**Machine Learning Project**

**Background**

In this project, the data is collected by accelerometers on the belt , forearm, arm and dumbbell of 6 participants. They were asked to perform barbell lifts correctly and incorrectly in 5 different ways. The goal of the project is to predict the manner in which they did the exercise.

**Method**

* Chose the variables not including NAs as training dataset; I also chose the same variables as testing dataset.
* Chose 5 times cross validation.
* Used tree classification, random forest and LDA as classification method. The tree classification and random forest methods are not able to produce the result. Thus, I chose LDA method.
* Used LDA method for prediction

**R program**

library(AppliedPredictiveModeling)

library(caret)

library(ElemStatLearn)

library(pgmm)

library(rpart)

library(gbm)

library(lubridate)

library(forecast)

library(e1071)

vowel.train <- read.table("https://d396qusza40orc.cloudfront.net/predmachlearn/pml-training.csv", sep=",", head=T, row.names=1 )

vowel.test <- read.table("https://d396qusza40orc.cloudfront.net/predmachlearn/pml-testing.csv", sep=",", head=T, row.names=1 )

# data cleaning by choosing the valuable fields

training<-subset(vowel.train, select=c(new\_window, num\_window, roll\_belt, pitch\_belt, yaw\_belt, total\_accel\_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,

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,roll\_dumbbell, pitch\_dumbbell, yaw\_dumbbell,total\_accel\_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,

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, classe))

testing<-subset(vowel.test, select=c(new\_window, num\_window, roll\_belt, pitch\_belt, yaw\_belt, total\_accel\_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,

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,roll\_dumbbell, pitch\_dumbbell, yaw\_dumbbell,total\_accel\_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,

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 ))

#set cross validation

ctrl<-trainControl(method="cv", number = 5)

set.seed(22334)

modFit2 <- train(classe ~ ., data = training,method = "lda",prox=TRUE, trControl=ctrl)

pred2<-predict(modFit2, testing)

Result

pred2

[1] B A B E A C D D A A D A B A E E A B B B