**SVM 1 CODE**

install.packages("e1071",dependencies=TRUE)

library(e1071)

energyefficiency$**Y1\_cat** <- as.factor(energyefficiency$**Y1\_cat**)

model1 <- svm(**Y1\_cat** ~ **X3+X4**, data=energyefficiency)

print(model1)

summary(model1)

plot(model1,energyefficiency)

**SVM 2 Code**

energyefficiency$**Y2\_cat** <- as.factor(energyefficiency$**Y2\_cat**)

model1 <- svm(**Y2\_cat** ~ **X3+X4**, data=energyefficiency)

print(model1)

summary(model1)

plot(model1,energyefficiency)

**SVM 3 Code**

energyefficiency$**Y2\_cat** <- as.factor(energyefficiency$**Y2\_cat**)

model1 <- svm(**Y2\_cat** ~ **.**, data=energyefficiency)

print(model1)

summary(model1)

plot(model1, energyefficiency, X3 ~ X4, slice = list(**X6E**=0, **X6S**=1, **X6W=0, X7=0, X8U=0, X8N=0, X8E=0, X8S=0, X8W=0**))

**NEURAL NETWORK CODE**

install.packages("neuralnet", dependencies = TRUE)

library(neuralnet)

energynet <- neuralnet(Y1+Y2 ~ X3+X4+X6E+X6S+X6W+X7+ **X8U**+ **X8N+ X8E+ X8S+X8W**, energyefficiency, hidden=2, lifesign="minimal", linear.output=TRUE, threshold=0.01)

energynet$result.matrix

plot(energynet)

energy\_index <- sample(nrow(energyefficiency), 1/2 \* nrow(energyefficiency))

energy\_train <- energyefficiency[energy\_index,]

energy\_test <- energyefficiency[-energy\_index, ]

energynet <- neuralnet(Y1~ X3+X4+X6E+X6S+X6W+X7+ **X8U**+ **X8N+ X8E+ X8S+X8W**, energy\_train, hidden=2, lifesign="minimal", linear.output=TRUE, threshold=0.01)

model\_results <- compute(energynet,energy\_test)

predicted\_load <- model\_results$net.result

cor(predicted\_load, energy\_test$Y1)

**NAÏVE BAYES CODE Y1**

table(energyefficiency$Y1)

summary(energyefficiency)

energyefficiency$Y1 <- factor(energyefficiency$Y1, levels=c("A","B","C","D"), labels= c("A","B","C","D"))

energy\_index <- sample(nrow(energyefficiency), 1/2 \* nrow(energyefficiency))

energy\_train <- energyefficiency[energy\_index, ]

energy\_test <- energyefficiency[-energy\_index, ]

energy\_model <- naiveBayes(Y1 ~ ., data=energy\_train, laplace=1)

energy\_model

energy\_pred <- predict(energy\_model, energy\_test, type="class")

energy\_pred\_table <- table(energy\_test$Y1, energy\_pred)

energy\_pred\_table

sum(diag(energy\_pred\_table))/nrow(energy\_test)

**NAÏVE BAYES CODE Y2**

table(energyefficiency$Y2)

summary(energyefficiency)

energyefficiency$Y2 <- factor(energyefficiency$Y2, levels=c("A","B","C","D"), labels= c("A","B","C","D"))

energy\_index <- sample(nrow(energyefficiency), 1/2 \* nrow(energyefficiency))

energy\_train <- energyefficiency[energy\_index, ]

energy\_test <- energyefficiency[-energy\_index, ]

energy\_model <- naiveBayes(Y2 ~ ., data=energy\_train, laplace=1)

energy\_model

energy\_pred <- predict(energy\_model, energy\_test, type="class")

energy\_pred\_table <- table(energy\_test$Y2, energy\_pred)

energy\_pred\_table

sum(diag(energy\_pred\_table))/nrow(energy\_test)

**KNN 1 CODE**

energyefficiency$Y1\_cat <- factor(energyefficiency$Y1\_cat, levels= c("A","B","C","D"), labels= c("A","B","C","D"))

normalize <- function(x) { return ((x-min(x))/(max(x)-min(x))) }

energy\_norm <- as.data.frame(lapply(energyefficiency[1:11], normalize))

energy\_index <- sample(nrow(energy\_norm), 1/3 \* nrow(energy\_norm))

energy\_train <- energy\_norm[energy\_index, ]

energy\_test <- energy\_norm[-energy\_index, ]

energy\_train\_labels <- energyefficiency[energy\_index,12]

energy\_test\_labels <- energyefficiency[-energy\_index,12]

install.packages("class")

library(class)

energy\_test\_pred <- knn(train = energy\_train, test = energy\_test, cl=energy\_train\_labels, k=30)

install.packages("gmodels")

library(gmodels)

CrossTable(x=energy\_test\_labels, y=energy\_test\_pred, prop.chisq=FALSE)

energy\_test\_pred <- knn(train = energy\_train, test = enery\_test, cl=energy\_train\_labels, k=200)

CrossTable(x=energy\_test\_labels, y=energy\_test\_pred, prop.chisq=FALSE)

**KNN 2 CODE**

energyefficiency$Y2\_cat <- factor(energyefficiency$Y2\_cat, levels= c("A","B","C","D"), labels= c("A","B","C","D"))

normalize <- function(x) { return ((x-min(x))/(max(x)-min(x))) }

energy\_norm <- as.data.frame(lapply(energyefficiency[1:11], normalize))

energy\_index <- sample(nrow(energy\_norm), 1/3 \* nrow(energy\_norm))

energy\_train <- energy\_norm[energy\_index, ]

energy\_test <- energy\_norm[-energy\_index, ]

energy\_train\_labels <- energyefficiency[energy\_index,12]

energy\_test\_labels <- energyefficiency[-energy\_index,12]

energy\_test\_pred <- knn(train = energy\_train, test = energy\_test, cl=energy\_train\_labels, k=30)

CrossTable(x=energy\_test\_labels, y=energy\_test\_pred, prop.chisq=FALSE)

energy\_test\_pred <- knn(train = energy\_train, test = enery\_test, cl=energy\_train\_labels, k=200)

CrossTable(x=energy\_test\_labels, y=energy\_test\_pred, prop.chisq=FALSE)