trainCA <- read.csv('pml-training.csv')

testCA <- read.csv('pml-testing.csv')

library(caret)

head(trainCA)

names(trainCA)

cor(training[,-160])

myMod <- train(classe~.

,data=trainCA

,method="rf"

,trControl=trainControl(method="cv")

,number=10)

> myMod

Random Forest

19622 samples

159 predictor

5 classes: 'A', 'B', 'C', 'D', 'E'

No pre-processing

Resampling: Cross-Validated (10 fold)

Summary of sample sizes: 365, 365, 365, 367, 365, 365, ...

Resampling results across tuning parameters:

mtry Accuracy Kappa Accuracy SD Kappa SD

2 0.2684803 0.0000000 0.006056577 0.00000000

117 0.8913071 0.8623028 0.082544646 0.10548663

6952 0.9899937 0.9873968 0.017696094 0.02227609

Accuracy was used to select the optimal model using the largest value.

The final value used for the model was mtry = 6952.

>

> summary(myMod)

Length Class Mode

call 5 -none- call

type 1 -none- character

predicted 406 factor numeric

err.rate 3000 -none- numeric

confusion 30 -none- numeric

votes 2030 matrix numeric

oob.times 406 -none- numeric

classes 5 -none- character

importance 6952 -none- numeric

importanceSD 0 -none- NULL

localImportance 0 -none- NULL

proximity 0 -none- NULL

ntree 1 -none- numeric

mtry 1 -none- numeric

forest 14 -none- list

y 406 factor numeric

test 0 -none- NULL

inbag 0 -none- NULL

xNames 6952 -none- character

problemType 1 -none- character

tuneValue 1 data.frame list

obsLevels 5 -none- character

> str(trainCA)

'data.frame': 19622 obs. of 160 variables:

$ X : int 1 2 3 4 5 6 7 8 9 10 ...

$ user\_name : Factor w/ 6 levels "adelmo","carlitos",..: 2 2 2 2 2 2 2 2 2 2 ...

$ raw\_timestamp\_part\_1 : int 1323084231 1323084231 1323084231 1323084232 1323084232 1323084232 1323084232 1323084232 1323084232 1323084232 ...

$ raw\_timestamp\_part\_2 : int 788290 808298 820366 120339 196328 304277 368296 440390 484323 484434 ...

$ cvtd\_timestamp : Factor w/ 20 levels "02/12/2011 13:32",..: 9 9 9 9 9 9 9 9 9 9 ...

$ new\_window : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...

$ num\_window : int 11 11 11 12 12 12 12 12 12 12 ...

$ roll\_belt : num 1.41 1.41 1.42 1.48 1.48 1.45 1.42 1.42 1.43 1.45 ...

$ pitch\_belt : num 8.07 8.07 8.07 8.05 8.07 8.06 8.09 8.13 8.16 8.17 ...

$ yaw\_belt : num -94.4 -94.4 -94.4 -94.4 -94.4 -94.4 -94.4 -94.4 -94.4 -94.4 ...

$ total\_accel\_belt : int 3 3 3 3 3 3 3 3 3 3 ...

$ kurtosis\_roll\_belt : Factor w/ 397 levels "","-0.016850",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_picth\_belt : Factor w/ 317 levels "","-0.021887",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_yaw\_belt : Factor w/ 2 levels "","#DIV/0!": 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_roll\_belt : Factor w/ 395 levels "","-0.003095",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_roll\_belt.1 : Factor w/ 338 levels "","-0.005928",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_yaw\_belt : Factor w/ 2 levels "","#DIV/0!": 1 1 1 1 1 1 1 1 1 1 ...

$ max\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ max\_picth\_belt : int NA NA NA NA NA NA NA NA NA NA ...

$ max\_yaw\_belt : Factor w/ 68 levels "","-0.1","-0.2",..: 1 1 1 1 1 1 1 1 1 1 ...

$ min\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ min\_pitch\_belt : int NA NA NA NA NA NA NA NA NA NA ...

$ min\_yaw\_belt : Factor w/ 68 levels "","-0.1","-0.2",..: 1 1 1 1 1 1 1 1 1 1 ...

$ amplitude\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ amplitude\_pitch\_belt : int NA NA NA NA NA NA NA NA NA NA ...

$ amplitude\_yaw\_belt : Factor w/ 4 levels "","#DIV/0!","0.00",..: 1 1 1 1 1 1 1 1 1 1 ...

$ var\_total\_accel\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_roll\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_pitch\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_pitch\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_pitch\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_yaw\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_yaw\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_yaw\_belt : num NA NA NA NA NA NA NA NA NA NA ...

$ gyros\_belt\_x : num 0 0.02 0 0.02 0.02 0.02 0.02 0.02 0.02 0.03 ...

$ gyros\_belt\_y : num 0 0 0 0 0.02 0 0 0 0 0 ...

$ gyros\_belt\_z : num -0.02 -0.02 -0.02 -0.03 -0.02 -0.02 -0.02 -0.02 -0.02 0 ...

$ accel\_belt\_x : int -21 -22 -20 -22 -21 -21 -22 -22 -20 -21 ...

$ accel\_belt\_y : int 4 4 5 3 2 4 3 4 2 4 ...

$ accel\_belt\_z : int 22 22 23 21 24 21 21 21 24 22 ...

$ magnet\_belt\_x : int -3 -7 -2 -6 -6 0 -4 -2 1 -3 ...

$ magnet\_belt\_y : int 599 608 600 604 600 603 599 603 602 609 ...

$ magnet\_belt\_z : int -313 -311 -305 -310 -302 -312 -311 -313 -312 -308 ...

$ roll\_arm : num -128 -128 -128 -128 -128 -128 -128 -128 -128 -128 ...

$ pitch\_arm : num 22.5 22.5 22.5 22.1 22.1 22 21.9 21.8 21.7 21.6 ...

$ yaw\_arm : num -161 -161 -161 -161 -161 -161 -161 -161 -161 -161 ...

$ total\_accel\_arm : int 34 34 34 34 34 34 34 34 34 34 ...

$ var\_accel\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_pitch\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_pitch\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_pitch\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ avg\_yaw\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ stddev\_yaw\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ var\_yaw\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ gyros\_arm\_x : num 0 0.02 0.02 0.02 0 0.02 0 0.02 0.02 0.02 ...

$ gyros\_arm\_y : num 0 -0.02 -0.02 -0.03 -0.03 -0.03 -0.03 -0.02 -0.03 -0.03 ...

$ gyros\_arm\_z : num -0.02 -0.02 -0.02 0.02 0 0 0 0 -0.02 -0.02 ...

$ accel\_arm\_x : int -288 -290 -289 -289 -289 -289 -289 -289 -288 -288 ...

$ accel\_arm\_y : int 109 110 110 111 111 111 111 111 109 110 ...

$ accel\_arm\_z : int -123 -125 -126 -123 -123 -122 -125 -124 -122 -124 ...

$ magnet\_arm\_x : int -368 -369 -368 -372 -374 -369 -373 -372 -369 -376 ...

$ magnet\_arm\_y : int 337 337 344 344 337 342 336 338 341 334 ...

$ magnet\_arm\_z : int 516 513 513 512 506 513 509 510 518 516 ...

$ kurtosis\_roll\_arm : Factor w/ 330 levels "","-0.02438",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_picth\_arm : Factor w/ 328 levels "","-0.00484",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_yaw\_arm : Factor w/ 395 levels "","-0.01548",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_roll\_arm : Factor w/ 331 levels "","-0.00051",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_pitch\_arm : Factor w/ 328 levels "","-0.00184",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_yaw\_arm : Factor w/ 395 levels "","-0.00311",..: 1 1 1 1 1 1 1 1 1 1 ...

$ max\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ max\_picth\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ max\_yaw\_arm : int NA NA NA NA NA NA NA NA NA NA ...

$ min\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ min\_pitch\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ min\_yaw\_arm : int NA NA NA NA NA NA NA NA NA NA ...

$ amplitude\_roll\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ amplitude\_pitch\_arm : num NA NA NA NA NA NA NA NA NA NA ...

$ amplitude\_yaw\_arm : int NA NA NA NA NA NA NA NA NA NA ...

$ roll\_dumbbell : num 13.1 13.1 12.9 13.4 13.4 ...

$ pitch\_dumbbell : num -70.5 -70.6 -70.3 -70.4 -70.4 ...

$ yaw\_dumbbell : num -84.9 -84.7 -85.1 -84.9 -84.9 ...

$ kurtosis\_roll\_dumbbell : Factor w/ 398 levels "","-0.0035","-0.0073",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_picth\_dumbbell : Factor w/ 401 levels "","-0.0163","-0.0233",..: 1 1 1 1 1 1 1 1 1 1 ...

$ kurtosis\_yaw\_dumbbell : Factor w/ 2 levels "","#DIV/0!": 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_roll\_dumbbell : Factor w/ 401 levels "","-0.0082","-0.0096",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_pitch\_dumbbell : Factor w/ 402 levels "","-0.0053","-0.0084",..: 1 1 1 1 1 1 1 1 1 1 ...

$ skewness\_yaw\_dumbbell : Factor w/ 2 levels "","#DIV/0!": 1 1 1 1 1 1 1 1 1 1 ...

$ max\_roll\_dumbbell : num NA NA NA NA NA NA NA NA NA NA ...

$ max\_picth\_dumbbell : num NA NA NA NA NA NA NA NA NA NA ...

$ max\_yaw\_dumbbell : Factor w/ 73 levels "","-0.1","-0.2",..: 1 1 1 1 1 1 1 1 1 1 ...

$ min\_roll\_dumbbell : num NA NA NA NA NA NA NA NA NA NA ...

$ min\_pitch\_dumbbell : num NA NA NA NA NA NA NA NA NA NA ...

$ min\_yaw\_dumbbell : Factor w/ 73 levels "","-0.1","-0.2",..: 1 1 1 1 1 1 1 1 1 1 ...

$ amplitude\_roll\_dumbbell : num NA NA NA NA NA NA NA NA NA NA ...

[list output truncated]

> names(trainCA)

[1] "X" "user\_name" "raw\_timestamp\_part\_1" "raw\_timestamp\_part\_2"

[5] "cvtd\_timestamp" "new\_window" "num\_window" "roll\_belt"

[9] "pitch\_belt" "yaw\_belt" "total\_accel\_belt" "kurtosis\_roll\_belt"

[13] "kurtosis\_picth\_belt" "kurtosis\_yaw\_belt" "skewness\_roll\_belt" "skewness\_roll\_belt.1"

[17] "skewness\_yaw\_belt" "max\_roll\_belt" "max\_picth\_belt" "max\_yaw\_belt"

[21] "min\_roll\_belt" "min\_pitch\_belt" "min\_yaw\_belt" "amplitude\_roll\_belt"

[25] "amplitude\_pitch\_belt" "amplitude\_yaw\_belt" "var\_total\_accel\_belt" "avg\_roll\_belt"

[29] "stddev\_roll\_belt" "var\_roll\_belt" "avg\_pitch\_belt" "stddev\_pitch\_belt"

[33] "var\_pitch\_belt" "avg\_yaw\_belt" "stddev\_yaw\_belt" "var\_yaw\_belt"

[37] "gyros\_belt\_x" "gyros\_belt\_y" "gyros\_belt\_z" "accel\_belt\_x"

[41] "accel\_belt\_y" "accel\_belt\_z" "magnet\_belt\_x" "magnet\_belt\_y"

[45] "magnet\_belt\_z" "roll\_arm" "pitch\_arm" "yaw\_arm"

[49] "total\_accel\_arm" "var\_accel\_arm" "avg\_roll\_arm" "stddev\_roll\_arm"

[53] "var\_roll\_arm" "avg\_pitch\_arm" "stddev\_pitch\_arm" "var\_pitch\_arm"

[57] "avg\_yaw\_arm" "stddev\_yaw\_arm" "var\_yaw\_arm" "gyros\_arm\_x"

[61] "gyros\_arm\_y" "gyros\_arm\_z" "accel\_arm\_x" "accel\_arm\_y"

[65] "accel\_arm\_z" "magnet\_arm\_x" "magnet\_arm\_y" "magnet\_arm\_z"

[69] "kurtosis\_roll\_arm" "kurtosis\_picth\_arm" "kurtosis\_yaw\_arm" "skewness\_roll\_arm"

[73] "skewness\_pitch\_arm" "skewness\_yaw\_arm" "max\_roll\_arm" "max\_picth\_arm"

[77] "max\_yaw\_arm" "min\_roll\_arm" "min\_pitch\_arm" "min\_yaw\_arm"

[81] "amplitude\_roll\_arm" "amplitude\_pitch\_arm" "amplitude\_yaw\_arm" "roll\_dumbbell"

[85] "pitch\_dumbbell" "yaw\_dumbbell" "kurtosis\_roll\_dumbbell" "kurtosis\_picth\_dumbbell"

[89] "kurtosis\_yaw\_dumbbell" "skewness\_roll\_dumbbell" "skewness\_pitch\_dumbbell" "skewness\_yaw\_dumbbell"

[93] "max\_roll\_dumbbell" "max\_picth\_dumbbell" "max\_yaw\_dumbbell" "min\_roll\_dumbbell"

[97] "min\_pitch\_dumbbell" "min\_yaw\_dumbbell" "amplitude\_roll\_dumbbell" "amplitude\_pitch\_dumbbell"

[101] "amplitude\_yaw\_dumbbell" "total\_accel\_dumbbell" "var\_accel\_dumbbell" "avg\_roll\_dumbbell"

[105] "stddev\_roll\_dumbbell" "var\_roll\_dumbbell" "avg\_pitch\_dumbbell" "stddev\_pitch\_dumbbell"

[109] "var\_pitch\_dumbbell" "avg\_yaw\_dumbbell" "stddev\_yaw\_dumbbell" "var\_yaw\_dumbbell"

[113] "gyros\_dumbbell\_x" "gyros\_dumbbell\_y" "gyros\_dumbbell\_z" "accel\_dumbbell\_x"

[117] "accel\_dumbbell\_y" "accel\_dumbbell\_z" "magnet\_dumbbell\_x" "magnet\_dumbbell\_y"

[121] "magnet\_dumbbell\_z" "roll\_forearm" "pitch\_forearm" "yaw\_forearm"

[125] "kurtosis\_roll\_forearm" "kurtosis\_picth\_forearm" "kurtosis\_yaw\_forearm" "skewness\_roll\_forearm"

[129] "skewness\_pitch\_forearm" "skewness\_yaw\_forearm" "max\_roll\_forearm" "max\_picth\_forearm"

[133] "max\_yaw\_forearm" "min\_roll\_forearm" "min\_pitch\_forearm" "min\_yaw\_forearm"

[137] "amplitude\_roll\_forearm" "amplitude\_pitch\_forearm" "amplitude\_yaw\_forearm" "total\_accel\_forearm"

[141] "var\_accel\_forearm" "avg\_roll\_forearm" "stddev\_roll\_forearm" "var\_roll\_forearm"

[145] "avg\_pitch\_forearm" "stddev\_pitch\_forearm" "var\_pitch\_forearm" "avg\_yaw\_forearm"

[149] "stddev\_yaw\_forearm" "var\_yaw\_forearm" "gyros\_forearm\_x" "gyros\_forearm\_y"

[153] "gyros\_forearm\_z" "accel\_forearm\_x" "accel\_forearm\_y" "accel\_forearm\_z"

[157] "magnet\_forearm\_x" "magnet\_forearm\_y" "magnet\_forearm\_z" "classe"