

Session 17 Assignment

Weight Lifting Exercise

This human activity recognition research has traditionally focused on discriminating between different activities, i.e. to predict "which" activity was performed at a specific point in time (like with the Daily Living Activities dataset above). The approach we propose for the Weight Lifting Exercises dataset is to investigate "how (well)" an activity was performed by the wearer. The "how (well)" investigation has only received little attention so far, even though it potentially provides useful information for a large variety of applications, such as sports training.

2. Perform the below given activities:

a. Create classification model using logistic regression model b. verify model goodness of fit

c. Report the accuracy measures d. Report the variable importance

e. Report the unimportant variables f. Interpret the results

g. Visualize the results

setwd("C:/Users/Seshan/Desktop/sv R related/acadgild/assignments/session17")

library(readr) Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1 <-

read.csv("Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1.csv",header= T,na.strings=c(""))

View(Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1)

View(Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1)

data<-Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1

#Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1 <- read.csv("Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1.csv",header= T,na.strings=c(""))

#data<-s <- read.csv("Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations1.csv",header= T,na.strings=c(""))

View(data)

# load libraries library(caret) library(randomForest) library(rpart) library(rpart.plot) library(ggplot2) library(lattice) library(rattle) summary(data) library(C50)

#install.package('devtools') # Only needed if you dont have this installed. library(devtools)

install\_github('adam-m-mcelhinney/helpRFunctions')

library(helpRFunctions)

names(data) dim(data) library(caret)

library(zoo) library(plyr) is.na(data) which(is.na(data)) sum(is.na(data)) colSums(is.na(data))

data[is.na(data)] <- mean(data, na.rm = TRUE)

str(data) summary(data) pairs(data[8:15])

# set last (classe) and prior (- classe) column index last <- as.numeric(ncol(data))

prior <- last - 1

# set variables to numerics for correlation check, except the "classe" for (i in 1:prior) {

data[,i] <- as.numeric(data[,i])}

# enable multi-core processing library(doParallel)

#cl <- makeCluster(detectCores())

registerDoParallel() set.seed(12345) dataTrain<-data[1:4004,]

dataTest<-data[4005:4024,] cor.check <- cor(dataTrain[, -c(last)]) diag(cor.check) <- 0

plot( levelplot(cor.check,main ="Correlation matrix for all WLE features in training set", scales=list(x=list(rot=90), cex=1.0) ))

# logistic regression model:

fit <- glm(classe~.,data = dataTrain,family = binomial(link='logit'))

summary(fit)

library(MASS)

step\_fit <- stepAIC(fit,method='backward')

summary(step\_fit)

confint(step\_fit)

#ANOVA on base model anova(fit,test = 'Chisq')

#ANOVA from reduced model after applying the Step AIC

anova(step\_fit,test = 'Chisq')

#plot the fitted model plot(fit$fitted.values)

pred\_link <- predict(fit,newdata = dataTest,type = 'link')

#check for multicollinearity library(car)

vif(fit)

vif(step\_fit)

library(caret)

#with default prob cut 0.50

dataTest$pred\_classe <- ifelse(pred<0.7,'yes','no')

table(dataTest$pred\_classe,dataTest$classe)

#training split of churn classes round(table(dataTrain$classe)/nrow(dataTrain),2)\*100

# test split of churn classes round(table(dataTest$classe)/nrow(dataTest),2)\*100

#predicted split of churn classes

round(table(dataTest$pred\_classe)/nrow(dataTest),2)\*100

#create confusion matrix confusionMatrix(dataTest$classe,dataTest$classe)

#how do we create a cross validation scheme control <- trainControl(method = 'repeatedcv',

number = 10, repeats = 3)

seed <-7

metric <- 'Accuracy' set.seed(seed)

fit\_default <- train(classe~., data = dataTrain, method = 'glm', metric = 0,

trControl = control)

print(fit\_default)

library(caret) varImp(step\_fit) varImp(fit\_default) library(devtools)

install\_github("riv","tomasgreif") install\_github("woe","tomasgreif") library(woe)

library(riv)

iv\_df <- iv.mult(dataTrain, y="classe", summary=TRUE, verbose=TRUE)

iv\_df

iv <- iv.mult(dataTrain, y="classe", summary=FALSE, verbose=TRUE)

# Plot information value summary

iv.plot.summary(iv\_df)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| -0.1697 : | 1 | -0.08596: | 1 | -0.10319: | 1 | -0.00863: | 1 |
| -0.20332: | 1 | -0.1009 : | 1 | -0.14513: | 1 | -0.05777: | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| max\_roll\_arm  Min. :-36.3000 | max\_picth\_arm  Min. :-164.000 | max\_yaw\_arm  Min. : 0.0000 | min\_roll\_arm  Min. :-87.1000 |
| 1st Qu.: 0.0000 | 1st Qu.: 0.000 | 1st Qu.: 0.0000 | 1st Qu.: 0.0000 |
| Median : 0.0000 | Median : 0.000 | Median : 0.0000 | Median : 0.0000 |
| Mean : 0.2127  3rd Qu.: 0.0000 | Mean : 1.232  3rd Qu.: 0.000 | Mean : 0.8345  3rd Qu.: 0.0000 | Mean : -0.6085  3rd Qu.: 0.0000 |
| Max. : 81.4000 | Max. : 180.000 | Max. :59.0000 | Max. : 35.7000 |
| min\_pitch\_arm | min\_yaw\_arm | amplitude\_roll\_arm |  |
| Min. :-180.000  1st Qu.: 0.000 | Min. : 0.0000  1st Qu.: 0.0000 | Min. : 0.0000  1st Qu.: 0.0000 |  |
| Median : 0.000 | Median : 0.0000 | Median : 0.0000 |  |
| Mean : -1.213 | Mean : 0.2806 | Mean : 0.8211 |  |
| 3rd Qu.: 0.000  Max. : 146.000 | 3rd Qu.: 0.0000  Max. :34.0000 | 3rd Qu.: 0.0000  Max. :90.0000 |  |
| amplitude\_pitch\_arm | amplitude\_yaw\_arm | roll\_dumbbell | pitch\_dumbbell |
| Min. : 0.000 | Min. : 0.0000 | Min. :-152.782 | Min. :-134.73 |
| 1st Qu.: 0.000  Median : 0.000 | 1st Qu.: 0.0000  Median : 0.0000 | 1st Qu.: -34.657  Median : -2.295 | 1st Qu.: -12.93  Median : 14.48 |
| Mean : 2.445 | Mean : 0.5539 | Mean : 3.500 | Mean : 5.18 |
| 3rd Qu.: 0.000 | 3rd Qu.: 0.0000 | 3rd Qu.: 58.014 | 3rd Qu.: 27.95 |
| Max. :360.000 | Max. :52.0000 | Max. : 139.729 | Max. : 97.28 |

kurtosis\_yaw\_dumbbell skewness\_roll\_dumbbell skewness\_pitch\_dumbbell

|  |  |  |
| --- | --- | --- |
| yaw\_dumbbell | kurtosis\_roll\_dumbbell | kurtosis\_picth\_dumbbell |
| Min. :-129.33 | Min. :-2.088900 | Min. :-2.088900 |
| 1st Qu.: 21.35 | 1st Qu.: 0.000000 | 1st Qu.: 0.000000 |
| Median : 72.49  Mean : 55.66 | Median : 0.000000  Mean : 0.007174 | Median : 0.000000  Mean : 0.001251 |
| 3rd Qu.: 122.01 | 3rd Qu.: 0.000000 | 3rd Qu.: 0.000000 |
| Max. : 152.92 | Max. : 7.563300 | Max. :11.273400 |

#DIV/0!: 88 Min. :-2.6110000 Min. :-2.050100

0 :3936 1st Qu.: 0.0000000 1st Qu.: 0.000000

Median : 0.0000000 Median : 0.000000

Mean : 0.0003258 Mean :-0.001974

3rd Qu.: 0.0000000 3rd Qu.: 0.000000

Max. : 2.3814000 Max. : 2.783200 skewness\_yaw\_dumbbell max\_roll\_dumbbell max\_picth\_dumbbell

#DIV/0!: 88 Min. :-70.9000 Min. :-84.500

0 :3936 1st Qu.: 0.0000 1st Qu.: 0.000

Median : 0.0000 Median : 0.000

Mean : 0.7494 Mean : 1.927

3rd Qu.: 0.0000 3rd Qu.: 0.000

Max. : 97.3000 Max. :152.900 max\_yaw\_dumbbell min\_roll\_dumbbell min\_pitch\_dumbbell Min. :-2.100000 Min. :-134.7000 Min. :-129.3000

1st Qu.: 0.000000 1st Qu.: 0.0000 1st Qu.: 0.0000

Median : 0.000000 Median : 0.0000 Median : 0.0000

Mean : 0.007232 Mean : -0.6017 Mean : 0.3381

3rd Qu.: 0.000000 3rd Qu.: 0.0000 3rd Qu.: 0.0000

Max. : 7.600000 Max. : 26.8000 Max. : 122.9000 min\_yaw\_dumbbell amplitude\_roll\_dumbbell amplitude\_pitch\_dumbbell Min. :-2.100000 Min. : 0.000 Min. : 0.000

1st Qu.: 0.000000 1st Qu.: 0.000 1st Qu.: 0.000

Median : 0.000000 Median : 0.000 Median : 0.000

Mean : 0.007232 Mean : 1.351 Mean : 1.589

3rd Qu.: 0.000000 3rd Qu.: 0.000 3rd Qu.: 0.000

Max. : 7.600000 Max. :171.750 Max. :217.330 amplitude\_yaw\_dumbbell total\_accel\_dumbbell var\_accel\_dumbbell Min. :0 Min. : 1.00 Min. : 0.0000

1st Qu.:0 1st Qu.: 6.00 1st Qu.: 0.0000

Median :0 Median : 9.00 Median : 0.0000

Mean :0 Mean :12.02 Mean : 0.2074

3rd Qu.:0 3rd Qu.:14.00 3rd Qu.: 0.0000

Max. :0 Max. :37.00 Max. :230.4278 avg\_roll\_dumbbell stddev\_roll\_dumbbell var\_roll\_dumbbell Min. :-110.93280 Min. : 0.0000 Min. : 0.00

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1st Qu.: | 0.00000 | 1st Qu.: | 0.0000 | 1st Qu.: | 0.00 |
| Median : | 0.00000 | Median : | 0.0000 | Median : | 0.00 |

Mean : 0.05821 Mean : 0.5755 Mean : 29.73

3rd Qu.: 0.00000 3rd Qu.: 0.0000 3rd Qu.: 0.00

Max. : 117.40360 Max. :103.1239 Max. :10634.53 avg\_pitch\_dumbbell stddev\_pitch\_dumbbell var\_pitch\_dumbbell Min. :-70.91580 Min. : 0.0000 Min. : 0.000

1st Qu.: 0.00000 1st Qu.: 0.0000 1st Qu.: 0.000

Median : 0.00000 Median : 0.0000 Median : 0.000

Mean : 0.07618 Mean : 0.3323 Mean : 7.486

3rd Qu.: 0.00000 3rd Qu.: 0.0000 3rd Qu.: 0.000

Max. : 57.45260 Max. :48.4298 Max. :2345.441 avg\_yaw\_dumbbell stddev\_yaw\_dumbbell var\_yaw\_dumbbell gyros\_dumbbell\_x Min. :-105.650 Min. : 0.0000 Min. : 0.00 Min. :-1.4300

1st Qu.: 0.000 1st Qu.: 0.0000 1st Qu.: 0.00 1st Qu.:-0.0200

Median : 0.000 Median : 0.0000 Median : 0.00 Median : 0.3200

Mean : 1.117 Mean : 0.4127 Mean : 12.65 Mean : 0.2487

3rd Qu.: 0.000 3rd Qu.: 0.0000 3rd Qu.: 0.00 3rd Qu.: 0.5300

Max. : 129.933 Max. :71.0596 Max. :5049.47 Max. : 1.4800 gyros\_dumbbell\_y gyros\_dumbbell\_z accel\_dumbbell\_x accel\_dumbbell\_y Min. :-2.04000 Min. :-1.4600 Min. :-237.000 Min. :-163.00

1st Qu.:-0.27000 1st Qu.:-0.3300 1st Qu.: -6.000 1st Qu.: -28.00

Median :-0.06000 Median :-0.1300 Median : 11.000 Median : -2.00

Mean :-0.04674 Mean :-0.1337 Mean : -7.091 Mean : 12.83

3rd Qu.: 0.14000 3rd Qu.: 0.0500 3rd Qu.: 23.000 3rd Qu.: 47.00

Max. : 4.37000 Max. : 1.8900 Max. : 217.000 Max. : 281.00 accel\_dumbbell\_z magnet\_dumbbell\_x magnet\_dumbbell\_y magnet\_dumbbell\_z Min. :-273.00 Min. :-638.00 Min. :-730.0 Min. :-262.00

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1st Qu.: | 12.00 | 1st Qu.:-515.00 | 1st Qu.:-544.0 | 1st Qu.:-101.00 |
| Median : | 51.00 | Median : 107.50 | Median :-486.0 | Median : -59.00 |

Mean : 16.63 Mean : 10.55 Mean :-115.7 Mean : -41.12

3rd Qu.: 79.00 3rd Qu.: 506.00 3rd Qu.: 304.0 3rd Qu.: 1.00

Max. : 122.00 Max. : 579.00 Max. : 618.0 Max. : 300.00 roll\_forearm pitch\_forearm yaw\_forearm kurtosis\_roll\_forearm

Min. :-180.0 Min. :-64.00 Min. :-180.00 0 :3936

1st Qu.:-115.0 1st Qu.: 0.00 1st Qu.:-106.00 #DIV/0!: 8

Median : 89.5 Median : 19.70 Median : 83.50 -1.3846: 2

Mean : 36.1 Mean : 18.57 Mean : 17.79 -0.0699: 1

3rd Qu.: 136.0 3rd Qu.: 43.90 3rd Qu.: 108.00 -0.0781: 1

Max. : 180.0 Max. : 86.90 Max. : 180.00 -0.1168: 1 kurtosis\_picth\_forearm kurtosis\_yaw\_forearm skewness\_roll\_forearm

0 :3936 #DIV/0!: 88 0 :3936

#DIV/0!: 8 0 :3936 #DIV/0!: 8

-0.0259: 1 -0.009 : 1

-0.0918: 1 -0.011 : 1

-0.1289: 1 -0.0252: 1

-0.1574: 1 -0.0525: 1 skewness\_pitch\_forearm skewness\_yaw\_forearm max\_roll\_forearm

0 :3937 #DIV/0!: 88 Min. :-63.9000

#DIV/0!: 8 0 :3936 1st Qu.: 0.0000

-0.0428: 1 Median : 0.0000

-0.0673: 1 Mean : 0.7345

-0.0732: 1 3rd Qu.: 0.0000

-0.14 : 1 Max. : 86.9000 max\_picth\_forearm max\_yaw\_forearm min\_roll\_forearm min\_pitch\_forearm Min. :-152.000 0 :3937 Min. :-64.00000 Min. :-180.00

1st Qu.: 0.000 -1.3 : 14 1st Qu.: 0.00000 1st Qu.: 0.00

Median : 0.000 #DIV/0!: 8 Median : 0.00000 Median : 0.00

Mean : 2.445 -1.5 : 6 Mean : 0.06573 Mean : -1.79

3rd Qu.: 0.000 -0.7 : 5 3rd Qu.: 0.00000 3rd Qu.: 0.00

Max. : 180.000 -0.9 : 5 Max. : 47.50000 Max. : 125.00 min\_yaw\_forearm amplitude\_roll\_forearm amplitude\_pitch\_forearm

0 :3937 Min. : 0.0000 Min. : 0.000

-1.3 : 14 1st Qu.: 0.0000 1st Qu.: 0.000

#DIV/0!: 8 Median : 0.0000 Median : 0.000

-1.5 : 6 Mean : 0.6687 Mean : 4.235

-0.7 : 5 3rd Qu.: 0.0000 3rd Qu.: 0.000

-0.9 : 5 Max. :77.1000 Max. :359.000 amplitude\_yaw\_forearm total\_accel\_forearm var\_accel\_forearm

#DIV/0!: 8 Min. :10.00 Min. : 0.0000

0 :4016 1st Qu.:30.00 1st Qu.: 0.0000

Median :35.00 Median : 0.0000

Mean :34.38 Mean : 0.6562

3rd Qu.:37.00 3rd Qu.: 0.0000

Max. :59.00 Max. :124.1778 avg\_roll\_forearm stddev\_roll\_forearm var\_roll\_forearm Min. :-145.1395 Min. : 0.000 Min. : 0.0

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1st Qu.: | 0.0000 | 1st Qu.: | 0.000 | 1st Qu.: | 0.0 |
| Median : | 0.0000 | Median : | 0.000 | Median : | 0.0 |

Mean : 0.8809 Mean : 1.482 Mean : 199.9

3rd Qu.: 0.0000 3rd Qu.: 0.000 3rd Qu.: 0.0

Max. : 151.2500 Max. :176.478 Max. :31144.6 avg\_pitch\_forearm stddev\_pitch\_forearm var\_pitch\_forearm Min. :-63.9000 Min. : 0.0000 Min. : 0.000

1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 0.000

Median : 0.0000 Median : 0.0000 Median : 0.000

Mean : 0.3827 Mean : 0.2087 Mean : 3.371

3rd Qu.: 0.0000 3rd Qu.: 0.0000 3rd Qu.: 0.000

Max. : 68.1682 Max. :26.7293 Max. :714.453

avg\_yaw\_forearm stddev\_yaw\_forearm var\_yaw\_forearm gyros\_forearm\_x

Min. :-152.3333 Min. : 0.000 Min. : 0.0 Min. :-1.8800

1st Qu.: 0.0000 1st Qu.: 0.000 1st Qu.: 0.0 1st Qu.:-0.1400

Median : 0.0000 Median : 0.000 Median : 0.0 Median : 0.0600

Mean : 0.4121 Mean : 1.354 Mean : 157.2 Mean : 0.1076

3rd Qu.: 0.0000 3rd Qu.: 0.000 3rd Qu.: 0.0 3rd Qu.: 0.4200

Max. : 132.5854 Max. :197.508 Max. :39009.3 Max. : 1.8100 gyros\_forearm\_y gyros\_forearm\_z accel\_forearm\_x

Min. :-5.730000 Min. :-2.58000 Min. :-328.000

1st Qu.:-1.780000 1st Qu.:-0.31000 1st Qu.:-117.000

Median :-0.020000 Median :-0.02000 Median : -6.000

Mean :-0.004108 Mean : 0.09302 Mean : -6.445

3rd Qu.: 1.830000 3rd Qu.: 0.48000 3rd Qu.: 113.000

Max. : 5.170000 Max. : 3.35000 Max. : 279.000 accel\_forearm\_y accel\_forearm\_z magnet\_forearm\_x magnet\_forearm\_y Min. :-467.00 Min. :-366 Min. :-1160.0 Min. :-725.0

1st Qu.: 75.75 1st Qu.:-210 1st Qu.: -589.0 1st Qu.: -76.0

Median : 229.50 Median :-181 Median : -330.5 Median : 653.0

Mean : 171.47 Mean :-163 Mean : -348.7 Mean : 358.6

3rd Qu.: 297.00 3rd Qu.:-150 3rd Qu.: -152.0 3rd Qu.: 747.0

Max. : 575.00 Max. : 239 Max. : 413.0 Max. :1440.0 magnet\_forearm\_z classe

Min. :-876.0 A:1365

1st Qu.: 370.8 B: 901

Median : 560.0 C: 112

Mean : 475.2 D: 276

3rd Qu.: 670.0 E:1370

Max. :1040.0

[ reached getOption("max.print") -- omitted 1 row ]

> pairs(data[8:15])

> # set last (classe) and prior (- classe) column index

> last <- as.numeric(ncol(data))

> prior <- last - 1

> # set variables to numerics for correlation check, except the "classe"

> for (i in 1:prior) {

+ data[,i] <- as.numeric(data[,i])}

>

> # enable multi-core processing

> library(doParallel)

Loading required package: foreach Loading required package: iterators Loading required package: parallel

> #cl <- makeCluster(detectCores())

> registerDoParallel()

> set.seed(12345)

> dataTrain<-data[1:4004,]

> dataTest<-data[4005:4024,]

> cor.check <- cor(dataTrain[, -c(last)]) Warning message:

In cor(dataTrain[, -c(last)]) : the standard deviation is zero

> diag(cor.check) <- 0

> plot( levelplot(cor.check,main ="Correlation matrix for all WLE features in training set",

+ scales=list(x=list(rot=90), cex=1.0) ))

> # logistic regression model:

> fit <- glm(classe~.,data = dataTrain,family = binomial(link='logit'))

Warning messages:

1: In drawDetails(x, recording = FALSE) : reached elapsed time limit

2: glm.fit: algorithm did not converge

3: glm.fit: fitted probabilities numerically 0 or 1 occurred

> summary(fit)

Call:

glm(formula = classe ~ ., family = binomial(link = "logit"), data = dataTrain)

Deviance Residuals:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Min | 1Q | Median | 3Q | Max |
| -3.063e-04 | -2.000e-08 | 2.000e-08 | 2.000e-08 | 3.324e-04 |

Coefficients: (14 not defined because of singularities)

Estimate Std. Error z value Pr(>|z|) (Intercept) 4.576e+05 1.230e+09 0.000 1.000 user\_name -5.210e+01 1.849e+05 0.000 1.000 raw\_timestamp\_part\_1 -3.450e-04 9.293e-01 0.000 1.000 raw\_timestamp\_part\_2 1.045e-05 2.451e-02 0.000 1.000 cvtd\_timestamp -2.202e+01 8.060e+04 0.000 1.000 new\_window -7.584e+02 6.402e+06 0.000 1.000 num\_window 6.767e+00 3.520e+03 0.002 0.998 roll\_belt 8.705e-01 3.350e+03 0.000 1.000 pitch\_belt 3.321e+00 5.762e+03 0.001 1.000 yaw\_belt 9.784e-02 9.781e+02 0.000 1.000 total\_accel\_belt -4.044e+00 1.389e+04 0.000 1.000 kurtosis\_roll\_belt 1.507e+03 2.120e+07 0.000 1.000 kurtosis\_picth\_belt -3.102e+00 4.225e+04 0.000 1.000 kurtosis\_yaw\_belt NA NA NA NA skewness\_roll\_belt 6.595e+01 6.259e+05 0.000 1.000 skewness\_roll\_belt.1 7.315e-01 1.152e+04 0.000 1.000 skewness\_yaw\_belt NA NA NA NA max\_roll\_belt -2.531e+02 6.233e+06 0.000 1.000 max\_picth\_belt -3.091e+01 4.399e+05 0.000 1.000 max\_yaw\_belt -1.502e+03 2.121e+07 0.000 1.000 min\_roll\_belt 2.082e+02 5.222e+06 0.000 1.000 min\_pitch\_belt 9.599e+01 8.100e+05 0.000 1.000 min\_yaw\_belt NA NA NA NA amplitude\_roll\_belt 3.149e+02 5.852e+06 0.000 1.000 amplitude\_pitch\_belt NA NA NA NA amplitude\_yaw\_belt NA NA NA NA var\_total\_accel\_belt 8.926e+01 9.288e+05 0.000 1.000 avg\_roll\_belt -7.727e-01 4.312e+04 0.000 1.000 stddev\_roll\_belt -9.439e+01 1.708e+06 0.000 1.000 var\_roll\_belt 6.176e+00 1.642e+05 0.000 1.000 avg\_pitch\_belt -1.398e+01 1.418e+05 0.000 1.000 stddev\_pitch\_belt 2.683e+02 2.000e+06 0.000 1.000 var\_pitch\_belt -9.808e+01 6.833e+05 0.000 1.000 avg\_yaw\_belt 3.630e+01 1.475e+06 0.000 1.000 stddev\_yaw\_belt -2.057e+02 2.243e+06 0.000 1.000 var\_yaw\_belt 1.584e-01 5.367e+03 0.000 1.000 gyros\_belt\_x 1.753e+00 1.607e+05 0.000 1.000 gyros\_belt\_y 2.195e+02 4.206e+05 0.001 1.000 gyros\_belt\_z -2.904e+01 1.310e+05 0.000 1.000 accel\_belt\_x 3.496e-01 1.758e+03 0.000 1.000 accel\_belt\_y 7.420e-01 2.353e+03 0.000 1.000

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| accel\_belt\_z | -2.403e-02 | 2.343e+03 | 0.000 | 1.000 |
| magnet\_belt\_x | 3.766e-01 | 7.941e+02 | 0.000 | 1.000 |
| magnet\_belt\_y | 1.431e-01 | 1.516e+03 | 0.000 | 1.000 |
| magnet\_belt\_z | 3.060e-01 | 6.958e+02 | 0.000 | 1.000 |
| roll\_arm | -2.981e-02 | 1.211e+02 | 0.000 | 1.000 |
| pitch\_arm | -8.005e-01 | 8.714e+02 | -0.001 | 0.999 |
| yaw\_arm | -7.708e-03 | 1.841e+02 | 0.000 | 1.000 |
| total\_accel\_arm | -4.613e-01 | 2.165e+03 | 0.000 | 1.000 |
| var\_accel\_arm | 2.124e+00 | 1.331e+04 | 0.000 | 1.000 |
| avg\_roll\_arm | -3.244e-02 | 6.289e+03 | 0.000 | 1.000 |
| stddev\_roll\_arm | -2.489e+00 | 4.218e+04 | 0.000 | 1.000 |
| var\_roll\_arm | 6.343e-03 | 2.574e+02 | 0.000 | 1.000 |
| avg\_pitch\_arm | -8.205e+00 | 1.062e+05 | 0.000 | 1.000 |
| stddev\_pitch\_arm | -3.290e+01 | 3.973e+05 | 0.000 | 1.000 |
| var\_pitch\_arm | 2.911e-01 | 3.677e+03 | 0.000 | 1.000 |
| avg\_yaw\_arm | -2.145e+00 | 1.631e+04 | 0.000 | 1.000 |
| stddev\_yaw\_arm | -4.885e+00 | 5.553e+04 | 0.000 | 1.000 |
| var\_yaw\_arm | 1.409e-02 | 3.264e+02 | 0.000 | 1.000 |
| gyros\_arm\_x | -6.674e+00 | 2.568e+04 | 0.000 | 1.000 |
| gyros\_arm\_y | -1.575e+01 | 5.820e+04 | 0.000 | 1.000 |
| gyros\_arm\_z | 1.132e+01 | 2.980e+04 | 0.000 | 1.000 |
| accel\_arm\_x | -2.149e-01 | 5.207e+02 | 0.000 | 1.000 |
| accel\_arm\_y | 6.879e-01 | 7.116e+02 | 0.001 | 0.999 |
| accel\_arm\_z | -2.381e-01 | 3.828e+02 | -0.001 | 1.000 |
| magnet\_arm\_x | -5.615e-02 | 1.698e+02 | 0.000 | 1.000 |
| magnet\_arm\_y | -3.838e-01 | 4.520e+02 | -0.001 | 0.999 |
| magnet\_arm\_z | 6.498e-02 | 2.805e+02 | 0.000 | 1.000 |
| kurtosis\_roll\_arm | 2.298e+00 | 1.475e+04 | 0.000 | 1.000 |
| kurtosis\_picth\_arm | -2.025e-02 | 9.916e+03 | 0.000 | 1.000 |
| kurtosis\_yaw\_arm | -1.043e+00 | 1.703e+04 | 0.000 | 1.000 |
| skewness\_roll\_arm | -9.194e-01 | 1.852e+04 | 0.000 | 1.000 |
| skewness\_pitch\_arm | -1.525e+00 | 2.065e+04 | 0.000 | 1.000 |
| skewness\_yaw\_arm | -4.074e-01 | 1.177e+04 | 0.000 | 1.000 |
| max\_roll\_arm | 8.219e+02 | 2.250e+07 | 0.000 | 1.000 |
| max\_picth\_arm | -5.548e+02 | 2.652e+07 | 0.000 | 1.000 |
| max\_yaw\_arm | -7.559e+00 | 9.583e+04 | 0.000 | 1.000 |
| min\_roll\_arm | -8.105e+02 | 2.244e+07 | 0.000 | 1.000 |
| min\_pitch\_arm | 5.575e+02 | 2.652e+07 | 0.000 | 1.000 |
| min\_yaw\_arm | 1.055e+01 | 9.002e+04 | 0.000 | 1.000 |
| amplitude\_roll\_arm | -8.030e+02 | 2.238e+07 | 0.000 | 1.000 |
| amplitude\_pitch\_arm | 5.576e+02 | 2.652e+07 | 0.000 | 1.000 |
| amplitude\_yaw\_arm | NA | NA | NA | NA |
| roll\_dumbbell | 3.117e-01 | 6.437e+02 | 0.000 | 1.000 |
| pitch\_dumbbell | -6.753e-01 | 1.728e+03 | 0.000 | 1.000 |
| yaw\_dumbbell | 1.263e-01 | 4.711e+02 | 0.000 | 1.000 |
| kurtosis\_roll\_dumbbell | 1.012e+02 | 9.264e+06 | 0.000 | 1.000 |
| kurtosis\_picth\_dumbbell kurtosis\_yaw\_dumbbell | -8.040e-01  NA | 1.266e+05  NA | 0.000  NA | 1.000  NA |
| skewness\_roll\_dumbbell | -8.218e+01 | 9.959e+05 | 0.000 | 1.000 |
| skewness\_pitch\_dumbbell | -6.297e+01 | 7.874e+05 | 0.000 | 1.000 |
| skewness\_yaw\_dumbbell max\_roll\_dumbbell | NA  1.122e+03 | NA  9.951e+06 | NA  0.000 | NA  1.000 |
| max\_picth\_dumbbell | -2.243e+02 | 4.617e+06 | 0.000 | 1.000 |
| max\_yaw\_dumbbell | -8.495e+01 | 9.121e+06 | 0.000 | 1.000 |
| min\_roll\_dumbbell | -1.114e+03 | 9.887e+06 | 0.000 | 1.000 |
| min\_pitch\_dumbbell | 2.223e+02 | 4.614e+06 | 0.000 | 1.000 |
| min\_yaw\_dumbbell | NA | NA | NA | NA |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| amplitude\_roll\_dumbbell | -1.119e+03 | 9.932e+06 | 0.000 | 1.000 |
| amplitude\_pitch\_dumbbell | 2.190e+02 | 4.642e+06 | 0.000 | 1.000 |
| amplitude\_yaw\_dumbbell total\_accel\_dumbbell | NA  2.634e+00 | NA  8.124e+03 | NA  0.000 | NA  1.000 |
| var\_accel\_dumbbell | 9.387e-01 | 1.293e+04 | 0.000 | 1.000 |
| avg\_roll\_dumbbell | 3.209e-01 | 1.170e+04 | 0.000 | 1.000 |
| stddev\_roll\_dumbbell | 3.826e+00 | 1.714e+05 | 0.000 | 1.000 |
| var\_roll\_dumbbell | -6.532e-03 | 1.294e+03 | 0.000 | 1.000 |
| avg\_pitch\_dumbbell | -9.252e+00 | 9.790e+04 | 0.000 | 1.000 |
| stddev\_pitch\_dumbbell | 7.252e+00 | 2.285e+05 | 0.000 | 1.000 |
| var\_pitch\_dumbbell | -8.990e-02 | 3.544e+03 | 0.000 | 1.000 |
| avg\_yaw\_dumbbell | 2.326e+00 | 3.002e+04 | 0.000 | 1.000 |
| stddev\_yaw\_dumbbell | 8.080e+00 | 1.707e+05 | 0.000 | 1.000 |
| var\_yaw\_dumbbell | -1.969e-02 | 1.225e+03 | 0.000 | 1.000 |
| gyros\_dumbbell\_x | -2.620e+00 | 5.656e+04 | 0.000 | 1.000 |
| gyros\_dumbbell\_y | 2.166e+00 | 3.581e+04 | 0.000 | 1.000 |
| gyros\_dumbbell\_z | 1.283e+01 | 5.726e+04 | 0.000 | 1.000 |
| accel\_dumbbell\_x | 7.158e-01 | 1.706e+03 | 0.000 | 1.000 |
| accel\_dumbbell\_y | -2.493e-01 | 9.631e+02 | 0.000 | 1.000 |
| accel\_dumbbell\_z | -2.423e-01 | 1.084e+03 | 0.000 | 1.000 |
| magnet\_dumbbell\_x | -1.128e-01 | 3.596e+02 | 0.000 | 1.000 |
| magnet\_dumbbell\_y | -2.477e-02 | 5.858e+02 | 0.000 | 1.000 |
| magnet\_dumbbell\_z | 2.711e-03 | 7.102e+02 | 0.000 | 1.000 |
| roll\_forearm | -7.360e-03 | 1.904e+02 | 0.000 | 1.000 |
| pitch\_forearm | 9.473e-01 | 1.582e+03 | 0.001 | 1.000 |
| yaw\_forearm | 4.287e-02 | 1.896e+02 | 0.000 | 1.000 |
| kurtosis\_roll\_forearm | 7.332e+00 | 1.101e+05 | 0.000 | 1.000 |
| kurtosis\_picth\_forearm | 6.396e-01 | 1.035e+04 | 0.000 | 1.000 |
| kurtosis\_yaw\_forearm | NA | NA | NA | NA |
| skewness\_roll\_forearm | 5.414e-01 | 2.195e+04 | 0.000 | 1.000 |
| skewness\_pitch\_forearm skewness\_yaw\_forearm | 6.050e-01  NA | 1.714e+04  NA | 0.000  NA | 1.000  NA |
| max\_roll\_forearm | 7.359e+02 | 5.512e+06 | 0.000 | 1.000 |
| max\_picth\_forearm | -7.005e-01 | 1.555e+04 | 0.000 | 1.000 |
| max\_yaw\_forearm | -3.109e+01 | 4.583e+05 | 0.000 | 1.000 |
| min\_roll\_forearm | -7.347e+02 | 5.555e+06 | 0.000 | 1.000 |
| min\_pitch\_forearm | -1.021e+00 | 7.942e+03 | 0.000 | 1.000 |
| min\_yaw\_forearm | NA | NA | NA | NA |
| amplitude\_roll\_forearm amplitude\_pitch\_forearm | -7.491e+02  NA | 5.527e+06  NA | 0.000  NA | 1.000  NA |
| amplitude\_yaw\_forearm | -1.610e+02 | 1.679e+06 | 0.000 | 1.000 |
| total\_accel\_forearm | 8.335e-01 | 5.021e+03 | 0.000 | 1.000 |
| var\_accel\_forearm | -9.501e-01 | 1.683e+04 | 0.000 | 1.000 |
| avg\_roll\_forearm | -3.053e+00 | 3.370e+04 | 0.000 | 1.000 |
| stddev\_roll\_forearm | -9.505e-01 | 3.371e+04 | 0.000 | 1.000 |
| var\_roll\_forearm | 9.389e-03 | 2.038e+02 | 0.000 | 1.000 |
| avg\_pitch\_forearm | -2.479e+00 | 1.298e+05 | 0.000 | 1.000 |
| stddev\_pitch\_forearm | 6.353e+01 | 3.663e+05 | 0.000 | 1.000 |
| var\_pitch\_forearm | -1.023e+00 | 7.995e+03 | 0.000 | 1.000 |
| avg\_yaw\_forearm | 3.378e+00 | 4.000e+04 | 0.000 | 1.000 |
| stddev\_yaw\_forearm | -4.433e+00 | 8.123e+04 | 0.000 | 1.000 |
| var\_yaw\_forearm | 2.646e-02 | 3.863e+02 | 0.000 | 1.000 |
| gyros\_forearm\_x | 1.456e+01 | 5.911e+04 | 0.000 | 1.000 |
| gyros\_forearm\_y | -6.460e+00 | 1.369e+04 | 0.000 | 1.000 |
| gyros\_forearm\_z | 2.089e+01 | 3.623e+04 | 0.001 | 1.000 |
| accel\_forearm\_x | -1.600e-01 | 3.288e+02 | 0.000 | 1.000 |
| accel\_forearm\_y | -2.062e-01 | 5.004e+02 | 0.000 | 1.000 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| accel\_forearm\_z | -2.349e-01 | 5.413e+02 | 0.000 | 1.000 |
| magnet\_forearm\_x | 1.437e-01 | 1.610e+02 | 0.001 | 0.999 |
| magnet\_forearm\_y | 1.355e-02 | 1.972e+02 | 0.000 | 1.000 |
| magnet\_forearm\_z | 1.891e-01 | 1.861e+02 | 0.001 | 0.999 |

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 5.1382e+03 on 4003 degrees of freedom Residual deviance: 3.3492e-07 on 3859 degrees of freedom AIC: 290

Number of Fisher Scoring iterations: 25

> library(MASS)

> step\_fit <- stepAIC(fit,method='backward') Start: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z +

magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + amplitude\_yaw\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + kurtosis\_yaw\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + skewness\_yaw\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + min\_yaw\_forearm +

amplitude\_roll\_forearm + amplitude\_pitch\_forearm + amplitude\_yaw\_forearm

+

total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x +

gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y +

accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + amplitude\_yaw\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + kurtosis\_yaw\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + skewness\_yaw\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + min\_yaw\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z +

accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x +

magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z +

magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + amplitude\_yaw\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + kurtosis\_yaw\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + skewness\_yaw\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt +

kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + amplitude\_yaw\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + kurtosis\_yaw\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x +

gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y +

accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x +

magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + amplitude\_yaw\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm +

kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm +

max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + min\_yaw\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm +

kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm +

max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x +

accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y +

magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x +

magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + skewness\_yaw\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell +

stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x +

gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y +

accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + kurtosis\_yaw\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm +

kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm +

amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + amplitude\_yaw\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell + skewness\_pitch\_dumbbel

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max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm +

kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm +

max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x +

accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y +

magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + amplitude\_yaw\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z +

accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z +

magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell +

kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell + skewness\_pitch\_dumbbel

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max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm +

kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm +

max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + amplitude\_pitch\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x +

accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x + gyros\_arm\_y +

gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm +

kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + min\_yaw\_belt + amplitude\_roll\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt +

var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x + gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y +

magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm

+

skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm +

max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm +

min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell + skewness\_pitch\_dumbbel

l +

max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm +

kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm +

max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

Step: AIC=290

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + yaw\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + kurtosis\_yaw\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + skewness\_yaw\_belt + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + amplitude\_roll\_belt + var\_total\_accel\_be

lt +

avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x + accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x +

gyros\_arm\_y + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell +

kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell + skewness\_pitch\_dumbbel

l +

max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell +

gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm +

kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm +

max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x +

accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y +

magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - cvtd\_timestamp | 1 | 3.4004e-07 | 288 |
| - accel\_belt\_y | 1 | 3.4021e-07 | 288 |
| - accel\_dumbbell\_x | 1 | 3.4092e-07 | 288 |
| - raw\_timestamp\_part\_2 | 1 | 3.4122e-07 | 288 |
| - accel\_forearm\_y | 1 | 3.4157e-07 | 288 |
| - magnet\_belt\_z | 1 | 3.4178e-07 | 288 |
| - accel\_forearm\_x | 1 | 3.4188e-07 | 288 |
| - pitch\_dumbbell | 1 | 3.4196e-07 | 288 |
| - gyros\_forearm\_y | 1 | 3.4250e-07 | 288 |
| - gyros\_belt\_y | 1 | 3.4270e-07 | 288 |
| - raw\_timestamp\_part\_1 | 1 | 3.4273e-07 | 288 |
| - pitch\_forearm | 1 | 3.4273e-07 | 288 |
| - roll\_dumbbell | 1 | 3.4287e-07 | 288 |
| - accel\_forearm\_z | 1 | 3.4324e-07 | 288 |
| - accel\_arm\_x | 1 | 3.4466e-07 | 288 |
| - gyros\_forearm\_z | 1 | 3.4786e-07 | 288 |
| - accel\_arm\_z | 1 | 3.5030e-07 | 288 |
| - magnet\_forearm\_x | 1 | 3.5500e-07 | 288 |
| - magnet\_forearm\_z | 1 | 3.6029e-07 | 288 |
| - magnet\_arm\_y | 1 | 3.6940e-07 | 288 |
| - accel\_arm\_y | 1 | 3.7901e-07 | 288 |
| - pitch\_arm | 1 | 4.1144e-07 | 288 |
| - num\_window | 1 | 5.9629e-07 | 288 |
| - pitch\_belt | 1 | 1.0195e-06 | 288 |

<none> 3.3492e-07 290

Step: AIC=288

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + amplitude\_roll\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x +

accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm +

avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm +

stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x + gyros\_arm\_y +

gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z + roll\_forearm + pitch\_forearm + yaw\_forearm +

kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

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| --- | --- | --- | --- |
| - roll\_forearm | Df  1 | Deviance  3.3393e-07 | AIC  286 |
| - kurtosis\_picth\_arm | 1 | 3.3418e-07 | 286 |
| - var\_yaw\_dumbbell | 1 | 3.3420e-07 | 286 |
| - var\_roll\_dumbbell | 1 | 3.3420e-07 | 286 |
| - kurtosis\_roll\_dumbbell | 1 | 3.3420e-07 | 286 |
| - max\_yaw\_dumbbell | 1 | 3.3420e-07 | 286 |
| - stddev\_roll\_dumbbell | 1 | 3.3420e-07 | 286 |
| - stddev\_yaw\_dumbbell | 1 | 3.3420e-07 | 286 |
| - skewness\_roll\_forearm | 1 | 3.3420e-07 | 286 |
| - var\_pitch\_dumbbell | 1 | 3.3421e-07 | 286 |
| - var\_yaw\_arm | 1 | 3.3421e-07 | 286 |
| - avg\_roll\_belt | 1 | 3.3421e-07 | 286 |
| - avg\_roll\_dumbbell | 1 | 3.3421e-07 | 286 |
| - avg\_roll\_arm | 1 | 3.3421e-07 | 286 |
| - amplitude\_roll\_arm | 1 | 3.3422e-07 | 286 |
| - min\_roll\_arm | 1 | 3.3422e-07 | 286 |
| - max\_roll\_arm | 1 | 3.3422e-07 | 286 |
| - avg\_pitch\_forearm | 1 | 3.3422e-07 | 286 |
| - skewness\_roll\_arm | 1 | 3.3422e-07 | 286 |
| - var\_roll\_belt | 1 | 3.3422e-07 | 286 |
| - skewness\_pitch\_forearm | 1 | 3.3423e-07 | 286 |
| - stddev\_roll\_belt | 1 | 3.3423e-07 | 286 |
| - stddev\_pitch\_dumbbell | 1 | 3.3423e-07 | 286 |
| - skewness\_roll\_belt.1 | 1 | 3.3423e-07 | 286 |

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| --- | --- | --- | --- |
| - kurtosis\_roll\_forearm | 1 | 3.3423e-07 | 286 |
| - skewness\_pitch\_dumbbell | 1 | 3.3424e-07 | 286 |
| - min\_roll\_belt | 1 | 3.3424e-07 | 286 |
| - max\_yaw\_forearm | 1 | 3.3424e-07 | 286 |
| - max\_roll\_belt | 1 | 3.3424e-07 | 286 |
| - max\_picth\_belt | 1 | 3.3424e-07 | 286 |
| - kurtosis\_picth\_belt | 1 | 3.3424e-07 | 286 |
| - max\_picth\_arm | 1 | 3.3424e-07 | 286 |
| - avg\_yaw\_belt | 1 | 3.3424e-07 | 286 |
| - min\_pitch\_arm | 1 | 3.3424e-07 | 286 |
| - amplitude\_pitch\_arm | 1 | 3.3424e-07 | 286 |
| - avg\_pitch\_arm | 1 | 3.3424e-07 | 286 |
| - gyros\_dumbbell\_y | 1 | 3.3424e-07 | 286 |
| - var\_yaw\_belt | 1 | 3.3424e-07 | 286 |
| - kurtosis\_yaw\_arm | 1 | 3.3425e-07 | 286 |
| - max\_yaw\_belt | 1 | 3.3425e-07 | 286 |
| - kurtosis\_roll\_belt | 1 | 3.3425e-07 | 286 |
| - skewness\_yaw\_arm | 1 | 3.3425e-07 | 286 |
| - kurtosis\_picth\_dumbbell | 1 | 3.3425e-07 | 286 |
| - stddev\_pitch\_arm | 1 | 3.3425e-07 | 286 |
| - skewness\_pitch\_arm | 1 | 3.3425e-07 | 286 |
| - amplitude\_roll\_belt | 1 | 3.3426e-07 | 286 |
| - max\_picth\_forearm | 1 | 3.3426e-07 | 286 |
| - amplitude\_pitch\_dumbbell | 1 | 3.3426e-07 | 286 |
| - var\_roll\_arm | 1 | 3.3426e-07 | 286 |
| - min\_pitch\_dumbbell | 1 | 3.3426e-07 | 286 |
| - max\_picth\_dumbbell | 1 | 3.3426e-07 | 286 |
| - stddev\_yaw\_forearm | 1 | 3.3426e-07 | 286 |
| - avg\_pitch\_belt | 1 | 3.3427e-07 | 286 |
| - kurtosis\_picth\_forearm | 1 | 3.3427e-07 | 286 |
| - skewness\_roll\_dumbbell | 1 | 3.3427e-07 | 286 |
| - var\_total\_accel\_belt | 1 | 3.3427e-07 | 286 |
| - new\_window | 1 | 3.3427e-07 | 286 |
| - avg\_yaw\_forearm | 1 | 3.3427e-07 | 286 |
| - avg\_roll\_forearm | 1 | 3.3427e-07 | 286 |
| - stddev\_yaw\_arm | 1 | 3.3428e-07 | 286 |
| - var\_pitch\_arm | 1 | 3.3428e-07 | 286 |
| - var\_yaw\_forearm | 1 | 3.3428e-07 | 286 |
| - skewness\_roll\_belt | 1 | 3.3428e-07 | 286 |
| - stddev\_yaw\_belt | 1 | 3.3428e-07 | 286 |
| - avg\_yaw\_dumbbell | 1 | 3.3428e-07 | 286 |
| - stddev\_roll\_arm | 1 | 3.3429e-07 | 286 |
| - var\_accel\_forearm | 1 | 3.3429e-07 | 286 |
| - var\_accel\_dumbbell | 1 | 3.3429e-07 | 286 |
| - min\_pitch\_belt | 1 | 3.3430e-07 | 286 |
| - magnet\_dumbbell\_y | 1 | 3.3430e-07 | 286 |
| - stddev\_roll\_forearm | 1 | 3.3430e-07 | 286 |
| - var\_roll\_forearm | 1 | 3.3431e-07 | 286 |
| - avg\_pitch\_dumbbell | 1 | 3.3431e-07 | 286 |
| - amplitude\_roll\_dumbbell | 1 | 3.3431e-07 | 286 |
| - min\_roll\_dumbbell | 1 | 3.3431e-07 | 286 |
| - max\_roll\_dumbbell | 1 | 3.3431e-07 | 286 |
| - amplitude\_yaw\_forearm | 1 | 3.3432e-07 | 286 |
| - max\_yaw\_arm | 1 | 3.3432e-07 | 286 |
| - stddev\_pitch\_belt | 1 | 3.3433e-07 | 286 |
| - kurtosis\_roll\_arm | 1 | 3.3433e-07 | 286 |
| - var\_pitch\_belt | 1 | 3.3434e-07 | 286 |

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| --- | --- | --- | --- |
| - avg\_yaw\_arm | 1 | 3.3436e-07 | 286 |
| - var\_accel\_arm | 1 | 3.3436e-07 | 286 |
| - min\_pitch\_forearm | 1 | 3.3437e-07 | 286 |
| - var\_pitch\_forearm | 1 | 3.3438e-07 | 286 |
| - magnet\_dumbbell\_z | 1 | 3.3439e-07 | 286 |
| - min\_yaw\_arm | 1 | 3.3440e-07 | 286 |
| - min\_roll\_forearm | 1 | 3.3442e-07 | 286 |
| - max\_roll\_forearm | 1 | 3.3443e-07 | 286 |
| - yaw\_arm | 1 | 3.3443e-07 | 286 |
| - amplitude\_roll\_forearm | 1 | 3.3443e-07 | 286 |
| - stddev\_pitch\_forearm | 1 | 3.3444e-07 | 286 |
| - gyros\_belt\_x | 1 | 3.3456e-07 | 286 |
| - accel\_belt\_z | 1 | 3.3461e-07 | 286 |
| - gyros\_dumbbell\_x | 1 | 3.3509e-07 | 286 |
| - magnet\_dumbbell\_x | 1 | 3.3511e-07 | 286 |
| - gyros\_forearm\_x | 1 | 3.3533e-07 | 286 |
| - yaw\_forearm | 1 | 3.3547e-07 | 286 |
| - accel\_belt\_x | 1 | 3.3562e-07 | 286 |
| - total\_accel\_arm | 1 | 3.3582e-07 | 286 |
| - magnet\_belt\_y | 1 | 3.3606e-07 | 286 |
| - gyros\_dumbbell\_z | 1 | 3.3609e-07 | 286 |
| - gyros\_arm\_y | 1 | 3.3614e-07 | 286 |
| - gyros\_belt\_z | 1 | 3.3621e-07 | 286 |
| - roll\_arm | 1 | 3.3625e-07 | 286 |
| - magnet\_forearm\_y | 1 | 3.3636e-07 | 286 |
| - yaw\_dumbbell | 1 | 3.3649e-07 | 286 |
| - gyros\_arm\_x | 1 | 3.3658e-07 | 286 |
| - accel\_dumbbell\_z | 1 | 3.3697e-07 | 286 |
| - total\_accel\_forearm | 1 | 3.3718e-07 | 286 |
| - accel\_dumbbell\_y | 1 | 3.3734e-07 | 286 |
| - magnet\_arm\_z | 1 | 3.3734e-07 | 286 |
| - magnet\_arm\_x | 1 | 3.3763e-07 | 286 |
| - user\_name | 1 | 3.3774e-07 | 286 |
| - gyros\_arm\_z | 1 | 3.3788e-07 | 286 |
| - magnet\_belt\_x | 1 | 3.3798e-07 | 286 |
| - roll\_belt | 1 | 3.3844e-07 | 286 |
| - total\_accel\_belt | 1 | 3.3895e-07 | 286 |
| - cvtd\_timestamp | 1 | 3.3940e-07 | 286 |
| - accel\_belt\_y | 1 | 3.3987e-07 | 286 |
| - pitch\_belt | 1 | 3.3988e-07 | 286 |
| - total\_accel\_dumbbell | 1 | 3.4029e-07 | 286 |
| - raw\_timestamp\_part\_2 | 1 | 3.4090e-07 | 286 |
| - accel\_dumbbell\_x | 1 | 3.4192e-07 | 286 |
| - magnet\_belt\_z | 1 | 3.4210e-07 | 286 |
| - gyros\_belt\_y | 1 | 3.4214e-07 | 286 |
| - accel\_forearm\_x | 1 | 3.4216e-07 | 286 |
| - accel\_forearm\_y | 1 | 3.4217e-07 | 286 |
| - raw\_timestamp\_part\_1 | 1 | 3.4253e-07 | 286 |
| - accel\_forearm\_z | 1 | 3.4264e-07 | 286 |
| - roll\_dumbbell | 1 | 3.4268e-07 | 286 |
| - pitch\_dumbbell | 1 | 3.4269e-07 | 286 |
| - pitch\_forearm | 1 | 3.4316e-07 | 286 |
| - gyros\_forearm\_y | 1 | 3.4329e-07 | 286 |
| - accel\_arm\_x | 1 | 3.4429e-07 | 286 |
| - gyros\_forearm\_z | 1 | 3.4816e-07 | 286 |
| - accel\_arm\_z | 1 | 3.5009e-07 | 286 |
| - magnet\_forearm\_x | 1 | 3.5557e-07 | 286 |

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| --- | --- | --- | --- | --- |
| - magnet\_forearm\_z |  | 1 | 3.5892e-07 | 286 |
| - magnet\_arm\_y |  | 1 | 3.7165e-07 | 286 |
| - accel\_arm\_y |  | 1 | 3.8108e-07 | 286 |
| - pitch\_arm |  | 1 | 4.1084e-07 | 286 |
| - num\_window |  | 1 | 5.9675e-07 | 286 |
| <none> |  |  | 3.3424e-07 | 288 |

Step: AIC=286

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + amplitude\_roll\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x +

accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x + gyros\_arm\_y +

gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_picth\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm + min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell

+

skewness\_pitch\_dumbbell + max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell

+

var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z + magnet\_dumbbell\_x + magnet\_dumbbell\_y +

magnet\_dumbbell\_z + pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_forearm + skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm + max\_picth\_forearm + max\_yaw\_forearm +

min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm +

amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm +

gyros\_forearm\_x + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

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|  | Df | Deviance | AIC |
| - kurtosis\_picth\_arm | 1 | 3.3388e-07 | 284 |
| - var\_yaw\_dumbbell | 1 | 3.3388e-07 | 284 |
| - avg\_roll\_dumbbell | 1 | 3.3389e-07 | 284 |
| - stddev\_yaw\_dumbbell | 1 | 3.3390e-07 | 284 |

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| - max\_yaw\_dumbbell | 1 | 3.3390e-07 | 284 |
| - skewness\_pitch\_forearm | 1 | 3.3390e-07 | 284 |
| - kurtosis\_roll\_dumbbell | 1 | 3.3390e-07 | 284 |
| - var\_roll\_dumbbell | 1 | 3.3391e-07 | 284 |
| - skewness\_roll\_forearm | 1 | 3.3391e-07 | 284 |
| - var\_yaw\_arm | 1 | 3.3391e-07 | 284 |
| - stddev\_roll\_dumbbell | 1 | 3.3391e-07 | 284 |
| - avg\_roll\_arm | 1 | 3.3392e-07 | 284 |
| - var\_pitch\_dumbbell | 1 | 3.3392e-07 | 284 |
| - amplitude\_roll\_arm | 1 | 3.3392e-07 | 284 |
| - min\_roll\_arm | 1 | 3.3392e-07 | 284 |
| - max\_roll\_arm | 1 | 3.3392e-07 | 284 |
| - avg\_pitch\_forearm | 1 | 3.3392e-07 | 284 |
| - avg\_roll\_belt | 1 | 3.3393e-07 | 284 |
| - skewness\_roll\_arm | 1 | 3.3393e-07 | 284 |
| - magnet\_dumbbell\_y | 1 | 3.3393e-07 | 284 |
| - var\_roll\_belt | 1 | 3.3393e-07 | 284 |
| - stddev\_pitch\_dumbbell | 1 | 3.3393e-07 | 284 |
| - max\_picth\_arm | 1 | 3.3393e-07 | 284 |
| - min\_pitch\_arm | 1 | 3.3393e-07 | 284 |
| - amplitude\_pitch\_arm | 1 | 3.3393e-07 | 284 |
| - avg\_yaw\_belt | 1 | 3.3393e-07 | 284 |
| - max\_roll\_belt | 1 | 3.3394e-07 | 284 |
| - min\_roll\_belt | 1 | 3.3394e-07 | 284 |
| - var\_yaw\_belt | 1 | 3.3394e-07 | 284 |
| - stddev\_roll\_belt | 1 | 3.3394e-07 | 284 |
| - kurtosis\_roll\_forearm | 1 | 3.3394e-07 | 284 |
| - max\_yaw\_forearm | 1 | 3.3394e-07 | 284 |
| - max\_picth\_belt | 1 | 3.3394e-07 | 284 |
| - skewness\_roll\_belt.1 | 1 | 3.3394e-07 | 284 |
| - skewness\_yaw\_arm | 1 | 3.3394e-07 | 284 |
| - kurtosis\_picth\_belt | 1 | 3.3395e-07 | 284 |
| - skewness\_pitch\_dumbbell | 1 | 3.3395e-07 | 284 |
| - avg\_pitch\_arm | 1 | 3.3395e-07 | 284 |
| - kurtosis\_picth\_dumbbell | 1 | 3.3395e-07 | 284 |
| - max\_picth\_forearm | 1 | 3.3395e-07 | 284 |
| - amplitude\_roll\_belt | 1 | 3.3395e-07 | 284 |
| - kurtosis\_yaw\_arm | 1 | 3.3395e-07 | 284 |
| - kurtosis\_picth\_forearm | 1 | 3.3395e-07 | 284 |
| - max\_yaw\_belt | 1 | 3.3396e-07 | 284 |
| - kurtosis\_roll\_belt | 1 | 3.3396e-07 | 284 |
| - stddev\_pitch\_arm | 1 | 3.3396e-07 | 284 |
| - amplitude\_pitch\_dumbbell | 1 | 3.3396e-07 | 284 |
| - stddev\_yaw\_forearm | 1 | 3.3396e-07 | 284 |
| - min\_pitch\_dumbbell | 1 | 3.3396e-07 | 284 |
| - var\_roll\_arm | 1 | 3.3396e-07 | 284 |
| - max\_picth\_dumbbell | 1 | 3.3396e-07 | 284 |
| - skewness\_pitch\_arm | 1 | 3.3396e-07 | 284 |
| - avg\_pitch\_belt | 1 | 3.3397e-07 | 284 |
| - stddev\_yaw\_arm | 1 | 3.3397e-07 | 284 |
| - var\_pitch\_arm | 1 | 3.3397e-07 | 284 |
| - new\_window | 1 | 3.3397e-07 | 284 |
| - var\_accel\_forearm | 1 | 3.3397e-07 | 284 |
| - skewness\_roll\_dumbbell | 1 | 3.3397e-07 | 284 |
| - avg\_yaw\_forearm | 1 | 3.3397e-07 | 284 |
| - var\_total\_accel\_belt | 1 | 3.3398e-07 | 284 |
| - var\_yaw\_forearm | 1 | 3.3398e-07 | 284 |

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| - avg\_yaw\_dumbbell | 1 | 3.3398e-07 | 284 |
| - avg\_roll\_forearm | 1 | 3.3398e-07 | 284 |
| - skewness\_roll\_belt | 1 | 3.3398e-07 | 284 |
| - var\_accel\_dumbbell | 1 | 3.3399e-07 | 284 |
| - stddev\_roll\_arm | 1 | 3.3399e-07 | 284 |
| - stddev\_yaw\_belt | 1 | 3.3399e-07 | 284 |
| - stddev\_roll\_forearm | 1 | 3.3399e-07 | 284 |
| - min\_pitch\_belt | 1 | 3.3400e-07 | 284 |
| - var\_roll\_forearm | 1 | 3.3400e-07 | 284 |
| - gyros\_dumbbell\_y | 1 | 3.3400e-07 | 284 |
| - avg\_pitch\_dumbbell | 1 | 3.3401e-07 | 284 |
| - max\_yaw\_arm | 1 | 3.3401e-07 | 284 |
| - amplitude\_roll\_dumbbell | 1 | 3.3401e-07 | 284 |
| - min\_roll\_dumbbell | 1 | 3.3401e-07 | 284 |
| - max\_roll\_dumbbell | 1 | 3.3401e-07 | 284 |
| - amplitude\_yaw\_forearm | 1 | 3.3401e-07 | 284 |
| - stddev\_pitch\_belt | 1 | 3.3403e-07 | 284 |
| - kurtosis\_roll\_arm | 1 | 3.3404e-07 | 284 |
| - var\_pitch\_belt | 1 | 3.3405e-07 | 284 |
| - var\_accel\_arm | 1 | 3.3406e-07 | 284 |
| - avg\_yaw\_arm | 1 | 3.3406e-07 | 284 |
| - min\_pitch\_forearm | 1 | 3.3407e-07 | 284 |
| - var\_pitch\_forearm | 1 | 3.3407e-07 | 284 |
| - magnet\_dumbbell\_z | 1 | 3.3408e-07 | 284 |
| - min\_yaw\_arm | 1 | 3.3408e-07 | 284 |
| - gyros\_belt\_x | 1 | 3.3411e-07 | 284 |
| - min\_roll\_forearm | 1 | 3.3412e-07 | 284 |
| - max\_roll\_forearm | 1 | 3.3412e-07 | 284 |
| - amplitude\_roll\_forearm | 1 | 3.3412e-07 | 284 |
| - stddev\_pitch\_forearm | 1 | 3.3413e-07 | 284 |
| - yaw\_arm | 1 | 3.3430e-07 | 284 |
| - accel\_belt\_z | 1 | 3.3441e-07 | 284 |
| - gyros\_dumbbell\_x | 1 | 3.3482e-07 | 284 |
| - accel\_belt\_x | 1 | 3.3524e-07 | 284 |
| - magnet\_dumbbell\_x | 1 | 3.3536e-07 | 284 |
| - total\_accel\_arm | 1 | 3.3539e-07 | 284 |
| - gyros\_dumbbell\_z | 1 | 3.3542e-07 | 284 |
| - gyros\_belt\_z | 1 | 3.3576e-07 | 284 |
| - magnet\_belt\_y | 1 | 3.3581e-07 | 284 |
| - gyros\_forearm\_x | 1 | 3.3585e-07 | 284 |
| - magnet\_forearm\_y | 1 | 3.3595e-07 | 284 |
| - gyros\_arm\_x | 1 | 3.3598e-07 | 284 |
| - yaw\_forearm | 1 | 3.3612e-07 | 284 |
| - yaw\_dumbbell | 1 | 3.3613e-07 | 284 |
| - roll\_arm | 1 | 3.3620e-07 | 284 |
| - gyros\_arm\_y | 1 | 3.3626e-07 | 284 |
| - magnet\_arm\_z | 1 | 3.3651e-07 | 284 |
| - accel\_dumbbell\_z | 1 | 3.3669e-07 | 284 |
| - roll\_belt | 1 | 3.3682e-07 | 284 |
| - accel\_dumbbell\_y | 1 | 3.3707e-07 | 284 |
| - magnet\_arm\_x | 1 | 3.3730e-07 | 284 |
| - total\_accel\_forearm | 1 | 3.3731e-07 | 284 |
| - user\_name | 1 | 3.3779e-07 | 284 |
| - gyros\_arm\_z | 1 | 3.3821e-07 | 284 |
| - total\_accel\_belt | 1 | 3.3882e-07 | 284 |
| - magnet\_belt\_x | 1 | 3.3895e-07 | 284 |
| - pitch\_belt | 1 | 3.3927e-07 | 284 |

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| - cvtd\_timestamp | 1 | 3.3937e-07 | 284 |
| - accel\_belt\_y | 1 | 3.3955e-07 | 284 |
| - total\_accel\_dumbbell | 1 | 3.4013e-07 | 284 |
| - gyros\_belt\_y | 1 | 3.4196e-07 | 284 |
| - roll\_dumbbell | 1 | 3.4208e-07 | 284 |
| - accel\_dumbbell\_x | 1 | 3.4213e-07 | 284 |
| - accel\_forearm\_x | 1 | 3.4219e-07 | 284 |
| - raw\_timestamp\_part\_2 | 1 | 3.4238e-07 | 284 |
| - raw\_timestamp\_part\_1 | 1 | 3.4245e-07 | 284 |
| - accel\_forearm\_y | 1 | 3.4264e-07 | 284 |
| - magnet\_belt\_z | 1 | 3.4299e-07 | 284 |
| - pitch\_dumbbell | 1 | 3.4299e-07 | 284 |
| - gyros\_forearm\_y | 1 | 3.4304e-07 | 284 |
| - pitch\_forearm | 1 | 3.4345e-07 | 284 |
| - accel\_forearm\_z | 1 | 3.4411e-07 | 284 |
| - accel\_arm\_x | 1 | 3.4426e-07 | 284 |
| - gyros\_forearm\_z | 1 | 3.4803e-07 | 284 |
| - accel\_arm\_z | 1 | 3.5000e-07 | 284 |
| - magnet\_forearm\_x | 1 | 3.5696e-07 | 284 |
| - magnet\_forearm\_z | 1 | 3.6194e-07 | 284 |
| - magnet\_arm\_y | 1 | 3.7411e-07 | 284 |
| - accel\_arm\_y | 1 | 3.8271e-07 | 284 |
| - pitch\_arm | 1 | 4.1200e-07 | 284 |
| - num\_window | 1 | 6.0541e-07 | 284 |

<none> 3.3393e-07 286

Step: AIC=284

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 + cvtd\_timestamp + new\_window + num\_window + roll\_belt + pitch\_belt + total\_accel\_belt + kurtosis\_roll\_belt + kurtosis\_picth\_belt + skewness\_roll\_belt + skewness\_roll\_belt.1 + max\_roll\_belt + max\_picth\_belt + max\_yaw\_belt + min\_roll\_belt + min\_pitch\_belt + amplitude\_roll\_belt + var\_total\_accel\_belt + avg\_roll\_belt + stddev\_roll\_belt + var\_roll\_belt + avg\_pitch\_belt + stddev\_pitch\_belt + var\_pitch\_belt + avg\_yaw\_belt + stddev\_yaw\_belt + var\_yaw\_belt + gyros\_belt\_x + gyros\_belt\_y + gyros\_belt\_z + accel\_belt\_x +

accel\_belt\_y + accel\_belt\_z + magnet\_belt\_x + magnet\_belt\_y + magnet\_belt\_z + roll\_arm + pitch\_arm + yaw\_arm + total\_accel\_arm + var\_accel\_arm + avg\_roll\_arm + stddev\_roll\_arm + var\_roll\_arm + avg\_pitch\_arm + stddev\_pitch\_arm + var\_pitch\_arm + avg\_yaw\_arm + stddev\_yaw\_arm + var\_yaw\_arm + gyros\_arm\_x + gyros\_arm\_y +

gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + magnet\_arm\_z + kurtosis\_roll\_arm + kurtosis\_yaw\_arm + skewness\_roll\_arm + skewness\_pitch\_arm + skewness\_yaw\_arm + max\_roll\_arm + max\_picth\_arm + max\_yaw\_arm + min\_roll\_arm +

min\_pitch\_arm + min\_yaw\_arm + amplitude\_roll\_arm + amplitude\_pitch\_arm + roll\_dumbbell + pitch\_dumbbell + yaw\_dumbbell + kurtosis\_roll\_dumbbell + kurtosis\_picth\_dumbbell + skewness\_roll\_dumbbell + skewness\_pitch\_dumbbel

l +

max\_roll\_dumbbell + max\_picth\_dumbbell + max\_yaw\_dumbbell + min\_roll\_dumbbell + min\_pitch\_dumbbell + amplitude\_roll\_dumbbell + amplitude\_pitch\_dumbbell + total\_accel\_dumbbell + var\_accel\_dumbbell + avg\_roll\_dumbbell + stddev\_roll\_dumbbell + var\_roll\_dumbbell + avg\_pitch\_dumbbell + stddev\_pitch\_dumbbell + var\_pitch\_dumbbell + avg\_yaw\_dumbbell + stddev\_yaw\_dumbbell + var\_yaw\_dumbbell + gyros\_dumbbell\_x + gyros\_dumbbell\_y + gyros\_dumbbell\_z + accel\_dumbbell\_x + accel\_dumbbell\_y + accel\_dumbbell\_z +

magnet\_dumbbell\_x + magnet\_dumbbell\_y + magnet\_dumbbell\_z +

pitch\_forearm + yaw\_forearm + kurtosis\_roll\_forearm + kurtosis\_picth\_fore arm +

skewness\_roll\_forearm + skewness\_pitch\_forearm + max\_roll\_forearm +

max\_picth\_forearm + max\_yaw\_forearm + min\_roll\_forearm + min\_pitch\_forearm + amplitude\_roll\_forearm + amplitude\_yaw\_forearm + total\_accel\_forearm + var\_accel\_forearm + avg\_roll\_forearm + stddev\_roll\_forearm + var\_roll\_forearm + avg\_pitch\_forearm + stddev\_pitch\_forearm + var\_pitch\_forearm + avg\_yaw\_forearm + stddev\_yaw\_forearm + var\_yaw\_forearm + gyros\_forearm\_x +

gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y +

accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_y + magnet\_forearm\_z

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| - var\_yaw\_dumbbell | Df  1 | Deviance  3.3384e-07 | AIC  282 |
| - var\_roll\_dumbbell | 1 | 3.3385e-07 | 282 |
| - avg\_roll\_dumbbell | 1 | 3.3385e-07 | 282 |
| - avg\_pitch\_forearm | 1 | 3.3386e-07 | 282 |
| - avg\_yaw\_belt | 1 | 3.3387e-07 | 282 |
| - var\_pitch\_dumbbell | 1 | 3.3387e-07 | 282 |
| - max\_picth\_arm | 1 | 3.3387e-07 | 282 |
| - min\_pitch\_arm | 1 | 3.3387e-07 | 282 |
| - amplitude\_pitch\_arm | 1 | 3.3387e-07 | 282 |
| - magnet\_dumbbell\_y | 1 | 3.3387e-07 | 282 |
| - stddev\_pitch\_dumbbell | 1 | 3.3387e-07 | 282 |
| - stddev\_roll\_dumbbell | 1 | 3.3387e-07 | 282 |
| - avg\_roll\_belt | 1 | 3.3388e-07 | 282 |
| - var\_yaw\_belt | 1 | 3.3388e-07 | 282 |
| - skewness\_pitch\_forearm | 1 | 3.3388e-07 | 282 |
| - max\_picth\_belt | 1 | 3.3388e-07 | 282 |
| - var\_yaw\_arm | 1 | 3.3388e-07 | 282 |
| - amplitude\_pitch\_dumbbell | 1 | 3.3388e-07 | 282 |
| - skewness\_roll\_arm | 1 | 3.3389e-07 | 282 |
| - min\_pitch\_dumbbell | 1 | 3.3389e-07 | 282 |
| - max\_picth\_dumbbell | 1 | 3.3389e-07 | 282 |
| - max\_picth\_forearm | 1 | 3.3389e-07 | 282 |
| - max\_roll\_belt | 1 | 3.3389e-07 | 282 |
| - min\_roll\_belt | 1 | 3.3389e-07 | 282 |
| - var\_roll\_belt | 1 | 3.3389e-07 | 282 |
| - kurtosis\_picth\_dumbbell | 1 | 3.3389e-07 | 282 |
| - max\_yaw\_dumbbell | 1 | 3.3390e-07 | 282 |
| - kurtosis\_roll\_dumbbell | 1 | 3.3390e-07 | 282 |
| - stddev\_yaw\_dumbbell | 1 | 3.3390e-07 | 282 |
| - skewness\_yaw\_arm | 1 | 3.3390e-07 | 282 |
| - skewness\_roll\_forearm | 1 | 3.3390e-07 | 282 |
| - max\_yaw\_belt | 1 | 3.3390e-07 | 282 |
| - kurtosis\_roll\_belt | 1 | 3.3390e-07 | 282 |
| - amplitude\_roll\_belt | 1 | 3.3390e-07 | 282 |
| - stddev\_yaw\_forearm | 1 | 3.3390e-07 | 282 |
| - var\_roll\_arm | 1 | 3.3391e-07 | 282 |
| - avg\_roll\_arm | 1 | 3.3391e-07 | 282 |
| - stddev\_roll\_belt | 1 | 3.3391e-07 | 282 |
| - kurtosis\_yaw\_arm | 1 | 3.3391e-07 | 282 |
| - avg\_pitch\_arm | 1 | 3.3392e-07 | 282 |
| - kurtosis\_roll\_forearm | 1 | 3.3392e-07 | 282 |
| - skewness\_pitch\_dumbbell | 1 | 3.3392e-07 | 282 |
| - stddev\_yaw\_arm | 1 | 3.3392e-07 | 282 |

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| - max\_yaw\_forearm | 1 | 3.3392e-07 | 282 |
| - kurtosis\_picth\_forearm | 1 | 3.3392e-07 | 282 |
| - var\_accel\_dumbbell | 1 | 3.3393e-07 | 282 |
| - avg\_yaw\_forearm | 1 | 3.3393e-07 | 282 |
| - skewness\_roll\_belt.1 | 1 | 3.3393e-07 | 282 |
| - stddev\_roll\_forearm | 1 | 3.3394e-07 | 282 |
| - stddev\_yaw\_belt | 1 | 3.3394e-07 | 282 |
| - avg\_roll\_forearm | 1 | 3.3394e-07 | 282 |
| - var\_roll\_forearm | 1 | 3.3394e-07 | 282 |
| - gyros\_dumbbell\_y | 1 | 3.3394e-07 | 282 |
| - var\_pitch\_arm | 1 | 3.3394e-07 | 282 |
| - stddev\_pitch\_arm | 1 | 3.3395e-07 | 282 |
| - kurtosis\_picth\_belt | 1 | 3.3395e-07 | 282 |
| - var\_yaw\_forearm | 1 | 3.3396e-07 | 282 |
| - amplitude\_roll\_dumbbell | 1 | 3.3396e-07 | 282 |
| - min\_roll\_dumbbell | 1 | 3.3396e-07 | 282 |
| - max\_roll\_dumbbell | 1 | 3.3396e-07 | 282 |
| - skewness\_roll\_belt | 1 | 3.3396e-07 | 282 |
| - skewness\_roll\_dumbbell | 1 | 3.3397e-07 | 282 |
| - max\_yaw\_arm | 1 | 3.3397e-07 | 282 |
| - avg\_pitch\_dumbbell | 1 | 3.3397e-07 | 282 |
| - amplitude\_yaw\_forearm | 1 | 3.3397e-07 | 282 |
| - min\_pitch\_belt | 1 | 3.3397e-07 | 282 |
| - avg\_yaw\_dumbbell | 1 | 3.3397e-07 | 282 |
| - new\_window | 1 | 3.3399e-07 | 282 |
| - skewness\_pitch\_arm | 1 | 3.3399e-07 | 282 |
| - avg\_pitch\_belt | 1 | 3.3399e-07 | 282 |
| - var\_pitch\_belt | 1 | 3.3400e-07 | 282 |
| - stddev\_pitch\_belt | 1 | 3.3402e-07 | 282 |
| - magnet\_dumbbell\_z | 1 | 3.3402e-07 | 282 |
| - min\_yaw\_arm | 1 | 3.3403e-07 | 282 |
| - avg\_yaw\_arm | 1 | 3.3404e-07 | 282 |
| - min\_pitch\_forearm | 1 | 3.3404e-07 | 282 |
| - var\_pitch\_forearm | 1 | 3.3405e-07 | 282 |
| - gyros\_belt\_x | 1 | 3.3406e-07 | 282 |
| - var\_accel\_arm | 1 | 3.3407e-07 | 282 |
| - stddev\_pitch\_forearm | 1 | 3.3411e-07 | 282 |
| - yaw\_arm | 1 | 3.3425e-07 | 282 |
| - var\_accel\_forearm | 1 | 3.3428e-07 | 282 |
| - accel\_belt\_z | 1 | 3.3435e-07 | 282 |
| - min\_roll\_forearm | 1 | 3.3435e-07 | 282 |
| - max\_roll\_forearm | 1 | 3.3443e-07 | 282 |
| - amplitude\_roll\_forearm | 1 | 3.3470e-07 | 282 |
| - gyros\_dumbbell\_x | 1 | 3.3476e-07 | 282 |
| - accel\_belt\_x | 1 | 3.3518e-07 | 282 |
| - magnet\_dumbbell\_x | 1 | 3.3530e-07 | 282 |
| - total\_accel\_arm | 1 | 3.3533e-07 | 282 |
| - gyros\_dumbbell\_z | 1 | 3.3538e-07 | 282 |
| - var\_total\_accel\_belt | 1 | 3.3561e-07 | 282 |
| - gyros\_belt\_z | 1 | 3.3571e-07 | 282 |
| - magnet\_belt\_y | 1 | 3.3576e-07 | 282 |
| - gyros\_forearm\_x | 1 | 3.3582e-07 | 282 |
| - magnet\_forearm\_y | 1 | 3.3590e-07 | 282 |
| - gyros\_arm\_x | 1 | 3.3595e-07 | 282 |
| - yaw\_forearm | 1 | 3.3606e-07 | 282 |
| - yaw\_dumbbell | 1 | 3.3606e-07 | 282 |
| - roll\_arm | 1 | 3.3616e-07 | 282 |

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| - gyros\_arm\_y | 1 | 3.3623e-07 | 282 |
| - roll\_belt | 1 | 3.3642e-07 | 282 |
| - magnet\_arm\_z | 1 | 3.3645e-07 | 282 |
| - accel\_dumbbell\_z | 1 | 3.3661e-07 | 282 |
| - accel\_dumbbell\_y | 1 | 3.3700e-07 | 282 |
| - total\_accel\_forearm | 1 | 3.3726e-07 | 282 |
| - magnet\_arm\_x | 1 | 3.3727e-07 | 282 |
| - user\_name | 1 | 3.3775e-07 | 282 |
| - gyros\_arm\_z | 1 | 3.3821e-07 | 282 |
| - total\_accel\_belt | 1 | 3.3876e-07 | 282 |
| - magnet\_belt\_x | 1 | 3.3890e-07 | 282 |
| - pitch\_belt | 1 | 3.3923e-07 | 282 |
| - cvtd\_timestamp | 1 | 3.3931e-07 | 282 |
| - accel\_belt\_y | 1 | 3.3949e-07 | 282 |
| - total\_accel\_dumbbell | 1 | 3.4009e-07 | 282 |
| - kurtosis\_roll\_arm | 1 | 3.4040e-07 | 282 |
| - gyros\_belt\_y | 1 | 3.4193e-07 | 282 |
| - roll\_dumbbell | 1 | 3.4200e-07 | 282 |
| - accel\_dumbbell\_x | 1 | 3.4209e-07 | 282 |
| - accel\_forearm\_x | 1 | 3.4215e-07 | 282 |
| - raw\_timestamp\_part\_2 | 1 | 3.4233e-07 | 282 |
| - raw\_timestamp\_part\_1 | 1 | 3.4244e-07 | 282 |
| - accel\_forearm\_y | 1 | 3.4256e-07 | 282 |
| - magnet\_belt\_z | 1 | 3.4289e-07 | 282 |
| - pitch\_dumbbell | 1 | 3.4293e-07 | 282 |
| - gyros\_forearm\_y | 1 | 3.4300e-07 | 282 |
| - pitch\_forearm | 1 | 3.4343e-07 | 282 |
| - accel\_forearm\_z | 1 | 3.4409e-07 | 282 |
| - accel\_arm\_x | 1 | 3.4420e-07 | 282 |
| - gyros\_forearm\_z | 1 | 3.4797e-07 | 282 |
| - accel\_arm\_z | 1 | 3.4996e-07 | 282 |
| - magnet\_forearm\_x | 1 | 3.5690e-07 | 282 |
| - magnet\_forearm\_z | 1 | 3.6191e-07 | 282 |
| - amplitude\_roll\_arm | 1 | 3.7097e-07 | 282 |
| - magnet\_arm\_y | 1 | 3.7403e-07 | 282 |
| - accel\_arm\_y | 1 | 3.8267e-07 | 282 |
| - min\_roll\_arm | 1 | 3.8518e-07 | 282 |
| - pitch\_arm | 1 | 4.1200e-07 | 282 |
| - max\_roll\_arm | 1 | 4.8987e-07 | 282 |
| - num\_window | 1 | 6.0541e-07 | 282 |
| - stddev\_roll\_arm | 1 | 6.7660e-07 | 282 |
| <none> |  | 3.3388e-07 | 284 |

|  |  |  |  |
| --- | --- | --- | --- |
| - raw\_timestamp\_part\_2 | 1 | 0.00 | 66.00 |
| - user\_name | 1 | 0.00 | 66.00 |
| - pitch\_forearm | 1 | 0.00 | 66.00 |
| - magnet\_arm\_x | 1 | 0.00 | 66.00 |
| - accel\_forearm\_z | 1 | 0.00 | 66.00 |
| - total\_accel\_arm | 1 | 0.00 | 66.00 |
| - accel\_arm\_x | 1 | 0.00 | 66.00 |
| - total\_accel\_belt | 1 | 0.00 | 66.00 |
| - pitch\_dumbbell | 1 | 0.00 | 66.00 |
| - roll\_belt | 1 | 0.00 | 66.00 |
| - accel\_arm\_z | 1 | 0.00 | 66.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 66.00 |
| - magnet\_belt\_z | 1 | 0.00 | 66.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 66.00 |

|  |  |  |  |
| --- | --- | --- | --- |
| - gyros\_arm\_z | 1 | 0.00 | 66.00 |
| - accel\_forearm\_y | 1 | 0.00 | 66.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 66.00 |
| - accel\_forearm\_x | 1 | 0.00 | 66.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 66.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 66.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 66.00 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 66.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 66.00 |
| - pitch\_arm | 1 | 0.00 | 66.00 |
| - accel\_arm\_y | 1 | 0.00 | 66.00 |
| - magnet\_arm\_y | 1 | 0.00 | 66.00 |
| <none> |  | 0.00 | 68.00 |
| - num\_window | 1 | 364.03 | 430.03 |
| Step: AIC=66 |  |  |  |

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 +

num\_window + roll\_belt + pitch\_belt + total\_accel\_belt + accel\_belt\_y + magnet\_belt\_x + magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z +

accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_belt\_y | Df  1 | Deviance  0.00 | AIC  64.00 |
| - raw\_timestamp\_part\_2 | 1 | 0.00 | 64.00 |
| - roll\_dumbbell | 1 | 0.00 | 64.00 |
| - magnet\_belt\_x | 1 | 0.00 | 64.00 |
| - pitch\_belt | 1 | 0.00 | 64.00 |
| - user\_name | 1 | 0.00 | 64.00 |
| - pitch\_forearm | 1 | 0.00 | 64.00 |
| - accel\_forearm\_z | 1 | 0.00 | 64.00 |
| - magnet\_arm\_x | 1 | 0.00 | 64.00 |
| - accel\_arm\_x | 1 | 0.00 | 64.00 |
| - total\_accel\_arm | 1 | 0.00 | 64.00 |
| - gyros\_dumbbell\_z | 1 | 0.00 | 64.00 |
| - pitch\_dumbbell | 1 | 0.00 | 64.00 |
| - total\_accel\_belt | 1 | 0.00 | 64.00 |
| - roll\_belt | 1 | 0.00 | 64.00 |
| - magnet\_belt\_z | 1 | 0.00 | 64.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 64.00 |
| - accel\_arm\_z | 1 | 0.00 | 64.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 64.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 64.00 |
| - accel\_forearm\_y | 1 | 0.00 | 64.00 |
| - accel\_forearm\_x | 1 | 0.00 | 64.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 64.00 |
| - gyros\_arm\_z | 1 | 0.00 | 64.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 64.00 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 64.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 64.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 64.00 |
| - pitch\_arm | 1 | 0.00 | 64.00 |
| - accel\_arm\_y | 1 | 0.00 | 64.00 |

|  |  |  |  |
| --- | --- | --- | --- |
| - magnet\_arm\_y | 1 | 0.00 | 64.00 |
| <none> |  | 0.00 | 66.00 |
| - num\_window  Step: AIC=64 | 1 | 364.24 | 428.24 |

classe ~ user\_name + raw\_timestamp\_part\_1 + raw\_timestamp\_part\_2 +

num\_window + roll\_belt + pitch\_belt + total\_accel\_belt + magnet\_belt\_x + magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z + accel\_dumbbell\_x + magnet\_dumbbell\_x +

pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x +

accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - raw\_timestamp\_part\_2 | Df  1 | Deviance  0.00 | AIC  62.00 |
| - magnet\_belt\_x | 1 | 0.00 | 62.00 |
| - roll\_dumbbell | 1 | 0.00 | 62.00 |
| - pitch\_belt | 1 | 0.00 | 62.00 |
| - pitch\_forearm | 1 | 0.00 | 62.00 |
| - user\_name | 1 | 0.00 | 62.00 |
| - accel\_arm\_x | 1 | 0.00 | 62.00 |
| - magnet\_arm\_x | 1 | 0.00 | 62.00 |
| - total\_accel\_arm | 1 | 0.00 | 62.00 |
| - accel\_forearm\_z | 1 | 0.00 | 62.00 |
| - total\_accel\_belt | 1 | 0.00 | 62.00 |
| - pitch\_dumbbell | 1 | 0.00 | 62.00 |
| - gyros\_dumbbell\_z | 1 | 0.00 | 62.00 |
| - roll\_belt | 1 | 0.00 | 62.00 |
| - magnet\_belt\_z | 1 | 0.00 | 62.00 |
| - accel\_arm\_z | 1 | 0.00 | 62.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 62.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 62.00 |
| - accel\_forearm\_y | 1 | 0.00 | 62.00 |
| - accel\_forearm\_x | 1 | 0.00 | 62.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 62.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 62.00 |
| - gyros\_arm\_z | 1 | 0.00 | 62.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 62.00 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 62.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 62.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 62.00 |
| - pitch\_arm | 1 | 0.00 | 62.00 |
| - accel\_arm\_y | 1 | 0.00 | 62.00 |
| - magnet\_arm\_y | 1 | 0.00 | 62.00 |
| <none> |  | 0.00 | 64.00 |
| - num\_window | 1 | 379.83 | 441.83 |
| Step: AIC=62 |  |  |  |

classe ~ user\_name + raw\_timestamp\_part\_1 + num\_window + roll\_belt +

pitch\_belt + total\_accel\_belt + magnet\_belt\_x + magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y +

roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z

+

accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y +

gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z +

magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - pitch\_belt | Df  1 | Deviance  0.0 | AIC  60.0 |
| - roll\_dumbbell | 1 | 0.0 | 60.0 |
| - user\_name | 1 | 0.0 | 60.0 |
| - magnet\_belt\_x | 1 | 0.0 | 60.0 |
| - pitch\_forearm | 1 | 0.0 | 60.0 |
| - total\_accel\_belt | 1 | 0.0 | 60.0 |
| - magnet\_arm\_x | 1 | 0.0 | 60.0 |
| - accel\_forearm\_z | 1 | 0.0 | 60.0 |
| - pitch\_dumbbell | 1 | 0.0 | 60.0 |
| - accel\_arm\_x | 1 | 0.0 | 60.0 |
| - total\_accel\_arm | 1 | 0.0 | 60.0 |
| - roll\_belt | 1 | 0.0 | 60.0 |
| - magnet\_belt\_z | 1 | 0.0 | 60.0 |
| - total\_accel\_dumbbell | 1 | 0.0 | 60.0 |
| - accel\_dumbbell\_x | 1 | 0.0 | 60.0 |
| - gyros\_dumbbell\_z | 1 | 0.0 | 60.0 |
| - accel\_arm\_z | 1 | 0.0 | 60.0 |
| - magnet\_dumbbell\_x | 1 | 0.0 | 60.0 |
| - magnet\_forearm\_x | 1 | 0.0 | 60.0 |
| - accel\_forearm\_x | 1 | 0.0 | 60.0 |
| - gyros\_arm\_z | 1 | 0.0 | 60.0 |
| - accel\_forearm\_y | 1 | 0.0 | 60.0 |
| - raw\_timestamp\_part\_1 | 1 | 0.0 | 60.0 |
| - gyros\_forearm\_z | 1 | 0.0 | 60.0 |
| - magnet\_forearm\_z | 1 | 0.0 | 60.0 |
| - gyros\_forearm\_y | 1 | 0.0 | 60.0 |
| - pitch\_arm | 1 | 0.0 | 60.0 |
| - accel\_arm\_y | 1 | 0.0 | 60.0 |
| - magnet\_arm\_y | 1 | 0.0 | 60.0 |
| <none> |  | 0.0 | 62.0 |
| - num\_window | 1 | 384.5 | 444.5 |
| Step: AIC=60 |  |  |  |

classe ~ user\_name + raw\_timestamp\_part\_1 + num\_window + roll\_belt +

total\_accel\_belt + magnet\_belt\_x + magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z +

accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - user\_name | Df  1 | Deviance  0.00 | AIC  58.00 |
| - magnet\_belt\_x | 1 | 0.00 | 58.00 |
| - roll\_dumbbell | 1 | 0.00 | 58.00 |
| - total\_accel\_belt | 1 | 0.00 | 58.00 |
| - pitch\_dumbbell | 1 | 0.00 | 58.00 |
| - magnet\_arm\_x | 1 | 0.00 | 58.00 |
| - pitch\_forearm | 1 | 0.00 | 58.00 |
| - accel\_forearm\_z | 1 | 0.00 | 58.00 |
| - magnet\_belt\_z | 1 | 0.00 | 58.00 |
| - total\_accel\_arm | 1 | 0.00 | 58.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 58.00 |

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_arm\_x | 1 | 0.00 | 58.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 58.00 |
| - roll\_belt | 1 | 0.00 | 58.00 |
| - gyros\_dumbbell\_z | 1 | 0.00 | 58.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 58.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 58.00 |
| - accel\_forearm\_x | 1 | 0.00 | 58.00 |
| - accel\_arm\_z | 1 | 0.00 | 58.00 |
| - accel\_forearm\_y | 1 | 0.00 | 58.00 |
| - gyros\_arm\_z | 1 | 0.00 | 58.00 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 58.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 58.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 58.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 58.00 |
| - pitch\_arm | 1 | 0.00 | 58.00 |
| - accel\_arm\_y | 1 | 0.00 | 58.00 |
| - magnet\_arm\_y | 1 | 0.00 | 58.00 |
| <none> |  | 0.00 | 60.00 |
| - num\_window | 1 | 559.11 | 617.11 |

Step: AIC=58

classe ~ raw\_timestamp\_part\_1 + num\_window + roll\_belt + total\_accel\_belt + magnet\_belt\_x + magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x + magnet\_arm\_y + roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z + accel\_dumbbell\_x + magnet\_dumbbell\_x +

pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x +

accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - magnet\_belt\_x | Df  1 | Deviance  0.00 | AIC  56.00 |
| - roll\_dumbbell | 1 | 0.00 | 56.00 |
| - pitch\_forearm | 1 | 0.00 | 56.00 |
| - accel\_forearm\_z | 1 | 0.00 | 56.00 |
| - pitch\_dumbbell | 1 | 0.00 | 56.00 |
| - magnet\_belt\_z | 1 | 0.00 | 56.00 |
| - magnet\_arm\_x | 1 | 0.00 | 56.00 |
| - total\_accel\_belt | 1 | 0.00 | 56.00 |
| - total\_accel\_arm | 1 | 0.00 | 56.00 |
| - accel\_arm\_x | 1 | 0.00 | 56.00 |
| - gyros\_dumbbell\_z | 1 | 0.00 | 56.00 |
| - roll\_belt | 1 | 0.00 | 56.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 56.00 |
| - accel\_forearm\_y | 1 | 0.00 | 56.00 |
| - accel\_arm\_z | 1 | 0.00 | 56.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 56.00 |
| - accel\_forearm\_x | 1 | 0.00 | 56.00 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 56.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 56.00 |
| - gyros\_arm\_z | 1 | 0.00 | 56.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 56.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 56.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 56.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 56.00 |
| - accel\_arm\_y | 1 | 0.00 | 56.00 |
| - pitch\_arm | 1 | 0.00 | 56.00 |
| - magnet\_arm\_y | 1 | 0.00 | 56.00 |

|  |  |  |
| --- | --- | --- |
| <none> |  | 0.00 58.00 |
| - num\_window | 1 | 873.48 929.48 |

Step: AIC=56

classe ~ raw\_timestamp\_part\_1 + num\_window + roll\_belt + total\_accel\_belt +

magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z +

accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x +

magnet\_arm\_y + roll\_dumbbell + pitch\_dumbbell + total\_accel\_dumbbell +

gyros\_dumbbell\_z + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - roll\_dumbbell | Df  1 | Deviance  0.00 | AIC  54.0 |
| - pitch\_forearm | 1 | 0.00 | 54.0 |
| - magnet\_belt\_z | 1 | 0.00 | 54.0 |
| - magnet\_arm\_x | 1 | 0.00 | 54.0 |
| - accel\_forearm\_z | 1 | 0.00 | 54.0 |
| - pitch\_dumbbell | 1 | 0.00 | 54.0 |
| - total\_accel\_belt | 1 | 0.00 | 54.0 |
| - accel\_arm\_x | 1 | 0.00 | 54.0 |
| - total\_accel\_arm | 1 | 0.00 | 54.0 |
| - gyros\_dumbbell\_z | 1 | 0.00 | 54.0 |
| - roll\_belt | 1 | 0.00 | 54.0 |
| - magnet\_forearm\_x | 1 | 0.00 | 54.0 |
| - accel\_forearm\_y | 1 | 0.00 | 54.0 |
| - accel\_arm\_z | 1 | 0.00 | 54.0 |
| - accel\_dumbbell\_x | 1 | 0.00 | 54.0 |
| - accel\_forearm\_x | 1 | 0.00 | 54.0 |
| - total\_accel\_dumbbell | 1 | 0.00 | 54.0 |
| - gyros\_forearm\_z | 1 | 0.00 | 54.0 |
| - gyros\_arm\_z | 1 | 0.00 | 54.0 |
| - magnet\_forearm\_z | 1 | 0.00 | 54.0 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 54.0 |
| - gyros\_forearm\_y | 1 | 0.00 | 54.0 |
| - raw\_timestamp\_part\_1 | 1 | 0.00 | 54.0 |
| - accel\_arm\_y | 1 | 0.00 | 54.0 |
| - pitch\_arm | 1 | 0.00 | 54.0 |
| - magnet\_arm\_y | 1 | 0.00 | 54.0 |
| <none> |  | 0.00 | 56.0 |
| - num\_window | 1 | 995.31 | 1049.3 |

Step: AIC=54

classe ~ raw\_timestamp\_part\_1 + num\_window + roll\_belt + total\_accel\_belt +

magnet\_belt\_z + pitch\_arm + total\_accel\_arm + gyros\_arm\_z +

accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_x +

magnet\_arm\_y + pitch\_dumbbell + total\_accel\_dumbbell + gyros\_dumbbell\_z + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + accel\_forearm\_y + accel\_forearm\_z + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| - pitch\_dumbbell | 1 | 0 | 52 |
| - magnet\_arm\_x | 1 | 0 | 52 |
| - pitch\_forearm | 1 | 0 | 52 |
| - accel\_forearm\_z | 1 | 0 | 52 |
| - total\_accel\_belt | 1 | 0 | 52 |

|  |  |  |  |
| --- | --- | --- | --- |
| - magnet\_belt\_z | 1 | 0 | 52 |
| - gyros\_dumbbell\_z | 1 | 0 | 52 |
| - total\_accel\_arm | 1 | 0 | 52 |
| - accel\_arm\_x | 1 | 0 | 52 |
| - roll\_belt | 1 | 0 | 52 |
| - magnet\_forearm\_x | 1 | 0 | 52 |
| - accel\_forearm\_y | 1 | 0 | 52 |
| - accel\_dumbbell\_x | 1 | 0 | 52 |
| - accel\_forearm\_x | 1 | 0 | 52 |
| - accel\_arm\_z | 1 | 0 | 52 |
| - total\_accel\_dumbbell | 1 | 0 | 52 |
| - gyros\_forearm\_z | 1 | 0 | 52 |
| - magnet\_forearm\_z | 1 | 0 | 52 |
| - gyros\_arm\_z | 1 | 0 | 52 |
| - magnet\_dumbbell\_x | 1 | 0 | 52 |
| - gyros\_forearm\_y | 1 | 0 | 52 |
| - raw\_timestamp\_part\_1 | 1 | 0 | 52 |
| - pitch\_arm | 1 | 0 | 52 |
| - accel\_arm\_y | 1 | 0 | 52 |
| - magnet\_arm\_y | 1 | 0 | 52 |
| <none> |  | 0 | 54 |
| - num\_window | 1 | 1062 | 1114 |
| - num\_window | 1 | 1952.44 | 1988.44 |

Step: AIC=36

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + accel\_arm\_z + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_arm\_z | Df  1 | Deviance  0.00 | AIC  34.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 34.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 34.00 |
| - accel\_forearm\_x | 1 | 0.00 | 34.00 |
| - gyros\_arm\_z | 1 | 0.00 | 34.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 34.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 34.00 |
| - accel\_arm\_y | 1 | 0.00 | 34.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 34.00 |
| - pitch\_forearm | 1 | 0.00 | 34.00 |
| - pitch\_arm | 1 | 0.00 | 34.00 |
| - magnet\_arm\_y | 1 | 0.00 | 34.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 34.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 34.00 |
| - accel\_arm\_x | 1 | 0.00 | 34.00 |
| <none> |  | 0.00 | 36.00 |
| - raw\_timestamp\_part\_1 | 1 | 363.71 | 397.71 |
| - num\_window | 1 | 2159.60 | 2193.60 |

Step: AIC=34

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + gyros\_arm\_z + accel\_arm\_x + accel\_arm\_y + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - gyros\_arm\_z | 1 | 0.00 | 32.00 |
| - accel\_arm\_y | 1 | 0.00 | 32.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 32.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 32.00 |
| - pitch\_forearm | 1 | 0.00 | 32.00 |
| - accel\_forearm\_x | 1 | 0.00 | 32.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 32.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 32.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 32.00 |
| - pitch\_arm | 1 | 0.00 | 32.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 32.00 |
| - magnet\_arm\_y | 1 | 0.00 | 32.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 32.00 |
| - accel\_arm\_x | 1 | 0.00 | 32.00 |
| <none> |  | 0.00 | 34.00 |
| - raw\_timestamp\_part\_1 | 1 | 363.71 | 395.71 |
| - num\_window | 1 | 2226.35 | 2258.35 |

Step: AIC=32

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + accel\_arm\_y + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_arm\_y | Df  1 | Deviance  0.00 | AIC  30.00 |
| - magnet\_forearm\_z | 1 | 0.00 | 30.00 |
| - pitch\_forearm | 1 | 0.00 | 30.00 |
| - magnet\_forearm\_x | 1 | 0.00 | 30.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 30.00 |
| - accel\_forearm\_x | 1 | 0.00 | 30.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 30.00 |
| - pitch\_arm | 1 | 0.00 | 30.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 30.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 30.00 |
| - magnet\_arm\_y | 1 | 0.00 | 30.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 30.00 |
| - accel\_arm\_x | 1 | 0.00 | 30.00 |
| <none> |  | 0.00 | 32.00 |
| - raw\_timestamp\_part\_1 | 1 | 411.68 | 441.68 |
| - num\_window | 1 | 2246.17 | 2276.17 |

Step: AIC=30

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + magnet\_forearm\_x + magnet\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - magnet\_forearm\_z | Df  1 | Deviance  0.0 | AIC  28.0 |
| - magnet\_forearm\_x | 1 | 0.0 | 28.0 |
| - accel\_forearm\_x | 1 | 0.0 | 28.0 |
| - total\_accel\_dumbbell | 1 | 0.0 | 28.0 |
| - pitch\_forearm | 1 | 0.0 | 28.0 |
| - gyros\_forearm\_z | 1 | 0.0 | 28.0 |

|  |  |  |  |
| --- | --- | --- | --- |
| - gyros\_forearm\_y | 1 | 0.0 | 28.0 |
| - magnet\_arm\_y | 1 | 0.0 | 28.0 |
| - pitch\_arm | 1 | 0.0 | 28.0 |
| - accel\_dumbbell\_x | 1 | 0.0 | 28.0 |
| - magnet\_dumbbell\_x | 1 | 0.0 | 28.0 |
| - accel\_arm\_x | 1 | 0.0 | 28.0 |
| <none> |  | 0.0 | 30.0 |
| - raw\_timestamp\_part\_1 | 1 | 453.4 | 481.4 |
| - num\_window | 1 | 2249.4 | 2277.4 |

Step: AIC=28

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x + magnet\_forearm\_x

|  |  |  |  |
| --- | --- | --- | --- |
| - magnet\_forearm\_x | Df  1 | Deviance  0.00 | AIC  26.00 |
| - accel\_forearm\_x | 1 | 0.00 | 26.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 26.00 |
| - pitch\_forearm | 1 | 0.00 | 26.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 26.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 26.00 |
| - magnet\_arm\_y | 1 | 0.00 | 26.00 |
| - pitch\_arm | 1 | 0.00 | 26.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 26.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 26.00 |
| <none> |  | 0.00 | 28.00 |
| - raw\_timestamp\_part\_1 | 1 | 512.71 | 538.71 |
| - accel\_arm\_x | 1 | 2234.71 | 2260.71 |
| - num\_window | 1 | 2687.05 | 2713.05 |

Step: AIC=26

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z + accel\_forearm\_x

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_forearm\_x | Df  1 | Deviance  0.00 | AIC  24.00 |
| - gyros\_forearm\_y | 1 | 0.00 | 24.00 |
| - pitch\_forearm | 1 | 0.00 | 24.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 24.00 |
| - gyros\_forearm\_z | 1 | 0.00 | 24.00 |
| - magnet\_arm\_y | 1 | 0.00 | 24.00 |
| - pitch\_arm | 1 | 0.00 | 24.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 24.00 |
| - accel\_arm\_x | 1 | 0.00 | 24.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 24.00 |
| <none> |  | 0.00 | 26.00 |
| - raw\_timestamp\_part\_1 | 1 | 550.76 | 574.76 |
| - num\_window | 1 | 2702.16 | 2726.16 |

Step: AIC=24

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_y + gyros\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - gyros\_forearm\_y | 1 | 0.0 | 22.0 |
| - total\_accel\_dumbbell | 1 | 0.0 | 22.0 |
| - gyros\_forearm\_z | 1 | 0.0 | 22.0 |
| - magnet\_arm\_y | 1 | 0.0 | 22.0 |
| - pitch\_arm | 1 | 0.0 | 22.0 |
| - accel\_dumbbell\_x | 1 | 0.0 | 22.0 |
| - magnet\_dumbbell\_x | 1 | 0.0 | 22.0 |
| - accel\_arm\_x | 1 | 0.0 | 22.0 |
| - pitch\_forearm | 1 | 0.0 | 22.0 |
| <none> |  | 0.0 | 24.0 |
| - raw\_timestamp\_part\_1 | 1 | 631.1 | 653.1 |
| - num\_window | 1 | 2752.0 | 2774.0 |

Step: AIC=22

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm + gyros\_forearm\_z

|  |  |  |  |
| --- | --- | --- | --- |
| - gyros\_forearm\_z | Df  1 | Deviance  0.00 | AIC  20.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 20.00 |
| - pitch\_arm | 1 | 0.00 | 20.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 20.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 20.00 |
| - magnet\_arm\_y | 1 | 0.00 | 20.00 |
| - pitch\_forearm | 1 | 0.00 | 20.00 |
| - accel\_arm\_x | 1 | 0.00 | 20.00 |
| <none> |  | 0.00 | 22.00 |
| - raw\_timestamp\_part\_1 | 1 | 636.19 | 656.19 |
| - num\_window | 1 | 2797.77 | 2817.77 |

Step: AIC=20

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_arm + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
| - pitch\_arm | Df  1 | Deviance  0.00 | AIC  18.00 |
| - total\_accel\_dumbbell | 1 | 0.00 | 18.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 18.00 |
| - magnet\_arm\_y | 1 | 0.00 | 18.00 |
| - pitch\_forearm | 1 | 0.00 | 18.00 |
| - accel\_arm\_x | 1 | 0.00 | 18.00 |
| - accel\_dumbbell\_x | 1 | 0.00 | 18.00 |
| <none> |  | 0.00 | 20.00 |
| - raw\_timestamp\_part\_1 | 1 | 636.38 | 654.38 |
| - num\_window | 1 | 2830.14 | 2848.14 |

Step: AIC=18

classe ~ raw\_timestamp\_part\_1 + num\_window + accel\_arm\_x + magnet\_arm\_y + total\_accel\_dumbbell + accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm

Df Deviance AIC

- total\_accel\_dumbbell 1 0.00 16.00

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_dumbbell\_x | 1 | 0.00 | 16.00 |
| - magnet\_dumbbell\_x | 1 | 0.00 | 16.00 |
| - accel\_arm\_x | 1 | 0.00 | 16.00 |
| - pitch\_forearm | 1 | 0.00 | 16.00 |
| - magnet\_arm\_y | 1 | 0.00 | 16.00 |
| <none> |  | 0.00 | 18.00 |
| - raw\_timestamp\_part\_1 | 1 | 779.63 | 795.63 |
| - num\_window | 1 | 2972.84 | 2988.84 |

Step: AIC=16

classe ~ raw\_timestamp\_part\_1 + num\_window + accel\_arm\_x + magnet\_arm\_y +

accel\_dumbbell\_x + magnet\_dumbbell\_x + pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
| - accel\_dumbbell\_x | Df  1 | Deviance  0.0 | AIC  14.0 |
| - magnet\_dumbbell\_x | 1 | 0.0 | 14.0 |
| - magnet\_arm\_y | 1 | 0.0 | 14.0 |
| - accel\_arm\_x | 1 | 0.0 | 14.0 |
| - pitch\_forearm | 1 | 0.0 | 14.0 |
| <none> |  | 0.0 | 16.0 |
| - raw\_timestamp\_part\_1 | 1 | 1009.6 | 1023.6 |
| - num\_window | 1 | 2999.6 | 3013.6 |

Step: AIC=14

classe ~ raw\_timestamp\_part\_1 + num\_window + accel\_arm\_x + magnet\_arm\_y +

magnet\_dumbbell\_x + pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| - magnet\_dumbbell\_x | 1 | 0.0 | 12.0 |
| - magnet\_arm\_y | 1 | 0.0 | 12.0 |
| - pitch\_forearm | 1 | 0.0 | 12.0 |
| - accel\_arm\_x | 1 | 0.0 | 12.0 |
| <none> |  | 0.0 | 14.0 |
| - raw\_timestamp\_part\_1 | 1 | 2170.5 | 2182.5 |
| - num\_window | 1 | 3211.5 | 3223.5 |

Step: AIC=12

classe ~ raw\_timestamp\_part\_1 + num\_window + accel\_arm\_x + magnet\_arm\_y +

pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| - magnet\_arm\_y | 1 | 0.0 | 10.0 |
| - accel\_arm\_x | 1 | 0.0 | 10.0 |
| - pitch\_forearm | 1 | 0.0 | 10.0 |
| <none> |  | 0.0 | 12.0 |
| - raw\_timestamp\_part\_1 | 1 | 3282.6 | 3292.6 |
| - num\_window | 1 | 3437.9 | 3447.9 |

Step: AIC=10

classe ~ raw\_timestamp\_part\_1 + num\_window + accel\_arm\_x + pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| - accel\_arm\_x | 1 | 0.0 | 8.0 |
| - pitch\_forearm | 1 | 0.0 | 8.0 |
| <none> |  | 0.0 | 10.0 |
| - num\_window | 1 | 3520.4 | 3528.4 |
| - raw\_timestamp\_part\_1 | 1 | 4496.5 | 4504.5 |

Step: AIC=8

classe ~ raw\_timestamp\_part\_1 + num\_window + pitch\_forearm

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| - pitch\_forearm | 1 | 0.0 | 6.0 |
| <none> |  | 0.0 | 8.0 |
| - num\_window | 1 | 3520.4 | 3526.4 |
| - raw\_timestamp\_part\_1 | 1 | 4662.4 | 4668.4 |

Step: AIC=6

classe ~ raw\_timestamp\_part\_1 + num\_window

|  |  |  |  |
| --- | --- | --- | --- |
|  | Df | Deviance | AIC |
| <none> |  | 0.0 | 6.0 |
| - num\_window | 1 | 4449.3 | 4453.3 |
| - raw\_timestamp\_part\_1 | 1 | 5138.0 | 5142.0 |

There were 50 or more warnings (use warnings() to see the first 50)

> summary(step\_fit)

Call:

glm(formula = classe ~ raw\_timestamp\_part\_1 + num\_window, family = binomial(l ink = "logit"),

data = dataTrain)

Deviance Residuals:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Min | 1Q | Median | 3Q | Max |
| -2.304e-03 | -2.000e-08 | 2.000e-08 | 2.000e-08 | 2.235e-03 |

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) 2.688e+08 9.192e+08 0.292 0.770 raw\_timestamp\_part\_1 -2.032e-01 6.947e-01 -0.292 0.770 num\_window 4.362e+01 1.477e+02 0.295 0.768

(Dispersion parameter for binomial family taken to be 1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null deviance: 5.1382e+03 | on 4003 | degrees | of | freedom |
| Residual deviance: 3.8673e-04  AIC: 6.0004 | on 4001 | degrees | of | freedom |

Number of Fisher Scoring iterations: 25

> confint(step\_fit)

Waiting for profiling to be done...

2.5 % 97.5 % (Intercept) 5.356253e+08 4.612380e+08 raw\_timestamp\_part\_1 -3.486092e-01 -4.048320e-01 num\_window 8.649066e+01 7.453712e+01

Warning messages:

1: glm.fit: fitted probabilities numerically 0 or 1 occurred

2: glm.fit: fitted probabilities numerically 0 or 1 occurred

3: glm.fit: fitted probabilities numerically 0 or 1 occurred

4: glm.fit: fitted probabilities numerically 0 or 1 occurred

5: glm.fit: fitted probabilities numerically 0 or 1 occurred

6: glm.fit: fitted probabilities numerically 0 or 1 occurred

7: glm.fit: fitted probabilities numerically 0 or 1 occurred

8: glm.fit: fitted probabilities numerically 0 or 1 occurred

9: glm.fit: fitted probabilities numerically 0 or 1 occurred

> #ANOVA on base model

> anova(fit,test = 'Chisq')

Analysis of Deviance Table Model: binomial, link: logit Response: classe

Terms added sequentially (first to last)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Df | Deviance | Resid. Df | Resid. Dev | Pr(>Chi) |  |
| NULL |  |  | 4003 | 5138.2 |  |
| raw\_timestamp\_part\_1 | 1 | 689.0 | 4002 | 4449.3 | < 2.2e-16 | \*\*\* |
| num\_window | 1 | 4449.3 | 4001 | 0.0 | < 2.2e-16 | \*\*\* |
| --- |  |  |  |  |  |  |

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

glm.fit: fitted probabilities numerically 0 or 1 occurred

>

> #plot the fitted model

> plot(fit$fitted.values)

> pred\_link <- predict(fit,newdata = dataTest,type = 'link') Warning message:

In predict.lm(object, newdata, se.fit, scale = 1, type = ifelse(type == :

prediction from a rank-deficient fit may be misleading

>

> #check for multicollinearity

> library(car)

Loading required package: carData

Attaching package: ‘car’

The following object is masked from ‘package:arules’:

recode

> vif(fit)

Error in vif.default(fit) : there are aliased coefficients in the model

> vif(step\_fit)

raw\_timestamp\_part\_1 num\_window

67.38515 67.38515

> library(caret)

> #with default prob cut 0.50

> dataTest$pred\_classe <- ifelse(pred<0.7,'yes','no')

>

> table(dataTest$pred\_classe,dataTest$classe)

A B C D E no 0 0 19 0 0 yes 0 0 1 0 0

>

#training split of churn classes

> round(table(dataTrain$classe)/nrow(dataTrain),2)\*100

A B C D E

34 23 2 7 34

> # test split of churn classes

> round(table(dataTest$classe)/nrow(dataTest),2)\*100

|  |  |  |  |
| --- | --- | --- | --- |
| A | B C | D | E |
| 0 | 0 100 | 0 | 0 |

> #predicted split of churn classes

> round(table(dataTest$pred\_classe)/nrow(dataTest),2)\*100

no yes

95 5

|  |
| --- |
| Confusion Matrix and Statistics  Reference  Prediction A B C D E  A 0 0 0 0 0  B 0 0 0 0 0  C 0 0 20 0 0  D 0 0 0 0 0  E 0 0 0 0 0  Overall Statistics  Accuracy : 1  95% CI : (0.8316, 1) No Information Rate : 1  P-Value [Acc > NIR] : 1  Kappa : NaN Mcnemar's Test P-Value : NA  Statistics by Class:  Class: A Class: B Class: C Class: D Class: E Sensitivity NA NA 1 NA NA Specificity 1 1 NA 1 1  Pos Pred Value NA NA NA NA NA Neg Pred Value NA NA NA NA NA Prevalence 0 0 1 0 0  Detection Rate 0 0 1 0 0  Detection Prevalence 0 0 1 0 0  Balanced Accuracy NA NA NA NA NA |
|  |
| > |
|  |

#how do we create a cross validation scheme

> control <- trainControl(method = 'repeatedcv',

+ number = 10,

+ repeats = 3)

> seed <-7

> metric <- 'Accuracy'

> set.seed(seed)

> fit\_default <- train(classe~.,

+ data = dataTrain,

+ method = 'glm',

+ metric = metric,

+ trControl = control)

Something is wrong; all the Accuracy metric values are missing: Accuracy Kappa

Min. : NA Min. : NA

1st Qu.: NA 1st Qu.: NA Median : NA Median : NA Mean :NaN Mean :NaN

3rd Qu.: NA 3rd Qu.: NA

Max. : NA Max. : NA NA's :1 NA's :1

Error: Stopping

In addition: Warning message:

In nominalTrainWorkflow(x = x, y = y, wts = weights, info = trainInfo, : There were missing values in resampled performance measures.

> print(fit\_default)

Error in print(fit\_default) : object 'fit\_default' not found

|  |
| --- |
| >  > library(caret)  > varImp(step\_fit)  Overall raw\_timestamp\_part\_1 0.2924915  num\_window 0.2953298  > varImp(fit\_default)  Error in varImp(fit\_default) : object 'fit\_default' not found |
|  |
| > |
|  |

> library(devtools)

>

> install\_github("riv","tomasgreif")

Skipping install of 'woe' from a github remote, the SHA1 (43fcf268) has not c hanged since last install.

Use `force = TRUE` to force installation

Warning message:

Username parameter is deprecated. Please use tomasgreif/riv

>

> install\_github("woe","tomasgreif")

Skipping install of 'woe' from a github remote, the SHA1 (43fcf268) has not c hanged since last install.

Use `force = TRUE` to force installation

Warning message:

Username parameter is deprecated. Please use tomasgreif/woe

>

> library(woe)

>

> library(riv)

> iv\_df <- iv.mult(dataTrain, y="classe", summary=TRUE, verbose=TRUE) Started processing of data frame: dataTrain

Calling iv.num for variable: user\_name

Building rpart model

Model finished

Sending model to tree parser

Rules parsed: 2

Mapping nodes to data

SQL Merge

DF Merge

Calling iv.str for nodes

Error in iv.str(df, "tmp\_iv\_calc\_label", y) : Not a binary outcome

> iv\_df

Error: object 'iv\_df' not found

>

> iv <- iv.mult(dataTrain, y="classe", summary=FALSE, verbose=TRUE) Started processing of data frame: dataTrain

Calling iv.num for variable: user\_name

Building rpart model

Model finished

Sending model to tree parser

Rules parsed: 2

Mapping nodes to data

SQL Merge

DF Merge

Calling iv.str for nodes

Error in iv.str(df, "tmp\_iv\_calc\_label", y) : Not a binary outcome

> # Plot information value summary

>

> iv.plot.summary(iv\_df)

Error in ggplot(data = iv) : object 'iv\_df' not found

