**1. Use the below given data set**

**Data Set**

Ans:

df <- read.csv("https://archive.ics.uci.edu/ml/machine-learning-databases/00273/Example\_WearableComputing\_weight\_lifting\_exercises\_biceps\_curl\_variations.csv",

header = FALSE)

data<-df[-1,]

head(data)

colnames(data) <- as.character(unlist(data[1,]))

data1 = data[-1, ]

data1<-as.data.frame(lapply(data1, as.integer))

table(data1$classe)

data1$classe<-as.factor(data1$classe)

**2. Perform the below given activities:**

**a. Create classification model using logistic regression model**

Ans:

library(nnet)

data1$out<-relevel(data1$classe, ref="2")

mymodel<-multinom(out~ ., data=data1)

summary(mymodel)

predict(mymodel,data1)

cm<-table(predict(mymodel),data1$classe)

**b. verify model goodness of fit**

Ans:

actual<-table(data1$classe)

expected<-table(predict(mymodel))

chisq.test(actual, p = expected/sum(expected))

Chi-squared test for given probabilities

data: actual

X-squared = 106.46, df = 4, p-value < 2.2e-16

#as p vallue is very low we cannot reject the null hypothesis so the modle is

having good fit

**c. Report the accuracy measures**

Ans:

accuracy=sum(diag(cm))/sum(cm)

accuracy

[1] 0.9515408

**d. Report the variable importance**

Ans:

#varible importance

library(caret)

varImp(mymodel, scale = FALSE)

**e. Report the unimportant variables**

Ans:

raw\_timestamp\_part\_2, new\_window ,yaw\_belt,kurtosis\_yaw\_belt,kurtosis\_yaw\_belt,skewness\_yaw\_belt,

max\_roll\_belt,max\_picth\_belt ,max\_yaw\_belt ,min\_roll\_belt ,min\_pitch\_belt ,min\_yaw\_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,

magnet\_belt\_x ,roll\_arm ,pitch\_arm ,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\_yaw\_arm,

skewness\_roll\_arm ,skewness\_pitch\_arm ,skewness\_yaw\_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\_yaw\_dumbbell ,skewness\_pitch\_dumbbell,

skewness\_yaw\_dumbbell,max\_roll\_dumbbell ,max\_picth\_dumbbell ,max\_yaw\_dumbbell ,min\_roll\_dumbbell,

min\_yaw\_dumbbell ,amplitude\_pitch\_dumbbell ,amplitude\_yaw\_dumbbell ,var\_accel\_dumbbell ,avg\_roll\_dumbbell,

stddev\_roll\_dumbbell ,stddev\_pitch\_dumbbell ,var\_pitch\_dumbbell ,avg\_yaw\_dumbbell ,stddev\_yaw\_dumbbell,

gyros\_dumbbell\_y ,gyros\_dumbbell\_z ,magnet\_dumbbell\_z ,roll\_forearm ,pitch\_forearm ,yaw\_forearm,

kurtosis\_picth\_forearm ,kurtosis\_yaw\_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 ,var\_accel\_forearm ,avg\_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.

#the above variables are having less importance in the modle

**f. Interpret the results**

Ans:

Here we will take a leap into the unknown with multinomial logistic regressions!

As a quick background, these regressions are only used when we want to predict the

odds of falling into one of three or more groups. It is distinctly different from ordinal

logistic regression, which assesses odds of being placed in a higher-level group when the

groups can be meaningfully ordered from low to high. Instead, multinomial logistic regression

uses a set of predictors to determine whether you are more likely to be in a particular group

when the groups have no meaningful “low to high” order

As with any regression, the first step is to look at the model fitting information.

This tells you whether you should look further into the model or accept the null hypothesis.

You will need to report the values for the chi-square, degrees of freedom, and p (sometimes called sig.),

but the p really tells you all you need to know about the significance of the model.

Some reviewers will also request the -2 Log Likelihood, so it is not a bad idea to at

least take note of it just in case. If your p value suggests significance (i.e., less than .05),

you are in the clear to look at the parameter estimates, which should have a set of outputs

for each independent (predictor) variable in the model.

This is where things get interesting, but much easier than they seem.

The output will show a set of results for each category of the dependent variable.

What is really going on is basically an individual binary logistic regression for each

category of the dependent variable, which assesses the likelihood of being in that group

compared to being in any of the other groups.

**g. Visualize the results**

Ans:

library(effects)

plot(allEffects(mymodel))