with the estimated lambda values

1] "angle(X,gravityMean) ==> -0.5"	201] "fBodyAcc-bandsEnergy()-1,24.2 ==> -0.7"
[2] "fBodyBodyGyroJerkMag-kurtosis() ==> -0.0999999999999999"	[202] "fBodyAcc-bandsEnergy()-49,64.2 ==> -2"
[3] "fBodyBodyGyroJerkMag-skewness() ==> 0.3"	[203] "fBodyAcc-bandsEnergy()-33,48.2 ==> -2"
[4] "fBodyBodyGyroJerkMag-maxInds ==> -0.6"	[204] "fBodyAcc-bandsEnergy()-17,32.2 ==> -1.9"
[5] "fBodyBodyGyroJerkMag-entropy() ==> 0.3"	[205] "fBodyAcc-bandsEnergy()-1,16.2 ==> -0.7"
[6] "fBodyBodyGyroJerkMag-iqr() ==> -0.5"	[206] "fBodyAcc-bandsEnergy()-57,64.2 ==> -2"
[7] "fBodyBodyGyroJerkMag-energy() ==> -1.8"	[207] "fBodyAcc-bandsEnergy()-49,56.2 ==> -2"
[8] "fBodyBodyGyroJerkMag-sma() ==> -0.5"	[208] "fBodyAcc-bandsEnergy()-41,48.2 ==> -1.9"
[9] "fBodyBodyGyroJerkMag-min() ==> -1"	[209] "fBodyAcc-bandsEnergy()-33,40.2 ==> -2"
[10] "fBodyBodyGyroJerkMag-max() ==> -0.6"	[210] "fBodyAcc-bandsEnergy()-25,32.2 ==> -2"
[11] "fBodyBodyGyroJerkMag-mad() ==> -0.4"	[211] "fBodyAcc-bandsEnergy()-17,24.2 ==> -1.7"
[12] "fBodyBodyGyroJerkMag-std() ==> -0.5"	[212] "fBodyAcc-bandsEnergy()-9,16.2 ==> -1.3"
[13] "fBodyBodyGyroJerkMag-mean() ==> -0.5"	[213] "fBodyAcc-bandsEnergy()-1,8.2 ==> -0.8"
[14] "fBodyBodyGyroMag-kurtosis() ==> -0.0999999999999999"	[214] "fBodyAcc-bandsEnergy()-25,48.1 ==> -1.1"
[15] "fBodyBodyGyroMag-skewness() ==> 0.2"	[215] "fBodyAcc-bandsEnergy()-1,24.1 ==> -0.4"
[16] "fBodyBodyGyroMag-maxInds ==> -0.8"	[216] "fBodyAcc-bandsEnergy()-49,64.1 ==> -1.5"
[17] "fBodyBodyGyroMag-entropy() ==> 0.6"	[217] "fBodyAcc-bandsEnergy()-33,48.1 ==> -1"
[18] "fBodyBodyGyroMag-iqr() ==> -0.3"	[218] "fBodyAcc-bandsEnergy()-17,32.1 ==> -0.9"
[19] "fBodyBodyGyroMag-energy() ==> -0.9"	[219] "fBodyAcc-bandsEnergy()-1,16.1 ==> -0.4"
[20] "fBodyBodyGyroMag-sma() ==> -0.2"	[220] "fBodyAcc-bandsEnergy()-57,64.1 ==> -2"
[21] "fBodyBodyGyroMag-min() ==> -1"	[221] "fBodyAcc-bandsEnergy()-49,56.1 ==> -1.3"
[22] "fBodyBodyGyroMag-max() ==> -0.2"	[222] "fBodyAcc-bandsEnergy()-41,48.1 ==> -1"
[23] "fBodyBodyGyroMag-mad() ==> -0.2"	[223] "fBodyAcc-bandsEnergy()-33,40.1 ==> -1.2"
[24] "fBodyBodyGyroMag-std() ==> -0.0999999999999999"	[224] "fBodyAcc-bandsEnergy()-25,32.1 ==> -1.3"
[25] "fBodyBodyGyroMag-mean() ==> -0.2"	[225] "fBodyAcc-bandsEnergy()-17,24.1 ==> -1"
[26] "fBodyBodyAccJerkMag-kurtosis() ==> -0.2"	[226] "fBodyAcc-bandsEnergy()-9,16.1 ==> -0.8"
[27] "fBodyBodyAccJerkMag-skewness() ==> 0.2"	[227] "fBodyAcc-bandsEnergy()-1,8.1 ==> -0.4"
[28] "fBodyBodyAccJerkMag-maxInds ==> -0.6"	[228] "fBodyAcc-bandsEnergy()-25,48 ==> -1.1"
[29] "fBodyBodyAccJerkMag-entropy() ==> 0"	[229] "fBodyAcc-bandsEnergy()-1,24 ==> -0.7"
[30] "fBodyBodyAccJerkMag-iqr() ==> -0.3"	[230] "fBodyAcc-bandsEnergy()-49,64 ==> -2"
[31] "fBodyBodyAccJerkMag-energy() ==> -0.8"	[231] "fBodyAcc-bandsEnergy()-33,48 ==> -1.4"
[32] "fBodyBodyAccJerkMag-sma() ==> -0.3"	[232] "fBodyAcc-bandsEnergy()-17,32 ==> -0.9"
[33] "fBodyBodyAccJerkMag-min() ==> -0.8"	[233] "fBodyAcc-bandsEnergy()-1,16 ==> -0.7"
[34] "fBodyBodyAccJerkMag-max() ==> -0.3"	[234] "fBodyAcc-bandsEnergy()-57,64 ==> -2"
[35] "fBodyBodyAccJerkMag-mad() ==> -0.3"	[235] "fBodyAcc-bandsEnergy()-49,56 ==> -2"

[36] "fBodyBodyAccJerkMag-std() ==> -0.3"
[37] "fBodyBodyAccJerkMag-mean() ==> -0.3"
[38] "fBodyAccMag-kurtosis() ==> -0.3"
[39] "fBodyAccMag-skewness() ==> 0"
[40] "fBodyAccMag-maxInds ==> -0.0999999999999999"
[41] "fBodyAccMag-entropy() ==> 0.3"
[42] "fBodyAccMag-iqr() ==> -0.3"
[43] "fBodyAccMag-energy() ==> -0.6"
[44] "fBodyAccMag-sma() ==> -0.2"
[45] "fBodyAccMag-min() ==> -1.1"
[46] "fBodyAccMag-max() ==> -0.2"
[47] "fBodyAccMag-mad() ==> -0.0999999999999999"
[48] "fBodyAccMag-std() ==> -0.0999999999999999"
[49] "fBodyAccMag-mean() ==> -0.2"
[50] "fBodyGyro-bandsEnergy()-25,48.2 ==> -2"
[51] "fBodyGyro-bandsEnergy()-1,24.2 ==> -0.9"
[52] "fBodyGyro-bandsEnergy()-49,64.2 ==> -2"
[53] "fBodyGyro-bandsEnergy()-33,48.2 ==> -2"
[54] "fBodyGyro-bandsEnergy()-17,32.2 ==> -1.5"
[55] "fBodyGyro-bandsEnergy()-1,16.2 ==> -1"
[56] "fBodyGyro-bandsEnergy()-57,64.2 ==> -2"
[57] "fBodyGyro-bandsEnergy()-49,56.2 ==> -2"
[58] "fBodyGyro-bandsEnergy()-41,48.2 ==> -2"
[59] "fBodyGyro-bandsEnergy()-33,40.2 ==> -2"
[60] "fBodyGyro-bandsEnergy()-25,32.2 ==> -2"
[61] "fBodyGyro-bandsEnergy()-17,24.2 ==> -1.7"
[62] "fBodyGyro-bandsEnergy()-9,16.2 ==> -1.7"
[63] "fBodyGyro-bandsEnergy()-1,8.2 ==> -1.2"
[64] "fBodyGyro-bandsEnergy()-25,48.1 ==> -2"
[65] "fBodyGyro-bandsEnergy()-1,24.1 ==> -1.1"
[66] "fBodyGyro-bandsEnergy()-49,64.1 ==> -2"
[67] "fBodyGyro-bandsEnergy()-33,48.1 ==> -2"
[68] "fBodyGyro-bandsEnergy()-17,32.1 ==> -2"
[69] "fBodyGyro-bandsEnergy()-1,16.1 ==> -1.1"
[70] "fBodyGyro-bandsEnergy()-57,64.1 ==> -2"
[71] "fBodyGyro-bandsEnergy()-49,56.1 ==> -2"
[72] "fBodyGyro-bandsEnergy()-41,48.1 ==> -2"
[73] "fBodyGyro-bandsEnergy()-33,40.1 ==> -2"
[74] "fBodyGyro-bandsEnergy()-25,32.1 ==> -2"
[75] "fBodyGyro-bandsEnergy()-17,24.1 ==> -2"
[76] "fBodyGyro-bandsEnergy()-9,16.1 ==> -2"
[77] "fBodyGyro-bandsEnergy()-1,8.1 ==> -1.1"
[78] "fBodyGyro-bandsEnergy()-25,48 ==> -2"
[79] "fBodyGyro-bandsEnergy()-1,24 ==> -1.2"
[80] "fBodyGyro-bandsEnergy()-49,64 ==> -2"
[81] "fBodyGyro-bandsEnergy()-33,48 ==> -2"
[236] "fBodyAcc-bandsEnergy()-41,48 ==> -1.4"
[237] "fBodyAcc-bandsEnergy()-33,40 ==> -1.4"
[238] "fBodyAcc-bandsEnergy()-25,32 ==> -1.3"
[239] "fBodyAcc-bandsEnergy()-17,24 ==> -1"
[240] "fBodyAcc-bandsEnergy()-9,16 ==> -1.1"
[241] "fBodyAcc-bandsEnergy()-1,8 ==> -0.7"
[242] "fBodyAcc-kurtosis()-Z ==> 0"
[243] "fBodyAcc-skewness()-Z ==> 0.3"
[244] "fBodyAcc-kurtosis()-Y ==> -0.3"
[245] "fBodyAcc-skewness()-Y ==> -0.0999999999999999"
[246] "fBodyAcc-kurtosis()-X ==> 0.1"
[247] "fBodyAcc-skewness()-X ==> 0.3"
[248] "fBodyAcc-maxInds-Z ==> -0.7"
[249] "fBodyAcc-maxInds-Y ==> -0.3"
[250] "fBodyAcc-maxInds-X ==> -0.0999999999999999"
[251] "fBodyAcc-entropy()-Z ==> 0.3"
[252] "fBodyAcc-entropy()-Y ==> 0.3"
[253] "fBodyAcc-entropy()-X ==> 0.2"
[254] "fBodyAcc-iqr()-Z ==> -0.4"
[255] "fBodyAcc-iqr()-Y ==> -0.3"
[256] "fBodyAcc-iqr()-X ==> -0.3"
[257] "fBodyAcc-energy()-Z ==> -0.7"
[258] "fBodyAcc-energy()-Y ==> -0.4"
[259] "fBodyAcc-energy()-X ==> -0.7"
[260] "fBodyAcc-sma() ==> -0.2"
[261] "fBodyAcc-min()-Z ==> -1.5"
[262] "fBodyAcc-min()-Y ==> -1.1"
[263] "fBodyAcc-min()-X ==> -1"
[264] "fBodyAcc-max()-Z ==> -0.0999999999999999"
[265] "fBodyAcc-max()-Y ==> -0.0999999999999999"
[266] "fBodyAcc-max()-X ==> -0.3"
[267] "fBodyAcc-mad()-Z ==> -0.2"
[268] "fBodyAcc-mad()-Y ==> -0.0999999999999999"
[269] "fBodyAcc-mad()-X ==> -0.2"
[270] "fBodyAcc-std()-Z ==> -0.0999999999999999"
[271] "fBodyAcc-std()-Y ==> -0.0999999999999999"
[272] "fBodyAcc-std()-X ==> -0.2"
[273] "fBodyAcc-mean()-Z ==> -0.2"
[274] "fBodyAcc-mean()-Y ==> -0.0999999999999999"
[275] "fBodyAcc-mean()-X ==> -0.3"
[276] "tBodyGyroJerkMag-entropy() ==> 0.6"
[277] "tBodyGyroJerkMag-iqr() ==> -0.5"
[278] "tBodyGyroJerkMag-energy() ==> -1.5"
[279] "tBodyGyroJerkMag-sma() ==> -0.4"
[280] "tBodyGyroJerkMag-min() ==> -0.6"
[281] "tBodyGyroJerkMag-max() ==> -0.5"

[82] "fBodyGyro-bandsEnergy()-17,32 ==> -1.5"
[83] "fBodyGyro-bandsEnergy()-1,16 ==> -1.3"
[84] "fBodyGyro-bandsEnergy()-57,64 ==> -2"
[85] "fBodyGyro-bandsEnergy()-49,56 ==> -2"
[86] "fBodyGyro-bandsEnergy()-41,48 ==> -2"
[87] "fBodyGyro-bandsEnergy()-33,40 ==> -2"
[88] "fBodyGyro-bandsEnergy()-25,32 ==> -2"
[89] "fBodyGyro-bandsEnergy()-17,24 ==> -1.5"
[90] "fBodyGyro-bandsEnergy()-9,16 ==> -1.2"
[91] "fBodyGyro-bandsEnergy()-1,8 ==> -1.5"
[92] "fBodyGyro-kurtosis()-Z ==> -0.0999999999999999"
[93] "fBodyGyro-skewness()-Z ==> 0.2"
[94] "fBodyGyro-kurtosis()-Y ==> -0.2"
[95] "fBodyGyro-skewness()-Y ==> -0.0999999999999999"
[96] "fBodyGyro-kurtosis()-X ==> 0"
[97] "fBodyGyro-skewness()-X ==> 0.5"
[98] "fBodyGyro-maxInds-Z ==> -0.4"
[99] "fBodyGyro-maxInds-Y ==> -0.7"
[100] "fBodyGyro-maxInds-X ==> -0.9"
[101] "fBodyGyro-entropy()-Z ==> 0.5"
[102] "fBodyGyro-entropy()-Y ==> 0.5"
[103] "fBodyGyro-entropy()-X ==> 0.5"
[104] "fBodyGyro-iqr()-Z ==> -0.3"
[105] "fBodyGyro-iqr()-Y ==> -0.5"
[106] "fBodyGyro-iqr()-X ==> -0.3"
[107] "fBodyGyro-energy()-Z ==> -0.9"
[108] "fBodyGyro-energy()-Y ==> -1.1"
[109] "fBodyGyro-energy()-X ==> -1.2"
[110] "fBodyGyro-sma() ==> -0.2"
[111] "fBodyGyro-min()-Z ==> -1.3"
[112] "fBodyGyro-min()-Y ==> -1.3"
[113] "fBodyGyro-min()-X ==> -1.7"
[114] "fBodyGyro-max()-Z ==> -0.4"
[115] "fBodyGyro-max()-Y ==> -0.4"
[116] "fBodyGyro-max()-X ==> -0.3"
[117] "fBodyGyro-mad()-Z ==> -0.2"
[118] "fBodyGyro-mad()-Y ==> -0.3"
[119] "fBodyGyro-mad()-X ==> -0.2"
[120] "fBodyGyro-std()-Z ==> -0.2"
[121] "fBodyGyro-std()-Y ==> -0.3"
[122] "fBodyGyro-std()-X ==> -0.3"
[123] "fBodyGyro-mean()-Z ==> -0.2"
[124] "fBodyGyro-mean()-Y ==> -0.3"
[125] "fBodyGyro-mean()-X ==> -0.2"
[126] "fBodyAccJerk-bandsEnergy()-25,48.2 ==> -2"
[127] "fBodyAccJerk-bandsEnergy()-1,24.2 ==> -1.2"
[282] "tBodyGyroJerkMag-mad() ==> -0.5"
[283] "tBodyGyroJerkMag-std() ==> -0.5"
[284] "tBodyGyroJerkMag-mean() ==> -0.4"
[285] "tBodyGyroMag-iqr() ==> -0.0999999999999999"
[286] "tBodyGyroMag-energy() ==> -0.6"
[287] "tBodyGyroMag-sma() ==> -0.0999999999999999"
[288] "tBodyGyroMag-min() ==> -0.3"
[289] "tBodyGyroMag-max() ==> -0.2"
[290] "tBodyGyroMag-mad() ==> -0.0999999999999999"
[291] "tBodyGyroMag-std() ==> -0.0999999999999999"
[292] "tBodyGyroMag-mean() ==> -0.0999999999999999"
[293] "tBodyAccJerkMag-arCoeff()2 ==> 0.4"
[294] "tBodyAccJerkMag-entropy() ==> 0.2"
[295] "tBodyAccJerkMag-iqr() ==> -0.3"
[296] "tBodyAccJerkMag-energy() ==> -0.8"
[297] "tBodyAccJerkMag-sma() ==> -0.3"
[298] "tBodyAccJerkMag-min() ==> -0.6"
[299] "tBodyAccJerkMag-max() ==> -0.3"
[300] "tBodyAccJerkMag-mad() ==> -0.3"
[301] "tBodyAccJerkMag-std() ==> -0.3"
[302] "tBodyAccJerkMag-mean() ==> -0.3"
[303] "tGravityAccMag-iqr() ==> -0.2"
[304] "tGravityAccMag-energy() ==> -0.4"
[305] "tGravityAccMag-sma() ==> -0.0999999999999999"
[306] "tGravityAccMag-min() ==> -0.6"
[307] "tGravityAccMag-max() ==> -0.0999999999999999"
[308] "tGravityAccMag-mad() ==> -0.0999999999999999"
[309] "tGravityAccMag-std() ==> -0.0999999999999999"
[310] "tGravityAccMag-mean() ==> -0.0999999999999999"
[311] "tBodyAccMag-iqr() ==> -0.2"
[312] "tBodyAccMag-energy() ==> -0.4"
[313] "tBodyAccMag-sma() ==> -0.0999999999999999"
[314] "tBodyAccMag-min() ==> -0.6"
[315] "tBodyAccMag-max() ==> -0.0999999999999999"
[316] "tBodyAccMag-mad() ==> -0.0999999999999999"
[317] "tBodyAccMag-std() ==> -0.0999999999999999"
[318] "tBodyAccMag-mean() ==> -0.0999999999999999"
[319] "tBodyGyroJerk-arCoeff()-Z,1 ==> 0.5"
[320] "tBodyGyroJerk-arCoeff()-Y,1 ==> 0.6"
[321] "tBodyGyroJerk-entropy()-Z ==> 0.3"
[322] "tBodyGyroJerk-entropy()-X ==> 0.6"
[323] "tBodyGyroJerk-iqr()-Z ==> -0.4"
[324] "tBodyGyroJerk-iqr()-Y ==> -0.6"
[325] "tBodyGyroJerk-iqr()-X ==> -0.4"
[326] "tBodyGyroJerk-energy()-Z ==> -1.4"
[327] "tBodyGyroJerk-energy()-Y ==> -2"

[128] "fBodyAccJerk-bandsEnergy()-49,64.2 ==> -1.9"
[129] "fBodyAccJerk-bandsEnergy()-33,48.2 ==> -2"
[130] "fBodyAccJerk-bandsEnergy()-17,32.2 ==> -2"
[131] "fBodyAccJerk-bandsEnergy()-1,16.2 ==> -1.1"
[132] "fBodyAccJerk-bandsEnergy()-57,64.2 ==> -2"
[133] "fBodyAccJerk-bandsEnergy()-49,56.2 ==> -1.9"
[134] "fBodyAccJerk-bandsEnergy()-41,48.2 ==> -2"
[135] "fBodyAccJerk-bandsEnergy()-33,40.2 ==> -2"
[136] "fBodyAccJerk-bandsEnergy()-25,32.2 ==> -2"
[137] "fBodyAccJerk-bandsEnergy()-17,24.2 ==> -1.8"
[138] "fBodyAccJerk-bandsEnergy()-9,16.2 ==> -1.3"
[139] "fBodyAccJerk-bandsEnergy()-1,8.2 ==> -1.3"
[140] "fBodyAccJerk-bandsEnergy()-25,48.1 ==> -1.1"
[141] "fBodyAccJerk-bandsEnergy()-1,24.1 ==> -0.7"
[142] "fBodyAccJerk-bandsEnergy()-49,64.1 ==> -1.6"
[143] "fBodyAccJerk-bandsEnergy()-33,48.1 ==> -1"
[144] "fBodyAccJerk-bandsEnergy()-17,32.1 ==> -0.9"
[145] "fBodyAccJerk-bandsEnergy()-1,16.1 ==> -0.7"
[146] "fBodyAccJerk-bandsEnergy()-57,64.1 ==> -2"
[147] "fBodyAccJerk-bandsEnergy()-49,56.1 ==> -1.5"
[148] "fBodyAccJerk-bandsEnergy()-41,48.1 ==> -1"
[149] "fBodyAccJerk-bandsEnergy()-33,40.1 ==> -1.4"
[150] "fBodyAccJerk-bandsEnergy()-25,32.1 ==> -1.4"
[151] "fBodyAccJerk-bandsEnergy()-17,24.1 ==> -0.9"
[152] "fBodyAccJerk-bandsEnergy()-9,16.1 ==> -0.9"
[153] "fBodyAccJerk-bandsEnergy()-1,8.1 ==> -0.6"
[154] "fBodyAccJerk-bandsEnergy()-25,48 ==> -1"
[155] "fBodyAccJerk-bandsEnergy()-1,24 ==> -0.8"
[156] "fBodyAccJerk-bandsEnergy()-49,64 ==> -2"
[157] "fBodyAccJerk-bandsEnergy()-33,48 ==> -1.3"
[158] "fBodyAccJerk-bandsEnergy()-17,32 ==> -1"
[159] "fBodyAccJerk-bandsEnergy()-1,16 ==> -0.9"
[160] "fBodyAccJerk-bandsEnergy()-57,64 ==> -2"
[161] "fBodyAccJerk-bandsEnergy()-49,56 ==> -2"
[162] "fBodyAccJerk-bandsEnergy()-41,48 ==> -1.3"
[163] "fBodyAccJerk-bandsEnergy()-33,40 ==> -1.5"
[164] "fBodyAccJerk-bandsEnergy()-25,32 ==> -1.4"
[165] "fBodyAccJerk-bandsEnergy()-17,24 ==> -1.1"
[166] "fBodyAccJerk-bandsEnergy()-9,16 ==> -1.1"
[167] "fBodyAccJerk-bandsEnergy()-1,8 ==> -0.9"
[168] "fBodyAccJerk-kurtosis()-Z ==> -0.6"
[169] "fBodyAccJerk-skewness()-Z ==> 0"
[170] "fBodyAccJerk-kurtosis()-Y ==> -0.5"
[171] "fBodyAccJerk-skewness()-Y ==> 0.1"
[172] "fBodyAccJerk-kurtosis()-X ==> -0.5"
[173] "fBodyAccJerk-skewness()-X ==> 0.2"
[328] "tBodyGyroJerk-energy()-X ==> -1.3"
[329] "tBodyGyroJerk-sma() ==> -0.4"
[330] "tBodyGyroJerk-max()-Z ==> -0.4"
[331] "tBodyGyroJerk-max()-Y ==> -0.6"
[332] "tBodyGyroJerk-max()-X ==> -0.4"
[333] "tBodyGyroJerk-mad()-Z ==> -0.4"
[334] "tBodyGyroJerk-mad()-Y ==> -0.6"
[335] "tBodyGyroJerk-mad()-X ==> -0.3"
[336] "tBodyGyroJerk-std()-Z ==> -0.4"
[337] "tBodyGyroJerk-std()-Y ==> -0.5"
[338] "tBodyGyroJerk-std()-X ==> -0.3"
[339] "tBodyGyro-arCoeff()-Z,1 ==> 0.6"
[340] "tBodyGyro-iqr()-Z ==> -0.3"
[341] "tBodyGyro-iqr()-Y ==> -0.3"
[342] "tBodyGyro-iqr()-X ==> -0.3"
[343] "tBodyGyro-energy()-Z ==> -0.8"
[344] "tBodyGyro-energy()-Y ==> -1.1"
[345] "tBodyGyro-energy()-X ==> -1"
[346] "tBodyGyro-sma() ==> -0.0999999999999999"
[347] "tBodyGyro-max()-Z ==> -0.6"
[348] "tBodyGyro-max()-Y ==> -0.6"
[349] "tBodyGyro-max()-X ==> -0.6"
[350] "tBodyGyro-mad()-Z ==> -0.2"
[351] "tBodyGyro-mad()-Y ==> -0.3"
[352] "tBodyGyro-mad()-X ==> -0.3"
[353] "tBodyGyro-std()-Z ==> -0.2"
[354] "tBodyGyro-std()-Y ==> -0.3"
[355] "tBodyGyro-std()-X ==> -0.2"
[356] "tBodyAccJerk-entropy()-Z ==> 0.1"
[357] "tBodyAccJerk-entropy()-Y ==> 0.3"
[358] "tBodyAccJerk-entropy()-X ==> 0.2"
[359] "tBodyAccJerk-iqr()-Z ==> -0.5"
[360] "tBodyAccJerk-iqr()-Y ==> -0.3"
[361] "tBodyAccJerk-iqr()-X ==> -0.3"
[362] "tBodyAccJerk-energy()-Z ==> -1.6"
[363] "tBodyAccJerk-energy()-Y ==> -0.7"
[364] "tBodyAccJerk-energy()-X ==> -0.8"
[365] "tBodyAccJerk-sma() ==> -0.3"
[366] "tBodyAccJerk-max()-Z ==> -0.6"
[367] "tBodyAccJerk-max()-Y ==> -0.4"
[368] "tBodyAccJerk-max()-X ==> -0.4"
[369] "tBodyAccJerk-mad()-Z ==> -0.5"
[370] "tBodyAccJerk-mad()-Y ==> -0.3"
[371] "tBodyAccJerk-mad()-X ==> -0.3"
[372] "tBodyAccJerk-std()-Z ==> -0.5"
[373] "tBodyAccJerk-std()-Y ==> -0.3"

[174] "fBodyAccJerk-meanFreq()-Y ==> 0.6"
[175] "fBodyAccJerk-entropy()-Z ==> 0"
[176] "fBodyAccJerk-entropy()-Y ==> 0.1"
[177] "fBodyAccJerk-entropy()-X ==> 0"
[178] "fBodyAccJerk-iqr()-Z ==> -0.5"
[179] "fBodyAccJerk-iqr()-Y ==> -0.3"
[180] "fBodyAccJerk-iqr()-X ==> -0.3"
[181] "fBodyAccJerk-energy()-Z ==> -1.6"
[182] "fBodyAccJerk-energy()-Y ==> -0.7"
[183] "fBodyAccJerk-energy()-X ==> -0.8"
[184] "fBodyAccJerk-sma() ==> -0.3"
[185] "fBodyAccJerk-min()-Z ==> -1.3"
[186] "fBodyAccJerk-min()-Y ==> -1.1"
[187] "fBodyAccJerk-min()-X ==> -1.3"
[188] "fBodyAccJerk-max()-Z ==> -0.6"
[189] "fBodyAccJerk-max()-Y ==> -0.3"
[190] "fBodyAccJerk-max()-X ==> -0.4"
[191] "fBodyAccJerk-mad()-Z ==> -0.5"
[192] "fBodyAccJerk-mad()-Y ==> -0.3"
[193] "fBodyAccJerk-mad()-X ==> -0.3"
[194] "fBodyAccJerk-std()-Z ==> -0.5"
[195] "fBodyAccJerk-std()-Y ==> -0.3"
[196] "fBodyAccJerk-std()-X ==> -0.3"
[197] "fBodyAccJerk-mean()-Z ==> -0.4"
[198] "fBodyAccJerk-mean()-Y ==> -0.3"
[199] "fBodyAccJerk-mean()-X ==> -0.3"
[200] "fBodyAcc-bandsEnergy()-25,48.2 ==> -2"
[

[374] "tBodyAccJerk-std()-X ==> -0.3"
[375] "tGravityAcc-correlation()-X,Z ==> 0.4"
[376] "tGravityAcc-arCoeff()-X,3 ==> 0.6"
[377] "tGravityAcc-entropy()-Z ==> -0.3"
[378] "tGravityAcc-entropy()-Y ==> -1.8"
[379] "tGravityAcc-entropy()-X ==> 0.1"
[380] "tGravityAcc-iqr()-Z ==> -2"
[381] "tGravityAcc-iqr()-Y ==> -2"
[382] "tGravityAcc-iqr()-X ==> -2"
[383] "tGravityAcc-energy()-Z ==> -0.8"
[384] "tGravityAcc-energy()-Y ==> -0.7"
[385] "tGravityAcc-min()-Z ==> -0.2"
[386] "tGravityAcc-min()-Y ==> -1.4"
[387] "tGravityAcc-max()-Z ==> -0.3"
[388] "tGravityAcc-max()-Y ==> -1.5"
[389] "tGravityAcc-mad()-Z ==> -1.9"
[390] "tGravityAcc-mad()-Y ==> -2"
[391] "tGravityAcc-mad()-X ==> -2"
[392] "tGravityAcc-std()-Z ==> -1.8"
[393] "tGravityAcc-std()-Y ==> -2"
[394] "tGravityAcc-std()-X ==> -2"
[395] "tGravityAcc-mean()-Z ==> -0.2"
[396] "tGravityAcc-mean()-Y ==> -1.5"
[397] "tBodyAcc-correlation()-X,Y ==> 0.6"
[398] "tBodyAcc-arCoeff()-Z,2 ==> 0.1"
[399] "tBodyAcc-arCoeff()-Y,2 ==> 0.6"
[400] "tBodyAcc-arCoeff()-X,2 ==> 0.5"
[401] "tBodyAcc-iqr()-Z ==> -0.0999999999999999"
[402] "tBodyAcc-iqr()-Y ==> -0.2"
[403] "tBodyAcc-iqr()-X ==> -0.3"
[404] "tBodyAcc-energy()-Z ==> -0.7"
[405] "tBodyAcc-energy()-Y ==> -0.7"
[406] "tBodyAcc-energy()-X ==> -0.7"
[407] "tBodyAcc-sma() ==> -0.0999999999999999"
[408] "tBodyAcc-max()-Z ==> -0.5"
[409] "tBodyAcc-max()-Y ==> -0.5"
[410] "tBodyAcc-max()-X ==> -0.3"
[411] "tBodyAcc-mad()-Z ==> -0.0999999999999999"
[412] "tBodyAcc-mad()-Y ==> -0.0999999999999999"
[413] "tBodyAcc-mad()-X ==> -0.3"
[414] "tBodyAcc-std()-Z ==> -0.0999999999999999"
[415] "tBodyAcc-std()-Y ==> -0.0999999999999999"
[416] "tBodyAcc-std()-X ==> -0.2"

APPENDIX 5 : List of confounding variables

Method Used : Corr function

[1] "fBodyAcc-sma()"	[210] "tBodyAcc-energy()-X"
[2] "fBodyAccJerk-sma()"	[211] "fBodyAcc-bandsEnergy()-1,8.1"
[3] "fBodyGyro-sma()"	[212] "fBodyAcc-bandsEnergy()-1,24"
[4] "tBodyAccJerk-sma()"	[213] "fBodyAccJerk-bandsEnergy()-9,16"
[5] "tBodyAccJerkMag-sma()"	[214] "fBodyAcc-bandsEnergy()-17,32"
[6] "tBodyAccJerkMag-mean()"	[215] "fBodyAcc-bandsEnergy()-1,16"
[7] "fBodyBodyAccJerkMag-sma()"	[216] "fBodyAccJerk-bandsEnergy()-17,32"
[8] "fBodyBodyAccJerkMag-mean()"	[217] "fBodyAccJerk-bandsEnergy()-17,32.1"
[9] "tBodyAccJerkMag-mad()"	[218] "fBodyAcc-bandsEnergy()-17,32.1"
[10] "tBodyAccJerkMag-std()"	[219] "fBodyAcc-bandsEnergy()-9,16"
[11] "fBodyAccMag-sma()"	[220] "fBodyAcc-max()-Z"
[12] "fBodyAccMag-mean()"	[221] "fBodyBodyGyroMag-energy()"
[13] "tBodyGyroJerk-sma()"	[222] "tBodyAccJerk-energy()-Z"
[14] "fBodyBodyAccJerkMag-mad()"	[223] "fBodyAccJerk-energy()-Z"
[15] "tBodyAcc-sma()"	[224] "fBodyAcc-bandsEnergy()-9,16.1"
[16] "tBodyAccJerkMag-iqr()"	[225] "fBodyAccJerk-bandsEnergy()-25,48"
[17] "tBodyGyroJerkMag-sma()"	[226] "fBodyGyro-max()-Z"
[18] "tBodyGyroJerkMag-mean()"	[227] "fBodyAcc-bandsEnergy()-17,24"
[19] "tBodyAccJerk-std()-X"	[228] "fBodyAccJerk-bandsEnergy()-1,24.2"
[20] "tBodyAccJerk-mad()-X"	[229] "tBodyAcc-entropy()-X"
[21] "tBodyAccMag-sma()"	[230] "tGravityAccMag-min()"
[22] "tGravityAccMag-mean()"	[231] "fBodyAccJerk-bandsEnergy()-33,48"
[23] "tGravityAccMag-sma()"	[232] "fBodyAccJerk-bandsEnergy()-17,24"
[24] "tBodyAccMag-mean()"	[233] "fBodyAccJerk-bandsEnergy()-9,16.1"
[25] "fBodyAcc-mean()-Y"	[234] "fBodyAcc-energy()-Z"
[26] "tBodyAccJerkMag-max()"	[235] "tBodyGyroJerkMag-energy()"
[27] "fBodyAccJerk-mean()-X"	[236] "fBodyAcc-bandsEnergy()-25,48"
[28] "tGravityAccMag-max()"	[237] "tBodyGyro-energy()-X"
[29] "tBodyAccMag-max()"	[238] "fBodyAcc-bandsEnergy()-1,8"
[30] "fBodyAccJerk-mad()-X"	[239] "tBodyGyroJerk-energy()-Z"
[31] "fBodyAccJerk-entropy()-Z"	[240] "fBodyAccJerk-bandsEnergy()-17,24.1"
[32] "tBodyGyroMag-sma()"	[241] "fBodyAcc-bandsEnergy()-17,24.1"
[33] "tBodyGyroMag-mean()"	[242] "fBodyAccJerk-bandsEnergy()-25,48.1"
[34] "fBodyBodyAccJerkMag-entropy()"	[243] "tBodyGyroJerk-energy()-X"
[35] "tBodyGyro-sma()"	[244] "fBodyAccJerk-bandsEnergy()-33,48.1"
[36] "fBodyAccJerk-mean()-Y"	[245] "fBodyAcc-bandsEnergy()-33,48"
[37] "fBodyAccJerk-std()-X"	[246] "fBodyAcc-bandsEnergy()-1,24.2"
[38] "fBodyBodyAccJerkMag-std()"	[247] "fBodyAcc-bandsEnergy()-25,48.1"
[39] "fBodyBodyAccJerkMag-iqr()"	[248] "fBodyAccJerk-bandsEnergy()-1,16.2"
[40] "fBodyAcc-mad()-Y"	[249] "fBodyGyro-max()-Y"
[41] "fBodyBodyGyroMag-sma()"	[250] "fBodyAcc-bandsEnergy()-33,48.1"
[42] "fBodyBodyGyroMag-mean()"	[251] "fBodyAccJerk-bandsEnergy()-1,8"
	[252] "fBodyAccJerk-bandsEnergy()-41,48.1"

[43] "tBodyAccJerk-std()-Y"	[253] "tBodyAcc-energy()-Z"
[44] "fBodyAcc-mean()-X"	[254] "fBodyGyro-energy()-X"
[45] "tBodyAccJerk-mad()-Y"	[255] "fBodyGyro-bandsEnergy()-1,24"
[46] "fBodyGyro-mean()-Z"	[256] "fBodyAccJerk-bandsEnergy()-33,40"
[47] "fBodyAcc-entropy()-Z"	[257] "fBodyAccJerk-bandsEnergy()-41,48"
[48] "tBodyAcc-std()-Y"	[258] "fBodyAcc-bandsEnergy()-41,48.1"
[49] "fBodyBodyGyroJerkMag-entropy()"	[259] "fBodyAcc-bandsEnergy()-33,40"
[50] "fBodyAccJerk-mad()-Y"	[260] "fBodyBodyGyroJerkMag-min()"
[51] "tBodyGyroJerk-mad()-Z"	[261] "fBodyAcc-bandsEnergy()-9,16.2"
[52] "fBodyAccJerk-entropy()-X"	[262] "tBodyGyro-energy()-Y"
[53] "fBodyAccMag-entropy()"	[263] "fBodyGyro-bandsEnergy()-1,16"
[54] "tBodyAccJerk-iqr()-X"	[264] "fBodyAcc-bandsEnergy()-25,32"
[55] "fBodyAcc-mean()-Z"	[265] "fBodyGyro-energy()-Y"
[56] "tBodyGyroJerk-iqr()-Z"	[266] "fBodyAccJerk-bandsEnergy()-9,16.2"
[57] "tBodyAccJerk-mad()-Z"	[267] "fBodyAccJerk-bandsEnergy()-17,32.2"
[58] "fBodyAccJerk-iqr()-X"	[268] "fBodyAccJerk-bandsEnergy()-25,32"
[59] "fBodyAccJerk-mean()-Z"	[269] "fBodyAcc-bandsEnergy()-1,16.2"
[60] "fBodyAcc-mad()-X"	[270] "fBodyGyro-energy()-Z"
[61] "fBodyAccJerk-entropy()-Y"	[271] "fBodyGyro-bandsEnergy()-17,32"
[62] "fBodyAccJerk-iqr()-Y"	[272] "fBodyAcc-bandsEnergy()-17,32.2"
[63] "tGravityAccMag-std()"	[273] "fBodyAcc-bandsEnergy()-25,32.1"
[64] "tBodyAccMag-std()"	[274] "fBodyAcc-bandsEnergy()-41,48"
[65] "fBodyAccJerk-std()-Y"	[275] "fBodyGyro-bandsEnergy()-1,24.1"
[66] "tBodyAccJerk-std()-Z"	[276] "fBodyAccJerk-bandsEnergy()-25,32.1"
[67] "fBodyAcc-entropy()-X"	[277] "fBodyGyro-bandsEnergy()-1,24.2"
[68] "tBodyAcc-mad()-Y"	[278] "fBodyAccJerk-bandsEnergy()-49,64.1"
[69] "tBodyGyroJerk-std()-Z"	[279] "fBodyAcc-bandsEnergy()-33,40.1"
[70] "fBodyAccMag-iqr()"	[280] "fBodyAccJerk-bandsEnergy()-49,56.1"
[71] "fBodyAccMag-mad()"	[281] "fBodyAccJerk-bandsEnergy()-17,24.2"
[72] "tBodyGyroMag-max()"	[282] "tBodyGyro-energy()-Z"
[73] "fBodyAcc-std()-Y"	[283] "fBodyGyro-bandsEnergy()-17,24"
[74] "tGravityAccMag-mad()"	[284] "fBodyAccJerk-meanFreq()-X"
[75] "tBodyAccMag-mad()"	[285] "fBodyAcc-bandsEnergy()-25,48.2"
[76] "fBodyAcc-iqr()-X"	[286] "fBodyAcc-bandsEnergy()-41,48.2"
[77] "fBodyAccJerk-mad()-Z"	[287] "fBodyAcc-bandsEnergy()-17,24.2"
[78] "tBodyAccJerkMag-entropy()"	[288] "fBodyAccJerk-bandsEnergy()-41,48.2"
[79] "tBodyAcc-min()-X"	[289] "tBodyAccJerk-arCoeff()-X,1"
[80] "tBodyAccJerk-iqr()-Z"	[290] "fBodyAccJerk-bandsEnergy()-25,48.2"
[81] "fBodyGyro-mean()-Y"	[291] "fBodyAccJerk-bandsEnergy()-49,64"
[82] "fBodyAcc-iqr()-Y"	[292] "fBodyAccJerk-bandsEnergy()-49,56"
[83] "tBodyAccJerk-iqr()-Y"	[293] "fBodyAcc-bandsEnergy()-33,48.2"
[84] "fBodyAcc-entropy()-Y"	[294] "fBodyBodyGyroJerkMag-energy()"
[85] "fBodyGyro-mean()-X"	[295] "fBodyAccJerk-bandsEnergy()-1,8.2"
[86] "tBodyAcc-std()-X"	[296] "fBodyAccJerk-bandsEnergy()-33,48.2"
[87] "tBodyGyroJerkMag-iqr()"	[297] "fBodyAccJerk-bandsEnergy()-49,56.2"
[88] "tBodyGyroMag-mad()"	[298] "fBodyAccJerk-bandsEnergy()-49,64.2"

[89] "fBodyGyro-mad()-Z"	[299] "fBodyGyro-bandsEnergy()-1,16.1"
[90] "fBodyGyro-entropy()-Z"	[300] "fBodyGyro-bandsEnergy()-1,16.2"
[91] "tBodyGyroMag-std()"	[301] "fBodyAcc-bandsEnergy()-25,32.2"
[92] "fBodyBodyGyroMag-entropy()"	[302] "fBodyGyro-bandsEnergy()-17,32.2"
[93] "tBodyAcc-min()-Y"	[303] "tBodyGyroJerk-energy()-Y"
[94] "fBodyAccJerk-iqr()-Z"	[304] "fBodyAccJerk-bandsEnergy()-25,32.2"
[95] "tBodyAcc-max()-X"	[305] "tBodyAcc-arCoeff()-X,1"
[96] "fBodyAccJerk-max()-X"	[306] "fBodyAcc-bandsEnergy()-49,56.1"
[97] "tBodyAcc-mad()-X"	[307] "fBodyGyro-bandsEnergy()-25,48"
[98] "tBodyAccJerkMag-energy()"	[308] "fBodyGyro-bandsEnergy()-41,48.2"
[99] "fBodyAccJerk-std()-Z"	[309] "fBodyAcc-bandsEnergy()-1,8.2"
[100] "fBodyGyro-entropy()-Y"	[310] "fBodyGyro-bandsEnergy()-25,48.2"
[101] "tGravityAccMag-energy()"	[311] "fBodyGyro-bandsEnergy()-33,48"
[102] "tBodyAccMag-energy()"	[312] "fBodyAcc-bandsEnergy()-49,56.2"
[103] "fBodyAcc-iqr()-Z"	[313] "fBodyGyro-bandsEnergy()-41,48"
[104] "tBodyAccJerk-entropy()-Z"	[314] "fBodyAcc-bandsEnergy()-49,56"
[105] "tBodyGyroJerkMag-mad()"	[315] "fBodyGyro-bandsEnergy()-33,48.2"
[106] "fBodyBodyGyroJerkMag-sma()"	[316] "fBodyAcc-bandsEnergy()-33,40.2"
[107] "fBodyBodyGyroJerkMag-mean()"	[317] "tBodyGyro-arCoeff()-Z,2"
[108] "tBodyAccJerk-min()-X"	[318] "fBodyGyro-bandsEnergy()-17,24.2"
[109] "fBodyAcc-mad()-Z"	[319] "tBodyGyroJerk-arCoeff()-Z,1"
[110] "tBodyGyroMag-iqr()"	[320] "fBodyGyro-bandsEnergy()-41,48.1"
[111] "fBodyGyro-iqr()-Z"	[321] "fBodyGyro-bandsEnergy()-25,32"
[112] "fBodyAcc-std()-X"	[322] "fBodyAccJerk-bandsEnergy()-33,40.2"
[113] "fBodyAcc-energy()-Y"	[323] "fBodyGyro-bandsEnergy()-25,32.2"
[114] "fBodyGyro-mad()-Y"	[324] "fBodyGyro-min()-Y"
[115] "fBodyGyro-mad()-X"	[325] "fBodyAcc-min()-X"
[116] "fBodyBodyGyroMag-iqr()"	[326] "fBodyGyro-bandsEnergy()-33,40"
[117] "tBodyGyroJerk-std()-X"	[327] "fBodyGyro-bandsEnergy()-9,16.1"
[118] "tBodyGyroJerk-mad()-X"	[328] "fBodyGyro-bandsEnergy()-25,48.1"
[119] "tBodyAccJerk-max()-Y"	[329] "fBodyAcc-bandsEnergy()-49,64.1"
[120] "fBodyAcc-bandsEnergy()-1,24.1"	[330] "tBodyAccJerk-arCoeff()-Y,1"
[121] "fBodyBodyAccJerkMag-max()"	[331] "fBodyAcc-bandsEnergy()-49,64.2"
[122] "fBodyGyro-entropy()-X"	[332] "fBodyGyro-bandsEnergy()-49,56.1"
[123] "fBodyBodyGyroMag-mad()"	[333] "fBodyGyro-bandsEnergy()-33,48.1"
[124] "tBodyAccJerk-max()-X"	[334] "fBodyGyro-bandsEnergy()-1,8.2"
[125] "tGravityAccMag-iqr()"	[335] "fBodyGyro-bandsEnergy()-25,32.1"
[126] "tBodyAccMag-iqr()"	[336] "fBodyAcc-bandsEnergy()-49,64"
[127] "tBodyGyroJerkMag-std()"	[337] "fBodyAccJerk-meanFreq()-Y"
[128] "fBodyAccMag-std()"	[338] "fBodyGyro-bandsEnergy()-49,56.2"
[129] "tBodyGyroJerk-entropy()-Z"	[339] "tBodyGyro-arCoeff()-Z,1"
[130] "tBodyAccJerk-min()-Y"	[340] "fBodyGyro-bandsEnergy()-49,64.1"
[131] "tBodyAccJerk-entropy()-Y"	[341] "fBodyGyro-bandsEnergy()-17,32.1"
[132] "fBodyAccJerk-max()-Y"	[342] "fBodyGyro-min()-Z"
[133] "tBodyGyro-std()-Z"	[343] "fBodyAcc-min()-Y"
[134] "tBodyAcc-iqr()-X"	[344] "tBodyAccJerk-arCoeff()-Z,1"

[135] "fBodyBodyGyroJerkMag-iqr()"	[345] "tBodyAcc-arCoeff()-Y,1"
[136] "tBodyAcc-max()-Y"	[346] "fBodyGyro-min()-X"
[137] "tBodyGyroJerk-iqr()-Y"	[347] "fBodyAcc-min()-Z"
[138] "tBodyAcc-std()-Z"	[348] "tBodyAccJerkMag-arCoeff()1"
[139] "tBodyAccJerk-entropy()-X"	[349] "fBodyGyro-bandsEnergy()-49,56"
[140] "fBodyGyro-iqr()-Y"	[350] "tBodyAcc-arCoeff()-X,2"
[141] "tBodyGyroJerk-mad()-Y"	[351] "tBodyGyroJerk-arCoeff()-Z,2"
[142] "tBodyGyro-std()-X"	[352] "fBodyAccJerk-skewness()-X"
[143] "tBodyGyro-std()-Y"	[353] "tGravityAcc-min()-Y"
[144] "tBodyGyroJerk-iqr()-X"	[354] "tBodyAcc-arCoeff()-Z,2"
[145] "tBodyAccJerk-min()-Z"	[355] "fBodyAccJerk-meanFreq()-Z"
[146] "tBodyGyro-mad()-Y"	[356] "tBodyAcc-arCoeff()-Y,2"
[147] "tBodyGyro-max()-Z"	[357] "tGravityAcc-mean()-Y"
[148] "tBodyGyro-mad()-X"	[358] "fBodyGyro-bandsEnergy()-49,64.2"
[149] "tBodyAcc-mad()-Z"	[359] "tGravityAcc-max()-Y"
[150] "tBodyAcc-iqr()-Y"	[360] "tBodyGyro-arCoeff()-Z,3"
[151] "fBodyAcc-bandsEnergy()-1,16.1"	[361] "angle(Y,gravityMean)"
[152] "tBodyGyro-mad()-Z"	[362] "fBodyGyro-bandsEnergy()-49,64"
[153] "fBodyBodyGyroJerkMag-mad()"	[363] "tGravityAcc-min()-Z"
[154] "fBodyBodyAccJerkMag-energy()"	[364] "tBodyGyro-arCoeff()-X,2"
[155] "tBodyGyroJerk-std()-Y"	[365] "tBodyGyro-arCoeff()-X,1"
[156] "tBodyGyroJerkMag-max()"	[366] "fBodyBodyAccJerkMag-skewness()"
[157] "fBodyGyro-iqr()-X"	[367] "fBodyAccJerk-skewness()-Y"
[158] "tBodyGyroJerk-max()-X"	[368] "tGravityAcc-mean()-Z"
[159] "tBodyGyroJerk-max()-Z"	[369] "tGravityAcc-max()-Z"
[160] "tBodyAccJerk-max()-Z"	[370] "angle(Z,gravityMean)"
[161] "tBodyAcc-max()-Z"	[371] "tGravityAccMag-arCoeff()2"
[162] "tBodyGyro-min()-Z"	[372] "tBodyAccMag-arCoeff()2"
[163] "tGravityAccMag-entropy()"	[373] "fBodyAccJerk-skewness()-Z"
[164] "tBodyAccMag-entropy()"	[374] "tGravityAccMag-arCoeff()1"
[165] "fBodyBodyGyroMag-std()"	[375] "tBodyAccMag-arCoeff()1"
[166] "fBodyAccJerk-max()-Z"	[376] "tGravityAcc-arCoeff()-X,4"
[167] "tBodyAccJerk-energy()-Y"	[377] "tBodyGyro-arCoeff()-Y,2"
[168] "fBodyAccJerk-energy()-Y"	[378] "tGravityAcc-max()-X"
[169] "tBodyGyro-min()-Y"	[379] "tGravityAcc-mean()-X"
[170] "fBodyGyro-std()-X"	[380] "tGravityAcc-energy()-X"
[171] "tBodyGyroJerk-entropy()-X"	[381] "tGravityAcc-min()-X"
[172] "tBodyGyroMag-energy()"	[382] "tBodyGyroJerk-arCoeff()-Y,1"
[173] "tBodyGyro-iqr()-Y"	[383] "angle(X,gravityMean)"
[174] "fBodyBodyGyroJerkMag-std()"	[384] "tBodyAccJerk-arCoeff()-X,3"
[175] "fBodyAccJerk-bandsEnergy()-1,24"	[385] "tBodyGyroJerk-arCoeff()-Z,3"
[176] "tBodyAccJerk-energy()-X"	[386] "tBodyGyroJerk-arCoeff()-Y,2"
[177] "fBodyAccJerk-energy()-X"	[387] "tGravityAcc-arCoeff()-X,3"
[178] "tBodyGyroJerkMag-entropy()"	[388] "tBodyGyroJerk-arCoeff()-X,2"
[179] "tBodyGyroJerk-min()-X"	[389] "fBodyBodyGyroMag-meanFreq()"
[180] "tBodyGyro-iqr()-X"	[390] "tGravityAccMag-arCoeff()3"

[181] "fBodyGyro-std()-Z"	[391] "tBodyAccMag-arCoeff()3"
[182] "fBodyAccJerk-bandsEnergy()-1,24.1"	[392] "tGravityAccMag-arCoeff()4"
[183] "tBodyGyroJerk-min()-Z"	[393] "tBodyAcc-arCoeff()-X,3"
[184] "tBodyAcc-min()-Z"	[394] "fBodyAcc-skewness()-X"
[185] "fBodyAcc-std()-Z"	[395] "fBodyBodyGyroMag-skewness()"
[186] "fBodyAcc-max()-X"	[396] "tGravityAcc-arCoeff()-Y,1"
[187] "fBodyAcc-max()-Y"	[397] "fBodyAcc-kurtosis()-Y"
[188] "tBodyGyroJerk-entropy()-Y"	[398] "tGravityAcc-arCoeff()-Z,1"
[189] "fBodyGyro-std()-Y"	[399] "fBodyGyro-skewness()-Y"
[190] "tBodyAcc-iqr()-Z"	[400] "tGravityAcc-arCoeff()-X,2"
[191] "tBodyGyro-max()-Y"	[401] "tBodyAccJerk-arCoeff()-Z,2"
[192] "tBodyGyro-iqr()-Z"	[402] "tBodyGyroMag-arCoeff()1"
[193] "fBodyAccMag-max()"	[403] "fBodyAccMag-kurtosis()"
[194] "fBodyBodyGyroJerkMag-max()"	[404] "tBodyAcc-arCoeff()-Z,3"
[195] "fBodyAccMag-energy()"	[405] "tGravityAcc-arCoeff()-Z,2"
[196] "tBodyAcc-energy()-Y"	[406] "fBodyAcc-kurtosis()-Z"
[197] "tBodyGyroJerk-min()-Y"	[407] "tBodyGyroJerkMag-arCoeff()2"
[198] "tBodyGyroJerkMag-min()"	[408] "tBodyGyro-arCoeff()-Y,3"
[199] "tBodyGyro-min()-X"	[409] "tGravityAcc-arCoeff()-Y,2"
[200] "fBodyAccJerk-bandsEnergy()-1,8.1"	[410] "tBodyAccJerk-arCoeff()-Y,2"
[201] "fBodyBodyGyroMag-max()"	[411] "tBodyAccJerk-arCoeff()-Z,3"
[202] "tBodyGyroJerk-max()-Y"	[412] "tBodyGyroJerkMag-arCoeff()1"
[203] "fBodyAccJerk-bandsEnergy()-1,16.1"	[413] "tBodyGyroMag-arCoeff()2"
[204] "tBodyGyro-max()-X"	[414] "tGravityAcc-arCoeff()-Z,3"
[205] "tBodyAccJerkMag-min()"	[415] "tGravityAcc-std()-Z"
[206] "fBodyAccJerk-bandsEnergy()-1,16"	[416] "tGravityAcc-mad()-Z"
[207] "fBodyGyro-max()-X"	[417] "fBodyBodyGyroJerkMag-skewness()"
[208] "tBodyAcc-entropy()-Y"	[418] "tBodyGyro-arCoeff()-Y,4"
[209] "fBodyAcc-energy()-X"	[419] "tGravityAcc-std()-Y"
	[420] "tGravityAcc-mad()-Y"
	[421] "tGravityAcc-arCoeff()-Y,4"
	[422] "tGravityAcc-iqr()-X"
	[423] "tGravityAcc-mad()-X"
	[424] "tBodyAccJerk-arCoeff()-Y,3"
	[425] "fBodyGyro-kurtosis()-Z"
	[426] "tBodyAcc-arCoeff()-Y,3"
	[427] "tBodyGyroMag-arCoeff()3"
	[428] "fBodyGyro-skewness()-X"
	[429] "tBodyGyro-mean()-X"
	[430] "angle(tBodyAccJerkMean),gravityMean)"

APPENDIX 6 : Multinomial Logistic Regression Coeficients and estimates

multinom(formula = activity ~ ., data = un_cor_dt)

Coefficients:

	(Intercept)	tbodyaccmeanx	tbodyaccmeany	tbodyaccmeanz
sitting	-52.06510	22.257302	32.639215	22.287817
standing	-30.81614	12.351169	-9.736598	18.918335
walk	11.43016	-20.125655	-11.176080	-26.276772
walkdown	14.55302	19.546859	7.048311	-9.358849
walkup	-32.97304	9.605017	-11.030467	-6.172497

	tbodyaccentropyz	tbodyaccarcoeffx4	tbodyaccarcoeffy4
sitting	-7.914472	-0.5432544	-0.006726476
standing	-8.077588	-2.3913270	-2.180545384
walk	13.938854	-12.3743810	-2.278033739
walkdown	4.749631	12.7628059	2.347807268
walkup	-3.940338	-8.3469130	1.609100977

	tbodyaccarcoeffz1	tbodyaccarcoeffz4
sitting	-1.1730640	-0.9341065
standing	0.5635418	-4.1707342
walk	-2.0884987	-7.9361355
walkdown	-2.5374100	-8.9520650
walkup	-2.1532780	0.2445584

	tbodyacccorrelationxy	tbodyacccorrelationxz
sitting	-0.8857976	-2.5260441
standing	-0.4919551	-1.1377729
walk	11.8281559	-0.5246985
walkdown	-14.9072013	-5.1635930
walkup	5.5087164	1.3950967

	tbodyacccorrelationyz	tgravityaccstdx	tgravityaccsma
sitting	0.7770579	-2.711335	22.16785
standing	1.6206880	19.702214	28.05636
walk	7.2099822	2.658363	13.73049
walkdown	-8.8373813	-5.765579	3.72345
walkup	-1.1619824	-39.604315	20.82405

	tgravityaccenergyy	tgravityaccenergyz	tgravityacciqry
sitting	-48.44242	-45.32359	-5.9545272
standing	-56.54702	-66.61073	5.5691009
walk	-20.78657	-15.79135	-3.9880681
walkdown	-40.72751	-29.70307	0.1478188
walkup	-19.13408	-43.54819	-17.0645502

	tgravityacciqrz	tgravityaccentropyx
sitting	11.4900238	0.4060201
standing	8.0394700	-1.2400978
walk	-20.2367282	-19.2995124
walkdown	-0.8773013	3.0160188
walkup	-3.3438800	7.4570559

	tgravityaccentropyy	tgravityaccentropyz
sitting	3.664473	-1.2234525

Std. Errors:

	(Intercept)	tbodyaccmeanx	tbodyaccmeany	tbodyaccmeanz
sitting	10.446933	11.48917	10.41247	8.650951
standing	14.536980	11.26071	10.43264	8.581492
walk	9.671144	15.37104	17.57680	17.102998
walkdown	16.223998	32.13239	27.60205	27.570661
walkup	16.705175	30.51701	25.90501	28.705077

	tbodyaccentropyz	tbodyaccarcoeffx4	tbodyaccarcoeffy4
sitting	21.32136	21.50350	20.30978
standing	21.32401	21.50580	20.31730
walk	31.19637	33.18035	27.32281
walkdown	28.13489	27.39117	23.13006
walkup	24.28039	26.40149	25.29066

	tbodyaccarcoeffz1	tbodyaccarcoeffz4
sitting	22.31722	23.68215
standing	22.33336	23.68445
walk	28.19370	28.37960
walkdown	25.31645	26.63126
walkup	24.56354	27.12933

	tbodyacccorrelationxy	tbodyacccorrelationxz
sitting	19.91551	21.36934
standing	19.91937	21.36821
walk	35.37570	30.44025
walkdown	28.66804	24.54254
walkup	26.64335	20.49001

	tbodyacccorrelationyz	tgravityaccstdx	tgravityaccsma
sitting	20.03053	8.800601	20.59501
standing	20.03432	8.098153	20.59147
walk	32.50495	11.126766	27.29323
walkdown	26.71437	24.502982	27.15297
walkup	25.14705	16.863869	27.05933

	tgravityaccenergyy	tgravityaccenergyz	tgravityacciqry
sitting	22.42389	19.70748	16.66953
standing	22.55632	19.75606	16.62632
walk	26.55530	32.41123	29.15003
walkdown	39.75297	30.84134	37.21352
walkup	26.51027	33.29131	37.64727

	tgravityacciqrz	tgravityaccentropyx
sitting	18.35828	20.67021
standing	18.28644	20.67442
walk	20.22141	25.92150
walkdown	35.92999	22.12024

standing -4.490074 1.6774777
walk -5.401806 6.0581299
walkdown -12.443344 0.1036189
walkup -9.155661 1.5379759

	tgravityaccarcoeffx1	tgravityaccarcoeffy3
sitting	-4.043006	-4.366552
standing	-4.322457	-6.205413
walk	-7.752076	7.119744
walkdown	-7.987923	2.969030
walkup	-15.700337	-10.615056

	tgravityaccarcoeffz4	tgravityacccorrelationxy
sitting	1.03090660	5.014373
standing	0.90029514	5.674872
walk	4.33500386	4.921114
walkdown	0.73091289	3.799025
walkup	0.02820394	6.047146

	tgravityacccorrelationxz	tgravityacccorrelationyz
sitting	-0.5221798	-1.846759
standing	-0.2595221	-2.241504
walk	0.7559259	-3.237077
walkdown	-1.1590319	-3.848406
walkup	0.9024493	-6.099152

	tbodyaccjerkmeanx	tbodyaccjerkmeany	tbodyaccjerkmeanz
sitting	-0.04767123	2.8538250	-2.899063
standing	1.02851585	7.1388458	-8.774927
walk	1.43359611	4.8101551	-3.867926
walkdown	3.55570215	0.6456602	-1.692481
walkup	-0.30630990	0.5582008	-2.216012

	tbodyaccjerkarcoeffx2	tbodyaccjerkarcoeffx4
sitting	2.519561	3.865568
standing	2.847732	2.895401
walk	13.367431	2.612495
walkdown	-7.795362	-2.468895
walkup	5.070694	3.815673

	tbodyaccjerkarcoeffy4	tbodyaccjerkarcoeffz4
sitting	10.253200	-7.148216
standing	13.918473	-7.690871
walk	9.928287	2.406391
walkdown	8.896778	-4.884408
walkup	2.493568	-3.387570

	tbodyaccjerkcorrelationxy	tbodyaccjerkcorrelationxz
sitting	-3.379763	1.576550
standing	-4.928771	-1.736874
walk	7.023059	6.259203
walkdown	-2.982664	-2.043596
walkup	-7.886092	-6.616591

walkup 33.84163 21.03910

	tgravityaccentropyy	tgravityaccentropyz
sitting	21.55332	16.44212
standing	21.55435	16.44781
walk	28.45059	24.09093
walkdown	27.90549	18.62735
walkup	30.40001	17.98515

	tgravityaccarcoeffx1	tgravityaccarcoeffy3
sitting	20.88139	20.56887
standing	20.88476	20.55988
walk	34.97109	31.91886
walkdown	33.92708	33.76259
walkup	33.48211	35.04894

	tgravityaccarcoeffz4	tgravityacccorrelationxy
sitting	22.72545	15.17455
standing	22.72763	15.17324
walk	32.36696	18.94232
walkdown	31.68226	16.09313
walkup	31.35294	16.86767

	tgravityacccorrelationxz	tgravityacccorrelationyz
sitting	14.79457	13.41208
standing	14.79551	13.41263
walk	17.71852	17.53794
walkdown	16.16356	15.31976
walkup	16.76995	16.65660

	tbodyaccjerkmeanx	tbodyaccjerkmeany	tbodyaccjerkmeanz
sitting	25.78547	20.75054	22.30335
standing	24.91906	20.82903	22.27177
walk	28.47018	29.14391	29.08515
walkdown	21.57336	21.76066	20.94865
walkup	22.01609	21.81671	22.21059

	tbodyaccjerkarcoeffx2	tbodyaccjerkarcoeffx4
sitting	23.70458	21.79717
standing	23.70706	21.79593
walk	30.87111	33.86615
walkdown	27.91587	27.68769
walkup	28.16001	28.07257

	tbodyaccjerkarcoeffy4	tbodyaccjerkarcoeffz4
sitting	22.37224	21.44515
standing	22.36936	21.45251
walk	36.76370	29.89783
walkdown	23.87710	23.77901
walkup	27.26396	24.12519

	tbodyaccjerkcorrelationxy	tbodyaccjerkcorrelationxz
sitting	22.09502	21.85442
standing	22.10097	21.85774

	tbodyaccjerkcorrelationyz	tbodygyromeany
sitting	-1.734631	8.045502
standing	-2.486944	17.598533
walk	3.977532	22.958129
walkdown	-3.631190	1.752801
walkup	3.173468	-6.613761

	tbodygyromeanz	tbodygyroentropyx	tbodygyroentropyy
sitting	-0.33648268	-3.3581135	-0.3981614
standing	0.05496038	-0.2140212	-1.9170384
walk	-20.82231595	4.8496404	-12.5385646
walkdown	13.37329985	1.5420823	0.5555593
walkup	5.38859815	-0.7499054	5.4389192

	tbodygyroentropyz	tbodygyroarcoeffx3
sitting	-1.705381	5.321831
standing	-2.134260	16.158472
walk	5.563402	15.053042
walkdown	-3.887578	20.870747
walkup	-1.145960	-28.185352

	tbodygyroarcoeffx4	tbodygyroarcoeffy1
sitting	2.059382	5.671587
standing	5.326615	12.623691
walk	11.899609	5.418786
walkdown	-5.029091	22.399615
walkup	-29.462795	14.623845

	tbodygyroarcoeffz4	tbodygyrocorrelationxy
sitting	-3.659682	-0.4210384
standing	-2.454451	0.3405305
walk	7.353925	-15.2450866
walkdown	-4.866875	-1.7999845
walkup	-12.235571	4.6548567

	tbodygyrocorrelationxz	tbodygyrocorrelationyz
sitting	-2.092285	-3.61799196
standing	-2.780054	-2.82412850
walk	-7.005698	-2.72752249
walkdown	-1.406033	-11.38426174
walkup	3.786432	0.09586469

	tbodygyrojerkmeanx	tbodygyrojerkmeany
sitting	3.99669273	4.946306
standing	4.23315742	-2.933169
walk	-9.21136597	-3.504769
walkdown	0.02974667	-5.722151
walkup	5.91284390	-4.456499

	tbodygyrojerkmeanz	tbodygyrojerkarcoeffx1
sitting	-7.9465724	-0.7652057
standing	2.3104448	-11.7073904
walk	2.3162425	-19.3386545
walkdown	32.35420	28.29136
walkup	26.49921	25.17948
walkup	25.72993	26.32724

	tbodyaccjerkcorrelationyz	tbodygyromeany
sitting	21.09298	20.25968
standing	21.09024	20.25267
walk	27.37360	27.51888
walkdown	26.92885	33.05845
walkup	26.66182	34.11730

	tbodygyromeanz	tbodygyroentropyx	tbodygyroentropyy
sitting	16.40659	23.02100	17.59094
standing	16.45584	23.02238	17.59158
walk	30.69522	27.59100	27.85042
walkdown	29.63270	24.26220	28.82540
walkup	31.71052	21.27928	26.96977

	tbodygyroentropyz	tbodygyroarcoeffx3
sitting	16.37550	20.50314
standing	16.37411	20.49395
walk	28.15845	30.27285
walkdown	24.46534	31.86558
walkup	25.22788	25.72946

	tbodygyroarcoeffx4	tbodygyroarcoeffy1
sitting	21.89766	25.06395
standing	21.90505	25.06796
walk	31.60790	30.84620
walkdown	28.99797	29.88652
walkup	33.04176	31.80693

	tbodygyroarcoeffz4	tbodygyrocorrelationxy
sitting	19.73338	16.56040
standing	19.73352	16.55931
walk	28.81138	32.75458
walkdown	22.65917	26.46374
walkup	21.13557	22.41818

	tbodygyrocorrelationxz	tbodygyrocorrelationyz
sitting	16.86314	16.76474
standing	16.86788	16.77219
walk	26.98398	28.85354
walkdown	20.87869	25.52551
walkup	20.93681	21.82354

	tbodygyrojerkmeanx	tbodygyrojerkmeany
sitting	16.15412	19.20255
standing	16.28991	18.82731
walk	34.97967	32.50732
walkdown	28.22124	26.01654
walkup	26.71286	30.78807

	tbodygyrojerkmeanz	tbodygyrojerkarcoeffx1

walkdown	-1.5235740	-2.0776291
walkup	-0.5224655	16.7456906
	tbodygyrojerkarcoeffx3	tbodygyrojerkarcoeffx4
sitting	-2.397018	2.3477083
standing	-6.261217	-1.0256397
walk	7.115948	6.6188420
walkdown	-29.271679	-11.3263426
walkup	-6.027008	0.8914336
	tbodygyrojerkarcoeffy3	tbodygyrojerkarcoeffy4
sitting	-0.2501347	-1.896537
standing	-2.9336596	-1.607166
walk	-4.8091725	-4.736061
walkdown	-3.7224423	-5.706409
walkup	-2.0090990	5.001833
	tbodygyrojerkarcoeffz4	tbodygyrojerkcorrelationxy
sitting	-0.48646485	0.409131
standing	-0.03885239	-2.062643
walk	2.22670866	11.968827
walkdown	-2.66489546	1.067722
walkup	-1.95059195	-9.250573
	tbodygyrojerkcorrelationxz	tbodygyrojerkcorrelationyz
sitting	3.8735927	0.95710943
standing	3.3532279	0.54552189
walk	13.3007786	10.32334013
walkdown	-0.5667466	1.84313074
walkup	-5.3961316	-0.02028736
	tbodyaccmagmin	tbodyaccmagarcoeff4
sitting	-22.713279	-3.9279183
standing	-27.079436	-4.2049072
walk	6.543872	-0.3847863
walkdown	1.440360	-5.5751715
walkup	-1.689224	-1.0069900
	tbodyaccjerkmagarcoeff2	tbodyaccjerkmagarcoeff3
sitting	1.8958450	-0.1135473
standing	-0.2428635	-1.9715610
walk	-1.0947229	1.0287888
walkdown	4.2087709	2.0360622
walkup	7.9893257	7.4699786
	tbodyaccjerkmagarcoeff4	tbodygyromagmin
sitting	-1.478719	-1.8308393
standing	-4.598449	-11.3686098
walk	-2.818642	-0.8576986
walkdown	-1.924776	2.1863046
walkup	4.864361	1.9404677
	tbodygyromagentropy	tbodygyromagarcoeff4
sitting	0.8843036	5.784424

sitting	21.74851	21.06437
standing	21.32997	21.07852
walk	30.89584	30.49425
walkdown	21.68183	28.14923
walkup	21.94142	35.23103
	tbodygyrojerkarcoeffx3	tbodygyrojerkarcoeffx4
sitting	16.46597	21.08920
standing	16.47537	21.08635
walk	24.33352	27.80985
walkdown	21.62911	26.09130
walkup	22.98559	22.76854
	tbodygyrojerkarcoeffy3	tbodygyrojerkarcoeffy4
sitting	24.35677	22.17967
standing	24.37871	22.19093
walk	32.15372	31.16410
walkdown	29.15544	28.19090
walkup	26.94428	28.12269
	tbodygyrojerkarcoeffz4	tbodygyrojerkcorrelationxy
sitting	19.46310	20.12448
standing	19.47028	20.12570
walk	28.95669	29.68896
walkdown	25.32817	27.62181
walkup	25.95955	28.46585
	tbodygyrojerkcorrelationxz	tbodygyrojerkcorrelationyz
sitting	19.69514	18.55630
standing	19.69283	18.56809
walk	28.15236	30.19427
walkdown	24.92195	22.98427
walkup	25.59605	25.17934
	tbodyaccmagmin	tbodyaccmagarcoeff4
sitting	16.92142	21.05485
standing	16.33305	21.05364
walk	36.13515	31.56422
walkdown	26.09894	24.75450
walkup	28.63632	23.73718
	tbodyaccjerkmagarcoeff2	tbodyaccjerkmagarcoeff3
sitting	20.92849	23.80007
standing	20.93571	23.80496
walk	29.39804	34.78382
walkdown	26.15736	27.81818
walkup	29.29980	28.02037
	tbodyaccjerkmagarcoeff4	tbodygyromagmin
sitting	20.80822	24.82171
standing	20.82161	24.83689
walk	26.24777	27.74754
walkdown	28.42071	20.86335

standing	0.4853016	4.888453
walk	20.7072609	5.098429
walkdown	1.5184224	3.961107
walkup	0.1116159	3.985672

	tbodygyrojerkmagarcoeff3	tbodygyrojerkmagarcoeff4
sitting	-2.388453	-1.388101
standing	-1.606467	-1.284819
walk	-1.115240	-7.779616
walkdown	-4.573281	1.515984
walkup	1.941595	1.336509

	fbodyaccmaxindsx	fbodyaccmaxindsy	fbodyaccmaxindsz
sitting	0.5013096	-0.0610814	-2.334120
standing	-0.1441538	-0.9295976	-3.688042
walk	-8.9794217	-2.1168880	-5.601444
walkdown	1.4146848	0.6618320	-3.364784
walkup	5.3956695	-11.4196624	-1.067740

	fbodyaccmeanfreqx	fbodyaccmeanfreqy	fbodyaccmeanfreqz
sitting	-4.127238	0.9286316	-0.34102321
standing	-2.898487	1.8032452	1.45201318
walk	4.023057	-3.9564805	10.95620926
walkdown	-8.613008	1.7709778	0.07392333
walkup	-10.584226	-26.0418346	-9.96441080

	fbodyacckurtosisx	fbodyaccskewnessy	fbodyaccskewnessz
sitting	4.7878154	0.4054228	-2.5992524
standing	2.8557368	2.9201761	-1.7933176
walk	-3.7718297	5.8079675	0.9084783
walkdown	0.8972511	4.0993311	-3.5227294
walkup	3.3084228	-1.3091521	-1.9727843

	fbodyaccbandsenergy5764	fbodyaccbandsenergy57641
sitting	18.496815	14.3853072
standing	-1.368354	-19.2369758
walk	-4.946388	4.9845718
walkdown	12.146215	0.6765478
walkup	3.971374	9.9754388

	fbodyaccbandsenergy57642	fbodyaccjerkminx
sitting	-7.167598	-19.7784024
standing	2.461081	6.4302372
walk	3.296725	5.4108172
walkdown	6.191519	0.1435825
walkup	12.693988	-0.2489307

	fbodyaccjerkminy	fbodyaccjerkminz
sitting	-10.5575867	-17.4271306
standing	-8.1786382	-0.9963600
walk	-2.2696958	1.0898162
walkdown	0.0315116	0.2180712
walkup	4.6664737	2.0559595

walkup	28.33585	22.86093

	tbodygyromagentropy	tbodygyromagarcoeff4
sitting	21.96258	20.25838
standing	21.96157	20.26448
walk	28.61552	31.74472
walkdown	26.92050	26.66233
walkup	25.11366	25.09785

	tbodygyrojerkmagarcoeff3	tbodygyrojerkmagarcoeff4
sitting	22.55203	20.93509
standing	22.55198	20.93996
walk	29.59498	31.32726
walkdown	27.28162	27.73558
walkup	25.48301	27.16722

	fbodyaccmaxindsx	fbodyaccmaxindsy	fbodyaccmaxindsz
sitting	22.54537	25.15346	20.88383
standing	22.54731	25.15656	20.88399
walk	37.46752	31.20001	30.08948
walkdown	31.28920	26.90975	29.26579
walkup	37.21074	33.40981	31.13829

	fbodyaccmeanfreqx	fbodyaccmeanfreqy	fbodyaccmeanfreqz
sitting	22.93754	23.40069	21.52301
standing	22.94590	23.39888	21.51593
walk	31.17099	32.23180	34.17807
walkdown	30.59479	32.16518	29.11475
walkup	31.10947	28.67459	25.09481

	fbodyacckurtosisx	fbodyaccskewnessy	fbodyaccskewnessz
sitting	19.80981	20.13275	18.54805
standing	19.81421	20.13670	18.55082
walk	27.43012	31.83607	28.71370
walkdown	26.30025	25.72948	23.70123
walkup	23.80810	27.40640	24.93399

	fbodyaccbandsenergy5764	fbodyaccbandsenergy57641
sitting	29.15089	20.89978
standing	31.24980	23.95003
walk	31.28211	36.87743
walkdown	27.83341	25.52625
walkup	31.75629	24.28360

	fbodyaccbandsenergy57642	fbodyaccjerkminx
sitting	19.85600	20.53351
standing	19.26179	18.43610
walk	30.66380	29.50280
walkdown	26.41133	18.95467
walkup	27.60279	19.59072

	fbodyaccjerkminy	fbodyaccjerkminz
sitting	21.50267	20.85299
standing	20.54133	21.30162

	fbodyaccjerkmaxindsx	fbodyaccjerkmaxindsy
sitting	3.130805	0.5466253
standing	3.960037	0.9189104
walk	6.965201	3.7862806
walkdown	4.496529	4.3761981
walkup	-4.443876	-0.2199059

	fbodyaccjerkmaxindsz	fbodyaccjerkkurtosisx
sitting	0.5663810	0.37911997
standing	0.9438965	2.47305114
walk	11.7438785	-0.01390488
walkdown	-0.7457375	2.14276827
walkup	-5.4749984	3.98029467

	fbodyaccjerkkurtosisy	fbodyaccjerkkurtosisz
sitting	-0.1488815	0.7351035
standing	-2.4707999	0.1632160
walk	5.8764707	0.6084283
walkdown	-0.7998653	-11.5296237
walkup	3.9868716	7.1894867

	fbodyaccjerkbandsenergy5764
sitting	30.813758
standing	12.824020
walk	-9.069102
walkdown	9.837542
walkup	19.173902

	fbodyaccjerkbandsenergy33401
sitting	-14.4303505
standing	7.3416914
walk	3.8186292
walkdown	9.8474467
walkup	0.5525397

	fbodyaccjerkbandsenergy57641
sitting	16.3492437
standing	4.4208367
walk	12.0948731
walkdown	12.6362346
walkup	-0.8981864

	fbodyaccjerkbandsenergy57642	fbodygyromaxindsx
sitting	19.103562	-1.923851
standing	14.783244	-3.630220
walk	2.846097	0.506165
walkdown	8.007232	-3.839044
walkup	-7.633735	3.489533

	fbodygyromaxindsy	fbodygyromaxindsz
sitting	-2.984053	0.9435071
standing	-2.954118	0.9772323
walk	5.020910	7.3893345

walk	25.88709	30.42264
walkdown	20.30145	22.91730
walkup	20.28698	24.62651

	fbodyaccjerkmaxindsx	fbodyaccjerkmaxindsy
sitting	19.99542	20.46879
standing	19.99924	20.47275
walk	31.40193	33.27275
walkdown	25.40619	28.29925
walkup	27.50325	27.82949

	fbodyaccjerkmaxindsz	fbodyaccjerkkurtosisx
sitting	19.35874	23.55243
standing	19.36255	23.54798
walk	25.96663	32.25292
walkdown	25.69258	26.43051
walkup	23.61891	24.28186

	fbodyaccjerkkurtosisy	fbodyaccjerkkurtosisz
sitting	24.36306	19.68959
standing	24.37618	19.69449
walk	33.78769	35.59566
walkdown	28.69759	31.07926
walkup	29.48469	25.97231

	fbodyaccjerkbandsenergy5764
sitting	10.89752
standing	13.39361
walk	17.44399
walkdown	20.83876
walkup	22.02475

	fbodyaccjerkbandsenergy33401
sitting	38.91349
standing	43.29025
walk	31.82887
walkdown	21.76694
walkup	30.08397

	fbodyaccjerkbandsenergy57641
sitting	29.44271
standing	25.41736
walk	31.07058
walkdown	30.08387
walkup	29.79407

	fbodyaccjerkbandsenergy57642	fbodygyromaxindsx
sitting	36.41894	18.16126
standing	45.88377	18.16350
walk	32.32574	32.89026
walkdown	27.27741	23.44860
walkup	36.66037	26.08792

	fbodygyromaxindsy	fbodygyromaxindsz

walkdown	-3.280871	-10.3376211
walkup	-3.879756	-11.6237076
	fbodygyromeanfreqx	fbodygyromeanfreqy
sitting	-2.875468	-6.2519065
standing	-6.238432	-5.3706298
walk	3.907418	-0.6233893
walkdown	-3.589193	-0.1896948
walkup	-9.643155	-6.8560707
	fbodygyromeanfreqz	fbodygyrokurtosisx
sitting	-0.9033736	0.3523067
standing	-2.2889623	1.0495238
walk	2.5727111	0.1624656
walkdown	1.7411043	-3.7801596
walkup	-1.0091374	-4.0749820
	fbodygyrokurtosisy	fbodygyroskewnessz
sitting	-4.057908	2.2774000
standing	-4.474042	0.4702964
walk	2.760236	-2.6257130
walkdown	-5.348090	-6.8046313
walkup	1.518556	2.0367576
	fbodygyrobandsenergy18	fbodygyrobandsenergy916
sitting	16.20726	-10.688642
standing	-34.61545	-3.113886
walk	14.61659	19.371716
walkdown	27.61732	-8.495429
walkup	10.33066	8.712631
	fbodygyrobandsenergy5764	fbodygyrobandsenergy181
sitting	-14.440619	-20.1520234
standing	33.695365	2.5920826
walk	12.919899	27.4136310
walkdown	8.082924	-0.4168417
walkup	16.863757	11.7088740
	fbodygyrobandsenergy17241	fbodygyrobandsenergy33401
sitting	-5.166932	30.4029987
standing	7.073449	32.1934784
walk	12.778320	-0.2581527
walkdown	11.278870	16.0099381
walkup	-19.616474	-31.0687223
	fbodygyrobandsenergy57641	fbodygyrobandsenergy9162
sitting	16.8610970	10.6081911
standing	0.1457712	-0.2549839
walk	2.8835334	-19.6226197
walkdown	1.3523933	28.4834102
walkup	23.7438527	5.9686792
	fbodygyrobandsenergy33402	fbodygyrobandsenergy57642
sitting	9.275858	4.147176
sitting	21.40750	23.63708
standing	21.41111	23.64306
walk	26.18834	27.58458
walkdown	25.73078	21.23175
walkup	26.67362	25.30687
	fbodygyromeanfreqx	fbodygyromeanfreqy
sitting	21.32553	21.17634
standing	21.33264	21.18248
walk	34.70512	34.86153
walkdown	26.68854	29.67297
walkup	26.41365	29.30098
	fbodygyromeanfreqz	fbodygyrokurtosisx
sitting	22.87328	18.82901
standing	22.88621	18.83126
walk	32.07329	24.55391
walkdown	26.53829	23.20478
walkup	28.93770	23.40155
	fbodygyrokurtosisy	fbodygyroskewnessz
sitting	17.82310	19.16249
standing	17.82709	19.16736
walk	30.35064	28.23300
walkdown	26.42788	28.28192
walkup	25.55169	29.62472
	fbodygyrobandsenergy18	fbodygyrobandsenergy916
sitting	10.79907	33.65411
standing	10.89547	31.09038
walk	23.78382	27.00016
walkdown	29.50740	22.50819
walkup	32.26390	25.43577
	fbodygyrobandsenergy5764	fbodygyrobandsenergy181
sitting	37.03758	22.41585
standing	32.85688	21.11036
walk	35.68905	29.96588
walkdown	31.72494	32.73833
walkup	28.18061	31.27736
	fbodygyrobandsenergy17241	fbodygyrobandsenergy33401
sitting	16.87988	38.72988
standing	19.32854	36.29550
walk	31.34969	13.75851
walkdown	42.46495	20.35587
walkup	27.58118	14.67936
	fbodygyrobandsenergy57641	fbodygyrobandsenergy9162
sitting	35.89690	40.39587
standing	34.21727	41.40928
walk	29.58703	31.85869
walkdown	33.82133	27.64475

standing	28.666242	13.421176
walk	-17.730931	13.285256
walkdown	-5.433003	4.444694
walkup	34.047258	2.619494

	fbodyaccmagmin	fbodyaccmagmaxinds	fbodyaccmagmeanfreq
sitting	-7.975631	-9.033520	6.771222
standing	-8.911126	-8.624907	6.464503
walk	-6.448175	-4.306282	17.691824
walkdown	-2.685733	-8.893374	-7.757053
walkup	-9.142789	-1.390145	17.806748

	fbodyaccmagskewness	fbodybodyaccjerkmagmin
sitting	2.2667920	-17.0419074
standing	0.9750061	-0.4479218
walk	-6.5435789	4.3121187
walkdown	4.8047467	4.5227621
walkup	-2.1397808	7.3629672

	fbodybodyaccjerkmagmaxinds
sitting	1.573821
standing	1.832831
walk	5.784622
walkdown	-2.614993
walkup	4.459978

	fbodybodyaccjerkmagmeanfreq
sitting	-3.0190621
standing	-5.3003096
walk	-6.1369845
walkdown	0.2190412
walkup	6.0358294

	fbodybodyaccjerkmagkurtosis	fbodybodygyromagmin
sitting	-1.5503194	-3.4147658
standing	-0.8652565	-11.9027460
walk	4.6697060	-7.5186586
walkdown	4.0227061	-6.3355742
walkup	-8.2429880	-0.9617879

	fbodybodygyromagmaxinds	fbodybodygyromagkurtosis
sitting	3.9596180	3.7762511
standing	4.9255935	3.7515176
walk	9.4851704	-0.7680692
walkdown	0.1689409	0.3700291
walkup	5.0124496	-5.6541989

	fbodybodygyrojerkmagmaxinds
sitting	-0.7819122
standing	0.2432389
walk	-8.1979983
walkdown	-5.7353273
walkup	32.65844

	fbodygyrobandsenergy33402	fbodygyrobandsenergy57642
sitting	15.41391	29.67935
standing	21.30914	26.75463
walk	20.03662	31.71624
walkdown	28.20876	31.53723
walkup	28.66786	33.84955

	fbodyaccmagmin	fbodyaccmagmaxinds	fbodyaccmagmeanfreq
sitting	20.95585	21.17796	24.73010
standing	20.89502	21.17766	24.72447
walk	32.53359	28.72538	34.08753
walkdown	24.34949	24.51198	31.30941
walkup	23.70594	27.15322	34.77191

	fbodyaccmagskewness	fbodybodyaccjerkmagmin
sitting	18.99167	24.93091
standing	18.99564	24.29388
walk	33.66979	20.93520
walkdown	24.78463	19.77710
walkup	25.72813	20.71287

	fbodybodyaccjerkmagmaxinds
sitting	19.11240
standing	19.11797
walk	43.53304
walkdown	48.37913
walkup	33.34035

	fbodybodyaccjerkmagmeanfreq
sitting	20.14038
standing	20.14217
walk	34.30247
walkdown	31.73872
walkup	30.82740

	fbodybodyaccjerkmagkurtosis	fbodybodygyromagmin
sitting	19.75767	19.44350
standing	19.75189	19.17024
walk	24.41522	30.51588
walkdown	21.89470	24.74572
walkup	20.29513	26.43638

	fbodybodygyromagmaxinds	fbodybodygyromagkurtosis
sitting	22.98158	17.13402
standing	22.98026	17.13660
walk	26.55813	25.67910
walkdown	24.64229	24.25905
walkup	28.14920	25.17049

	fbodybodygyrojerkmagmaxinds
sitting	29.87905
standing	29.88755

walkup	-2.3228602	
fbodybodygyrojerkmagmeanfreq		
sitting	2.254831	
standing	4.781145	
walk	11.950053	
walkdown	8.340159	
walkup	5.224806	
fbodybodygyrojerkmagkurtosis	angletbodyaccmeangravity	
sitting	1.433756	3.3741430
standing	1.652751	2.8647538
walk	2.433388	0.3682756
walkdown	-7.992946	2.6736247
walkup	3.948073	1.4578482
angletbodygyromeangravitymean		
sitting	0.41420003	
standing	1.30693134	
walk	1.77876568	
walkdown	1.16994171	
walkup	0.07281124	
angletbodygyrojerkmeangravitymean	anglezgravitymean	
sitting	-0.4037090768	-11.273039
standing	-0.4001369537	-6.366494
walk	-2.3635282109	11.594084
walkdown	-0.0004728684	-14.977327
walkup	1.4090109457	-2.657201

walk	35.52057	
walkdown	39.33621	
walkup	30.33177	
fbodybodygyrojerkmagmeanfreq		
sitting	24.53214	
standing	24.54078	
walk	37.46232	
walkdown	27.29499	
walkup	25.34358	
fbodybodygyrojerkmagkurtosis	angletbodyaccmeangravity	
sitting	21.21685	19.80398
standing	21.21617	19.81021
walk	25.50286	22.61082
walkdown	24.29373	20.49289
walkup	24.09928	20.41577
angletbodygyromeangravitymean		
sitting	15.54630	
standing	15.55098	
walk	17.08172	
walkdown	17.88910	
walkup	18.44265	
angletbodygyrojerkmeangravitymean	anglezgravitymean	
sitting	15.13266	20.60481
standing	15.13414	20.62582
walk	19.21688	30.97804
walkdown	19.29203	37.41030
walkup	17.57931	39.65138

APPENDIX 7: Confidence Interval of the parameters and estimates

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, , sitting

                                2.5 %     97.5 %
(Intercept)                -72.5407134 -31.589490
tbodyaccmeanx               -0.2610539  44.775659
tbodyaccmeany               12.2311442  53.047286
tbodyaccmeanz                5.3322642  39.243370
tbodyaccentropyz           -49.7035712  33.874626
tbodyaccarcoeffx4          -42.6893449  41.602836
tbodyaccarcoeffy4          -39.8131662  39.799713
tbodyaccarcoeffz1          -44.9140132  42.567885
tbodyaccarcoeffz4          -47.3502594  45.482046
tbodyacccorrelationxy      -39.9194896  38.147894
tbodyacccorrelationxz      -44.4091819  39.357094
tbodyacccorrelationyz      -38.4820504  40.036166
tgravityaccstdx            -19.9601956  14.537525
tgravityaccsma             -18.1976307  62.533323
tgravityaccenergyy         -92.3924352  -4.492399
tgravityaccenergyz         -83.9495419  -6.697642
tgravityacciqry            -38.6262056  26.717151
tgravityacciqrz            -24.4915459  47.471594
tgravityaccentropyx        -40.1068391  40.918879
tgravityaccentropyy        -38.5792648  45.908211
tgravityaccentropyz        -33.4494078  31.002503
tgravityaccarcoeffx1       -44.9697741  36.883763
bodygyrojerkcorrelationxy  -46.220475 70.158129
tbodygyrojerkcorrelationxz  -41.876834 68.478391
tbodygyrojerkcorrelationyz  -48.856340 69.503020
tbodyaccmagmin              -64.279716 77.367460
tbodyaccmagarcoeff4         -62.249528 61.479955
tbodyaccjerkmagarcoeff2     -58.713823 56.524377
tbodyaccjerkmagarcoeff3     -67.146245 69.203822
tbodyaccjerkmagarcoeff4     -54.263323 48.626039
tbodygyromagmin             -55.241883 53.526486
tbodygyromagentropy         -35.378130 76.792652
tbodygyromagarcoeff4        -57.120081 67.316938
tbodygyrojerkmagarcoeff3    -59.120340 56.889861
tbodygyrojerkmagarcoeff4    -69.179913 53.620680
fbodyaccmaxindsx            -82.414407 64.455564
fbodyaccmaxindsy            -63.267787 59.034011
fbodyaccmaxindsz            -64.575749 53.372860
fbodyaccmeanfreqx           -57.070967 65.117080
fbodyaccmeanfreqy           -67.129645 59.216684
fbodyaccmeanfreqz           -56.031572 77.943991
fbodyacckurtosisx           -57.533883 49.990223
fbodyaccskewnessy           -56.589582 68.205517
fbodyaccskewnessz           -55.369344 57.186301
fbodyaccbandsenergy5764     -66.258196 56.365420
fbodyaccbandsenergy57641    -67.293871 77.263015
fbodyaccbandsenergy57642    -56.803213 63.396662
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tgravityaccarcoeffy3	-44.6808017	35.947697
tgravityaccarcoeffz4	-43.5101518	45.571965
tgravityacccorrelationxy	-24.7271990	34.755946
tgravityacccorrelationxz	-29.5190030	28.474643
tgravityacccorrelationyz	-28.1339497	24.440431
tbodyaccjerkmeanx	-50.5862618	50.490919
tbodyaccjerkmeany	-37.8164928	43.524143
tbodyaccjerkmeanz	-46.6128237	40.814699
tbodyaccjerkarcoeffx2	-43.9405545	48.979677
tbodyaccjerkarcoeffx4	-38.8561007	46.587237
tbodyaccjerkarcoeffy4	-33.5955902	54.101990
tbodyaccjerkarcoeffz4	-49.1799364	34.883505
tbodyaccjerkcorrelationxy	-46.6852093	39.925683
tbodyaccjerkcorrelationxz	-41.2573315	44.410431
tbodyaccjerkcorrelationyz	-43.0761149	39.606853
tbodygyromeany	-31.6627495	47.753754
tbodygyromeanz	-32.4928003	31.819835
tbodygyroentropyx	-48.4784502	41.762223
tbodygyroentropyy	-34.8757754	34.079453
tbodygyroentropyz	-33.8007729	30.390011
tbodygyroarcoeffx3	-34.8635781	45.507239
tbodygyroarcoeffx4	-40.8592382	44.978002
tbodygyroarcoeffy1	-43.4528572	54.796032
tbodygyroarcoeffz4	-42.3363933	35.017030
tbodygyrocorrelationxy	-32.8788268	32.036750
tbodygyrocorrelationxz	-35.1434415	30.958871
tbodygyrocorrelationyz	-36.4762845	29.240301
tbodygyrojerkmeanx	-27.6647997	35.658185
tbodygyrojerkmeany	-32.6899924	42.582604
tbodygyrojerkmeanz	-50.5728731	34.679728
tbodygyrojerkarcoeffx1	-42.0506189	40.520207
tbodygyrojerkarcoeffx3	-34.6697337	29.875697
tbodygyrojerkarcoeffx4	-38.9863585	43.681775
tbodygyrojerkarcoeffy3	-47.9885323	47.488263
tbodygyrojerkarcoeffy4	-45.3678982	41.574825
tbodygyrojerkarcoeffz4	-38.6334339	37.660504
tbodygyrojerkcorrelationxy	-39.0341181	39.852380
tbodygyrojerkcorrelationxz	-34.7281703	42.475356
tbodygyrojerkcorrelationyz	-35.4125665	37.326785
tbodyaccmagmin	-55.8786593	10.452101
tbodyaccmagarcoeff4	-45.1946741	37.338838
tbodyaccjerkmagarcoeff2	-39.1232380	42.914928
tbodyaccjerkmagarcoeff3	-46.7608224	46.533728
tbodyaccjerkmagarcoeff4	-42.2620756	39.304638
tbodygyromagmin	-50.4804971	46.818818
tbodygyromagentropy	-42.1615715	43.930179
tbodygyromagarcoeff4	-33.9212727	45.490122
tbodygyrojerkmagarcoeff3	-46.5896234	41.812717
tbodygyrojerkmagarcoeff4	-42.4201262	39.643924
fbodyaccmaxindsx	-43.6868103	44.689429
fbodyaccmaxindsy	-49.3609565	49.238794
fbodyaccmaxindsz	-43.2656754	38.597434
fbodyaccmeanfreqx	-49.0839910	40.829514
fbodyaccmeanfreqy	-44.9358729	46.793136
fbodyaccmeanfreqz	-42.5253529	41.843306
fbodyacckurtosisx	-34.0387036	43.614334
fbodyaccskewnessy	-39.0540412	39.864887
fbodyaccskewnessz	-38.9527664	33.754261
fbodyaccbandsenergy5764	-38.6378712	75.631500
fbodyaccbandsenergy57641	-26.5775048	55.348119
fbodyaccbandsenergy57642	-46.0846344	31.749438
fbodyaccjerkminx	-60.0233359	20.466531
fbodyaccjerkminy	-52.7020531	31.586880
fbodyaccjerkminz	-58.2982407	23.443980
fbodyaccjerkmaxindsx	-36.0595035	42.321113
fbodyaccjerkmaxindsy	-39.5714732	40.664724
fbodyaccjerkmaxindsz	-37.3760430	38.508805
fbodyaccjerkkurtosisx	-45.7827908	46.541031
fbodyaccjerkkurtosisy	-47.8996107	47.601848
fbodyaccjerkkurtosisz	-37.8557876	39.325995
fbodyaccjerkbandsenergy5764	9.4550077	52.172508
fbodyaccjerkbandsenergy33401	-90.6993860	61.838685
fbodyaccjerkbandsenergy57641	-41.3574034	74.055891
fbodyaccjerkbandsenergy57642	-52.2762587	90.483382
fbodygyromaxindsx	-37.5192745	33.671573
fbodygyromaxindsy	-44.9419814	38.973876
fbodygyromaxindsz	-45.3843248	47.271339
fbodygyromeanfreqx	-44.6727459	38.921810
fbodygyromeanfreqy	-47.7567789	35.252966
fbodygyromeanfreqz	-45.7341712	43.927424
fbodyaccjerkminx	-52.413615	63.235249
fbodyaccjerkminy	-53.007459	48.468067
fbodyaccjerkminz	-58.537469	60.717102
fbodyaccjerkmaxindsx	-54.581457	68.511860
fbodyaccjerkmaxindsy	-61.427113	68.999675
fbodyaccjerkmaxindsz	-39.149774	62.637531
fbodyaccjerkkurtosisx	-63.228470	63.200660
fbodyaccjerkkurtosisy	-60.346185	72.099126
fbodyaccjerkkurtosisz	-69.157791	70.374648
fbodyaccjerkbandsenergy5764	-43.258693	25.120488
fbodyaccjerkbandsenergy33401	-58.564806	66.202065
fbodyaccjerkbandsenergy57641	-48.802345	72.992091
fbodyaccjerkbandsenergy57642	-60.511194	66.203388
fbodygyromaxindsx	-63.957553	64.969883
fbodygyromaxindsy	-46.307292	56.349112
fbodygyromaxindsz	-46.675451	61.454120
fbodygyromeanfreqx	-64.113362	71.928197
fbodygyromeanfreqy	-68.950730	67.703951
fbodygyromeanfreqz	-60.289779	65.435202
fbodygyrokurtosisx	-47.962314	48.287246
fbodygyrokurtosisy	-56.725925	62.246396
fbodygyroskewnessz	-57.961378	52.709952
fbodygyrobandsenergy18	-31.998841	61.232023
fbodygyrobandsenergy916	-33.547624	72.291056
fbodygyrobandsenergy5764	-57.029346	82.869145
fbodygyrobandsenergy181	-31.318413	86.145675
fbodygyrobandsenergy17241	-48.665948	74.222589
fbodygyrobandsenergy33401	-27.224345	26.708040
fbodygyrobandsenergy57641	-55.105974	60.873041
fbodygyrobandsenergy9162	-82.064505	42.819266
fbodygyrobandsenergy33402	-57.001991	21.540128
fbodygyrobandsenergy57642	-48.877429	75.447942
fbodyaccmagmin	-70.212848	57.316498
fbodyaccmagmaxinds	-60.606998	51.994434
fbodyaccmagmeanfreq	-49.118501	84.502149
fbodyaccmagskewness	-72.535147	59.447990
fbodybodyaccjerkmagmin	-36.720128	45.344366
fbodybodyaccjerkmagmaxinds	-79.538561	91.107805
fbodybodyaccjerkmagmeanfreq	-73.368598	61.094629
fbodybodyaccjerkmagkurtosis	-43.183239	52.522651
fbodybodygyromagmin	-67.328690	52.291372
fbodybodygyromagmaxinds	-42.567816	61.538157
fbodybodygyromagkurtosis	-51.098171	49.562032
fbodybodygyrojerkmagmaxinds	-77.817045	61.421048
fbodybodygyrojerkmagmeanfreq	-61.474747	85.374853
fbodybodygyrojerkmagkurtosis	-47.551305	52.418080
angletbodyaccmeangravity	-43.948118	44.684670
angletbodygyromeangravitymean	-31.700795	35.258326
angletbodygyrojerkmeangravitymean	-40.027925	35.300868
anglezgravitymean	-49.121763	72.309931

, , walkdown

	2.5 %	97.5 %
(Intercept)	-17.24543	46.35147
tbodyaccmeanx	-43.43146	82.52518
tbodyaccmeany	-47.05071	61.14733
tbodyaccmeanz	-63.39635	44.67865
tbodyaccentropyz	-50.39375	59.89301
tbodyaccarcoeffx4	-40.92291	66.44852
tbodyaccarcoeffy4	-42.98628	47.68189
tbodyaccarcoeffz1	-52.15673	47.08191
tbodyaccarcoeffz4	-61.14837	43.24424
tbodyacccorrelationxy	-71.09553	41.28113
tbodyacccorrelationxz	-53.26609	42.93890
tbodyacccorrelationyz	-61.19658	43.52181
tgravityaccstdx	-53.79054	42.25938
tgravityaccsma	-49.49539	56.94229
tgravityaccenergyy	-118.64190	37.18688
tgravityaccenergyz	-90.15099	30.74485
tgravityacciqry	-72.78934	73.08498
tgravityacciqrz	-71.29878	69.54418
tgravityaccentropyx	-40.33886	46.37090
tgravityaccentropyy	-67.13709	42.25041
tgravityaccentropyz	-36.40531	36.61255
tgravityaccarcoeffx1	-74.48378	58.50794
tgravityaccarcoeffy3	-63.20444	69.14250
tgravityaccarcoeffz4	-61.36518	62.82701
tgravityacccorrelationxy	-27.74294	35.34099
tgravityacccorrelationxz	-32.83902	30.52096

fbodygyrokurtosisx	-36.5518699	37.256483
fbodygyrokurtosisy	-38.9905438	30.874728
fbodygyroskewnessz	-35.2803812	39.835181
fbodygyrobandsenergy18	-4.9585392	37.373050
fbodygyrobandsenergy916	-76.6494864	55.272202
fbodygyrobandsenergy5764	-87.0329402	58.151701
fbodygyrobandsenergy181	-64.0862819	23.782235
fbodygyrobandsenergy17241	-38.2508962	27.917031
fbodygyrobandsenergy33401	-45.5061800	106.312177
fbodygyrobandsenergy57641	-53.4955432	87.217737
fbodygyrobandsenergy9162	-68.5662515	89.782634
fbodygyrobandsenergy33402	-20.9348470	39.486563
fbodygyrobandsenergy57642	-54.0232776	62.317629
fbodyaccmagmin	-49.0483464	33.097085
fbodyaccmagmaxinds	-50.5415513	32.474511
fbodyaccmagmeanfreq	-41.6988828	55.241326
fbodyaccmagskewness	-34.9561948	39.489779
fbodybodyaccjerkmagmin	-65.9055888	31.821774
fbodybodyaccjerkmagmaxinds	-35.8857871	39.033430
fbodybodyaccjerkmagmeanfreq	-42.4934854	36.455361
fbodybodyaccjerkmagkurtosis	-40.2746374	37.173999
fbodybodygyromagmin	-41.5233208	34.693789
fbodybodygyromagmaxinds	-41.0834430	49.002679
fbodybodygyromagkurtosis	-29.8058102	37.358312
fbodybodygyrojerkmagmaxinds	-59.3437782	57.779954
fbodybodygyrojerkmagmeanfreq	-45.8272716	50.336933
fbodybodygyrojerkmagkurtosis	-40.1505153	43.018028
angletbodyaccmeangravity	-35.4409432	42.189229
angletbodygyromeangravitymean	-30.0559974	30.884397
angletbodygyrojerkmeangravitymean	-30.0631819	29.255764
anglezgravitymean	-51.6577168	29.111638

, , standing

	2.5 %	97.5 %
(Intercept)	-59.308097	-2.324183
tbodyaccmeanx	-9.719417	34.421756
tbodyaccmeany	-30.184190	10.710994
tbodyaccmeanz	2.098920	35.737749
tbodyaccentropyz	-49.871880	33.716705
tbodyaccarcoeffx4	-44.541924	39.759270
tbodyaccarcoeffy4	-42.001722	37.640631
tbodyaccarcoeffz1	-43.209038	44.336122
tbodyaccarcoeffz4	-50.591410	42.249942
tbodyacccorrelationxy	-39.533194	38.549284
tbodyacccorrelationxz	-43.018691	40.743145
tbodyacccorrelationyz	-37.645861	40.887237
tgravityaccstdx	3.830127	35.574302
tgravityaccsma	-12.302171	68.414895
tgravityaccenergyy	-100.756597	-12.337441
tgravityaccenergyz	-105.331905	-27.889559
tgravityacciqry	-27.017895	38.156097
tgravityacciqrz	-27.801298	43.880238
tgravityaccentropyx	-41.761217	39.281022
tgravityaccentropyy	-46.735817	37.755669
tgravityaccentropyz	-30.559634	33.914589
tgravityaccarcoeffx1	-45.255834	36.610921
tgravityaccarcoeffy3	-46.502043	34.091217
tgravityaccarcoeffz4	-43.645039	45.445629
tgravityacccorrelationxy	-24.064135	35.413879
tgravityacccorrelationxz	-29.258197	28.739152
tgravityacccorrelationyz	-28.529782	24.046775
tbodyaccjerkmeanx	-47.811938	49.868970
tbodyaccjerkmeany	-33.685306	47.962998
tbodyaccjerkmeanz	-52.426789	34.876935
tbodyaccjerkarcoeffx2	-43.617242	49.312706
tbodyaccjerkarcoeffx4	-39.823837	45.614640
tbodyaccjerkarcoeffy4	-29.924658	57.761603
tbodyaccjerkarcoeffz4	-49.737016	34.355275
tbodyaccjerkcorrelationxy	-48.245875	38.388333
tbodyaccjerkcorrelationxz	-44.577263	41.103514
tbodyaccjerkcorrelationyz	-43.823058	38.849170
tbodygyromeany	-22.095963	57.293029
tbodygyromeanz	-32.197892	32.307813
tbodygyroentropyx	-45.337050	44.909008
tbodygyroentropyy	-36.395901	32.561824
tbodygyroentropyz	-34.226927	29.958407
tbodygyroarcoeffx3	-24.008935	56.325880
tbodygyroarcoeffx4	-37.606490	48.259721
tbodygyroarcoeffy1	-36.508604	61.755986
tgravityacccorrelationyz	-33.87459	26.17778
tbodyaccjerkmeanx	-38.72731	45.83871
tbodyaccjerkmeany	-42.00446	43.29578
tbodyaccjerkmeanz	-42.75109	39.36613
tbodyaccjerkarcoeffx2	-62.50945	46.91873
tbodyaccjerkarcoeffx4	-56.73578	51.79799
tbodyaccjerkarcoeffy4	-37.90147	55.69503
tbodyaccjerkarcoeffz4	-51.49041	41.72159
tbodyaccjerkcorrelationxy	-54.92016	48.95483
tbodyaccjerkcorrelationxz	-51.39446	47.30727
tbodyaccjerkcorrelationyz	-56.41077	49.14839
tbodygyromeany	-63.04058	66.54618
tbodygyromeanz	-44.70573	71.45233
tbodygyroentropyx	-46.01096	49.09513
tbodygyroentropyy	-55.94119	57.05231
tbodygyroentropyz	-51.83877	44.06362
tbodygyroarcoeffx3	-41.58464	83.32613
tbodygyroarcoeffx4	-61.86407	51.80589
tbodygyroarcoeffy1	-36.17688	80.97611
tbodygyroarcoeffz4	-49.27803	39.54428
tbodygyrocorrelationxy	-53.66797	50.06800
tbodygyrocorrelationxz	-42.32752	39.51546
tbodygyrocorrelationyz	-61.41334	38.64482
tbodygyrojerkmeanx	-55.28286	55.34236
tbodygyrojerkmeany	-56.71362	45.26932
tbodygyrojerkmeanz	-44.01918	40.97203
tbodygyrojerkarcoeffx1	-57.24912	53.09386
tbodygyrojerkarcoeffx3	-71.66395	13.12059
tbodygyrojerkarcoeffx4	-62.46434	39.81166
tbodygyrojerkarcoeffy3	-60.86605	53.42116
tbodygyrojerkarcoeffy4	-60.95955	49.54673
tbodygyrojerkarcoeffz4	-52.30719	46.97740
tbodygyrojerkcorrelationxy	-53.07004	55.20548
tbodygyrojerkcorrelationxz	-49.41287	48.27938
tbodygyrojerkcorrelationyz	-43.20520	46.89147
tbodyaccmagmin	-49.71262	52.59334
tbodyaccmagarcoeff4	-54.09310	42.94276
tbodyaccjerkmagarcoeff2	-47.05871	55.47625
tbodyaccjerkmagarcoeff3	-52.48656	56.55869
tbodyaccjerkmagarcoeff4	-57.62834	53.77879
tbodygyromagmin	-38.70511	43.07772
tbodygyromagentropy	-51.24478	54.28162
tbodygyromagarcoeff4	-48.29610	56.21832
tbodygyrojerkmagarcoeff3	-58.04427	48.89771
tbodygyrojerkmagarcoeff4	-52.84475	55.87672
fbodyaccmaxindsx	-59.91102	62.74039
fbodyaccmaxindsy	-52.08030	53.40396
fbodyaccmaxindsz	-60.72468	53.99512
fbodyaccmeanfreqx	-68.57769	51.35167
fbodyaccmeanfreqy	-61.27162	64.81357
fbodyaccmeanfreqz	-56.98994	57.13779
fbodyacckurtosisx	-50.65029	52.44479
fbodyaccskewnessy	-46.32952	54.52818
fbodyaccskewnessz	-49.97628	42.93082
fbodyaccbandsenergy5764	-42.40626	66.69869
fbodyaccbandsenergy57641	-49.35398	50.70708
fbodyaccbandsenergy57642	-45.57373	57.95677
fbodyaccjerkminx	-37.00689	37.29406
fbodyaccjerkminy	-39.75859	39.82161
fbodyaccjerkminz	-44.69902	45.13516
fbodyaccjerkmaxindsx	-45.29869	54.29175
fbodyaccjerkmaxindsy	-51.08931	59.84171
fbodyaccjerkmaxindsz	-51.10226	49.61079
fbodyaccjerkkurtosisx	-49.66008	53.94561
fbodyaccjerkkurtosisy	-57.04611	55.44638
fbodyaccjerkkurtosisz	-72.44385	49.38460
fbodyaccjerkbandsenergy5764	-31.00568	50.68077
fbodyaccjerkbandsenergy33401	-32.81496	52.50986
fbodyaccjerkbandsenergy57641	-46.32707	71.59954
fbodyaccjerkbandsenergy57642	-45.45551	61.46997
fbodygyromaxindsx	-49.79746	42.11937
fbodygyromaxindsy	-53.71227	47.15052
fbodygyromaxindsz	-51.95109	31.27585
fbodygyromeanfreqx	-55.89777	48.71938
fbodygyromeanfreqy	-58.34764	57.96825
fbodygyromeanfreqz	-50.27298	53.75519
fbodygyrokurtosisx	-49.26069	41.70037
fbodygyrokurtosisy	-57.14578	46.44960
fbodygyroskewnessz	-62.23617	48.62691
fbodygyrobandsenergy18	-30.21611	85.45076

tbodygyroarcoeffz4	-41.131431	36.222529
tbodygyrocorrelationxy	-32.115125	32.796186
tbodygyrocorrelationxz	-35.840488	30.280381
tbodygyrocorrelationyz	-35.697010	30.048753
tbodygyrojerkmeanx	-27.694481	36.160796
tbodygyrojerkmeany	-39.834027	33.967690
tbodygyrojerkmeanz	-39.495520	44.116410
tbodygyrojerkarcoeffx1	-53.020540	29.605759
tbodygyrojerkarcoeffx3	-38.552358	26.029924
tbodygyrojerkarcoeffx4	-42.354129	40.302850
tbodygyrojerkarcoeffy3	-50.715045	44.847726
tbodygyrojerkarcoeffy4	-45.100600	41.886267
tbodygyrojerkarcoeffz4	-38.199906	38.122201
tbodygyrojerkcorrelationxy	-41.508288	37.383002
tbodygyrojerkcorrelationxz	-35.244007	41.950463
tbodygyrojerkcorrelationyz	-35.847272	36.938316
tbodyaccmagmin	-59.091622	4.932751
tbodyaccmagarcoeff4	-45.469277	37.059462
tbodyaccjerkmagarcoeff2	-41.276109	40.790382
tbodyaccjerkmagarcoeff3	-48.628434	44.685312
tbodyaccjerkmagarcoeff4	-45.408047	36.211150
tbodygyromagmin	-60.048026	37.310806
tbodygyromagentropy	-42.558577	43.529180
tbodygyromagarcoeff4	-34.829199	44.606104
tbodygyrojerkmagarcoeff3	-45.807527	42.594593
tbodygyrojerkmagarcoeff4	-42.326394	39.756757
fbodyaccmaxindsx	-44.336075	44.047768
fbodyaccmaxindsy	-50.235558	48.376363
fbodyaccmaxindsz	-44.619915	37.243832
fbodyaccmeanfreqx	-47.871619	42.074644
fbodyaccmeanfreqy	-44.057711	47.664202
fbodyaccmeanfreqz	-40.718438	43.622465
fbodyacckurtosisx	-35.979406	41.690879
fbodyaccskewnessy	-36.547040	42.387392
fbodyaccskewnessz	-38.152259	34.565624
fbodyaccbandsenergy5764	-62.616846	59.880139
fbodyaccbandsenergy57641	-66.178165	27.704213
fbodyaccbandsenergy57642	-35.291336	40.213497
fbodyaccjerkminx	-29.703859	42.564334
fbodyaccjerkminy	-48.438898	32.081621
fbodyaccjerkminz	-42.746770	40.754051
fbodyaccjerkmaxindsx	-35.237754	43.157829
fbodyaccjerkmaxindsy	-39.206933	41.044754
fbodyaccjerkmaxindsz	-37.006007	38.893800
fbodyaccjerkkurtosisx	-43.680150	48.626252
fbodyaccjerkkurtosisy	-50.247227	45.305627
fbodyaccjerkkurtosisz	-38.437276	38.763708
fbodyaccjerkbandsenergy5764	-13.426972	39.075012
fbodyaccjerkbandsenergy33401	-77.505632	92.189014
fbodyaccjerkbandsenergy57641	-45.396281	54.237954
fbodyaccjerkbandsenergy57642	-75.147293	104.713781
fbodygyromaxindsx	-39.230032	31.969592
fbodygyromaxindsy	-44.919115	39.010878
fbodygyromaxindsz	-45.362320	47.316785
fbodygyromeanfreqx	-48.049635	35.572771
fbodygyromeanfreqy	-46.887519	36.146259
fbodygyromeanfreqz	-47.145110	42.567186
fbodygyrokurtosisx	-35.859067	37.958114
fbodygyrokurtosisy	-39.414490	30.466405
fbodygyroskewnessz	-37.097041	38.037634
fbodygyrobandsenergy18	-55.970181	-13.260716
fbodygyrobandsenergy916	-64.049904	57.822133
fbodygyrobandsenergy5764	-30.702935	98.093665
fbodygyrobandsenergy181	-38.783461	43.967627
fbodygyrobandsenergy17241	-30.809785	44.956682
fbodygyrobandsenergy33401	-38.944387	103.331344
fbodygyrobandsenergy57641	-66.918846	67.210389
fbodygyrobandsenergy9162	-81.415675	80.905707
fbodygyrobandsenergy33402	-13.098907	70.431392
fbodygyrobandsenergy57642	-39.016934	65.859285
fbodyaccmagmin	-49.864617	32.042365
fbodyaccmagmaxinds	-50.132353	32.882540
fbodyaccmagmeanfreq	-41.994559	54.923564
fbodyaccmagskewness	-36.255766	38.205778
fbodybodyaccjerkmagmin	-48.063059	47.167215
fbodybodyaccjerkmagmaxinds	-35.637693	39.303354
fbodybodyaccjerkmagmeanfreq	-44.778235	34.177615
fbodybodyaccjerkmagkurtosis	-39.578249	37.847736
fbodybodygyromagmin	-49.475719	25.670227
fbodybodygyromagmaxinds	-40.114886	49.966073

fbodygyrobandsenergy916	-52.61067	35.61981
fbodygyrobandsenergy5764	-54.09682	70.26266
fbodygyrobandsenergy181	-64.58279	63.74911
fbodygyrobandsenergy17241	-71.95091	94.50865
fbodygyrobandsenergy33401	-23.88684	55.90671
fbodygyrobandsenergy57641	-64.93620	67.64099
fbodygyrobandsenergy9162	-25.69931	82.66613
fbodygyrobandsenergy33402	-60.72116	49.85515
fbodygyrobandsenergy57642	-57.36713	66.25652
fbodyaccmagmin	-50.40985	45.03838
fbodyaccmagmaxinds	-56.93596	39.14922
fbodyaccmagmeanfreq	-69.12238	53.60827
fbodyaccmagskewness	-43.77224	53.38173
fbodybodyaccjerkmagmin	-34.23964	43.28516
fbodybodyaccjerkmagmaxinds	-97.43634	92.20635
fbodybodyaccjerkmagmeanfreq	-61.98771	62.42579
fbodybodyaccjerkmagkurtosis	-38.89011	46.93552
fbodybodygyromagmin	-54.83630	42.16515
fbodybodygyromagmaxinds	-48.12907	48.46695
fbodybodygyromagkurtosis	-47.17683	47.91689
fbodybodygyrojerkmagmaxinds	-82.83288	71.36223
fbodybodygyrojerkmagmeanfreq	-45.15704	61.83736
fbodybodygyrojerkmagkurtosis	-55.60779	39.62190
angletbodyaccmeangravity	-37.49170	42.83894
angletbodygyromeangravitymean	-33.89206	36.23194
angletbodygyrojerkmeangravitymean	-37.81215	37.81121
anglezgravitymean	-88.30016	58.34551

, , walkup

	2.5 %	97.5 %
(Intercept)	-65.71458	-0.2315022
tbodyaccmeanx	-50.20723	69.4172618
tbodyaccmeany	-61.80336	39.7424249
tbodyaccmeanz	-62.43341	50.0884204
tbodyaccentropyz	-51.52904	43.6483584
tbodyaccarcoeffx4	-60.09289	43.3990628
tbodyaccarcoeffy4	-47.95968	51.1778866
tbodyaccarcoeffz1	-50.29693	45.9903730
tbodyaccarcoeffz4	-52.92796	53.4170761
tbodyacccorrelationxy	-46.71128	57.7287142
tbodyacccorrelationxz	-38.76458	41.5547700
tbodyacccorrelationyz	-50.44930	48.1253352
tgravityaccstdx	-72.65689	-6.5517404
tgravityaccsma	-32.21126	73.8593521
tgravityaccenergyy	-71.09326	32.8251063
tgravityaccenergyz	-108.79796	21.7015747
tgravityacciqry	-90.85185	56.7227512
tgravityacciqrz	-69.67225	62.9844878
tgravityaccentropyx	-33.77882	48.6929317
tgravityaccentropyy	-68.73858	50.4272602
tgravityaccentropyz	-33.71227	36.7882194
tgravityaccarcoeffx1	-81.32408	49.9234017
tgravityaccarcoeffy3	-79.30971	58.0795973
tgravityaccarcoeffz4	-61.42242	61.4788311
tgravityacccorrelationxy	-27.01287	39.1071642
tgravityacccorrelationxz	-31.96604	33.7709379
tgravityacccorrelationyz	-38.74549	26.5471853
tbodyaccjerkmeanx	-43.45706	42.8444399
tbodyaccjerkmeany	-42.20177	43.3181682
tbodyaccjerkmeanz	-45.74798	41.3159515
tbodyaccjerkarcoeffx2	-50.12191	60.2632967
tbodyaccjerkarcoeffx4	-51.20555	58.8368999
tbodyaccjerkarcoeffy4	-50.94282	55.9299533
tbodyaccjerkarcoeffz4	-50.67207	43.8969307
tbodyaccjerkcorrelationxy	-58.31584	42.5436515
tbodyaccjerkcorrelationxz	-58.21704	44.9838591
tbodyaccjerkcorrelationyz	-49.08275	55.4296850
tbodygyromeany	-73.48245	60.2549259
tbodygyromeanz	-56.76288	67.5400807
tbodygyroentropyx	-42.45652	40.9567087
tbodygyroentropyy	-47.42086	58.2986961
tbodygyroentropyz	-50.59171	48.2997852
tbodygyroarcoeffx3	-78.61418	22.2434712
tbodygyroarcoeffx4	-94.22345	35.2978598
tbodygyroarcoeffy1	-47.71659	76.9642798
tbodygyroarcoeffz4	-53.66052	29.1893796
tbodygyrocorrelationxy	-39.28397	48.5936852
tbodygyrocorrelationxz	-37.24896	44.8218249
tbodygyrocorrelationyz	-42.67749	42.8692162

fbodybodygyromagkurtosis	-29.835610	37.338645
fbodybodygyrojerkmagmaxinds	-58.335291	58.821769
fbodybodygyrojerkmagmeanfreq	-43.317903	52.880193
fbodybodygyrojerkmagkurtosis	-39.930170	43.235673
angletbodyaccmeangravity	-35.962536	41.692044
angletbodygyromeangravitymean	-29.172435	31.786298
angletbodygyrojerkmeangravitymean	-30.062512	29.262238
anglezgravitymean	-46.792366	34.059379

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	2.5 %	97.5 %
(Intercept)	-7.524929	30.385257
tbodyaccmeanx	-50.252331	10.001021
tbodyaccmeany	-45.625969	23.273810
tbodyaccmeanz	-59.798031	7.244488
tbodyaccentropyz	-47.204899	75.082607
tbodyaccarcoeffx4	-77.406666	52.657904
tbodyaccarcoeffy4	-55.829761	51.273694
tbodyaccarcoeffz1	-57.347139	53.170142
tbodyaccarcoeffz4	-63.559136	47.686865
tbodyacccorrelationxy	-57.506938	81.163250
tbodyacccorrelationxz	-60.186501	59.137104
tbodyacccorrelationyz	-56.498552	70.918516
tgravityaccstdx	-19.149697	24.466423
tgravityaccsma	-39.763253	67.224229
tgravityaccenergyy	-72.833989	31.260859
tgravityaccenergyz	-79.316192	47.733499
tgravityacciqry	-61.121086	53.144950
tgravityacciqrz	-59.869959	19.396503
tgravityaccentropyx	-70.104714	31.505690
tgravityaccentropyy	-61.163931	50.360319
tgravityaccentropyz	-41.159235	53.275494
tgravityaccarcoeffx1	-76.294156	60.790003
tgravityaccarcoeffy3	-55.440074	69.679562
tgravityaccarcoeffz4	-59.103070	67.773078
tgravityacccorrelationxy	-32.205159	42.047388
tgravityacccorrelationxz	-33.971738	35.483590
tgravityacccorrelationyz	-37.610804	31.136650
tbodyaccjerkmeanx	-54.366932	57.234124
tbodyaccjerkmeany	-52.310857	61.931168
tbodyaccjerkmeanz	-60.873773	53.137920
tbodyaccjerkarcoeffx2	-47.138824	73.873687
tbodyaccjerkarcoeffx4	-63.763949	68.988939
tbodyaccjerkarcoeffy4	-62.127238	81.983811
tbodyaccjerkarcoeffz4	-56.192279	61.005060
tbodyaccjerkcorrelationxy	-56.390001	70.436119
tbodyaccjerkcorrelationxz	-49.190848	61.709255
tbodyaccjerkcorrelationyz	-49.673747	57.628810
tbodygyromeany	-30.977894	76.894151
tbodygyromeanz	-80.983843	39.339211
tbodygyroentropyx	-49.227721	58.927002
tbodygyroentropyy	-67.124392	42.047262
tbodygyroentropyz	-49.626154	60.752957
tbodygyroarcoeffx3	-44.280653	74.386737
tbodygyroarcoeffx4	-50.050741	73.849959
tbodygyroarcoeffy1	-55.038664	65.876236
tbodygyroarcoeffz4	-49.115340	63.823190
tbodygyrocorrelationxy	-79.442887	48.952713
tbodygyrocorrelationxz	-59.893323	45.881927
tbodygyrocorrelationyz	-59.279422	53.824377
tbodygyrojerkmeanx	-77.770257	59.347525
tbodygyrojerkmeany	-67.217952	60.208413
tbodygyrojerkmeanz	-58.238487	62.870972
tbodygyrojerkarcoeffx1	-79.106280	40.428971
tbodygyrojerkarcoeffx3	-40.576882	54.808778
tbodygyrojerkarcoeffx4	-47.887456	61.125140
tbodygyrojerkarcoeffy3	-67.829301	58.210956
tbodygyrojerkarcoeffy4	-65.816582	56.344461
tbodygyrojerkarcoeffz4	-54.527363	58.980781

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tbodygyrojerkmeanx	-46.44340	58.2690839
tbodygyrojerkmeany	-64.80001	55.8870098
tbodygyrojerkmeanz	-43.52686	42.4819302
tbodygyrojerkarcoeffx1	-52.30585	85.7972314
tbodygyrojerkarcoeffx3	-51.07794	39.0239264
tbodygyrojerkarcoeffx4	-43.73408	45.5169508
tbodygyrojerkarcoeffy3	-54.81891	50.8007132
tbodygyrojerkarcoeffy4	-50.11762	60.1212840
tbodygyrojerkarcoeffz4	-52.83037	48.9291865
tbodygyrojerkcorrelationxy	-65.04260	46.5414587
tbodygyrojerkcorrelationxz	-55.56347	44.7712111
tbodygyrojerkcorrelationyz	-49.37088	49.3303033
tbodyaccmagmin	-57.81538	54.4369288
tbodyaccmagarcoeff4	-47.53100	45.5170239
tbodyaccjerkmagarcoeff2	-49.43722	65.4158733
tbodyaccjerkmagarcoeff3	-47.44894	62.3888948
tbodyaccjerkmagarcoeff4	-50.67288	60.4016028
tbodygyromagmin	-42.86614	46.7470763
tbodygyromagentropy	-49.11025	49.3334837
tbodygyromagarcoeff4	-45.20522	53.1765600
tbodygyrojerkmagarcoeff3	-48.00419	51.8873747
tbodygyrojerkmagarcoeff4	-51.91026	54.5832821
fbodyaccmaxindsx	-67.53604	78.3273831
fbodyaccmaxindsy	-76.90169	54.0623663
fbodyaccmaxindsz	-62.09767	59.9621928
fbodyaccmeanfreqx	-71.55767	50.3892171
fbodyaccmeanfreqy	-82.24301	30.1593364
fbodyaccmeanfreqz	-59.14933	39.2205059
fbodyacckurtosisx	-43.35459	49.9714340
fbodyaccskewnessy	-55.02471	52.4064027
fbodyaccskewnessz	-50.84251	46.8969366
fbodyaccbandsenergy5764	-58.26980	66.2125524
fbodyaccbandsenergy57641	-37.61954	57.5704196
fbodyaccbandsenergy57642	-41.40648	66.7944525
fbodyaccjerkminx	-38.64604	38.1481774
fbodyaccjerkminy	-35.09527	44.4282176
fbodyaccjerkminz	-46.21111	50.3230268
fbodyaccjerkmaxindsx	-58.34926	49.4615091
fbodyaccjerkmaxindsy	-54.76470	54.3248881
fbodyaccjerkmaxindsz	-51.76720	40.8172065
fbodyaccjerkkurtosisx	-43.61127	51.5718627
fbodyaccjerkkurtosisy	-53.80206	61.7758012
fbodyaccjerkkurtosisz	-43.71531	58.0942817
fbodyaccjerkbandsenergy5764	-23.99381	62.3416192
fbodyaccjerkbandsenergy33401	-58.41096	59.5160379
fbodyaccjerkbandsenergy57641	-59.29349	57.4971172
fbodyaccjerkbandsenergy57642	-79.48675	64.2192791
fbodygyromaxindsx	-47.64185	54.6209151
fbodygyromaxindsy	-56.15909	48.3995735
fbodygyromaxindsz	-61.22427	37.9768560
fbodygyromeanfreqx	-61.41296	42.1266508
fbodygyromeanfreqy	-64.28494	50.5728035
fbodygyromeanfreqz	-57.72598	55.7077047
fbodygyrokurtosisx	-49.94117	41.7912040
fbodygyrokurtosisy	-48.56184	51.5989550
fbodygyroskewnessz	-56.02663	60.1001404
fbodygyrobandsenergy18	-52.90543	73.5667547
fbodygyrobandsenergy916	-41.14056	58.5658250
fbodygyrobandsenergy5764	-38.36922	72.0967336
fbodygyrobandsenergy181	-49.59363	73.0113811
fbodygyrobandsenergy17241	-73.67459	34.4416365
fbodygyrobandsenergy33401	-59.83975	-2.2976971
fbodygyrobandsenergy57641	-40.26551	87.7532144
fbodygyrobandsenergy9162	-60.14504	72.0823980
fbodygyrobandsenergy33402	-22.14072	90.2352397
fbodygyrobandsenergy57642	-63.72441	68.9633944
fbodyaccmagmin	-55.60557	37.3199939
fbodyaccmagmaxinds	-54.60947	51.8291812
fbodyaccmagmeanfreq	-50.34495	85.9584493
fbodyaccmagskewness	-52.56598	48.2864214
fbodybodyaccjerkmagmin	-33.23352	47.9594543
fbodybodyaccjerkmagmaxinds	-60.88592	69.8058725
fbodybodyaccjerkmagmeanfreq	-54.38476	66.4564167
fbodybodyaccjerkmagkurtosis	-48.02071	31.5347362
fbodybodygyromagmin	-52.77614	50.8525688
fbodybodygyromagmaxinds	-50.15896	60.1838604
fbodybodygyromagkurtosis	-54.98746	43.6790578
fbodybodygyrojerkmagmaxinds	-61.77204	57.1263166
fbodybodygyrojerkmagmeanfreq	-44.44770	54.8973082
fbodybodygyrojerkmagkurtosis	-43.28566	51.1818024

	angletbodyaccmeangravity	-38.55632	41.4720171
	angletbodygyromeangravitymean	-36.07412	36.2197448
	angletbodygyrojerkmeangravitymean	-33.04581	35.8638341
	anglezgravitymean	-80.37247	75.0580714