```r
###Classification C5.0(多進木解析;分類のみ)#################
library(kernlab);data(spam)
library(caret)
anyNA(spam)
set.seed(123)
dat.s <- createDataPartition( spam$type , p = 0.7 , list = F )
train.spam <- spam[ dat.s ,]
test.spam  <- spam[-dat.s ,]
#C5.0
library(C50)
c50.out <- C5.0(type ~ .,data=train.spam ,
                rules = F,#Tree model,rules = T:rule model
                control = C5.0Control(winnow = T),
                trials = 10) #number of boosting iterations
c50.out
names(c50.out)
summary(c50.out)
library(partykit)
as.party(c50.out)
plot(c50.out)
plot(c50.out , subtree = 3)
C5imp(c50.out, metric = "usage")
C5imp(c50.out , metric = "splits")
###Test
prd.c50 <- predict(c50.out , test.spam)
t <- table(prd.c50 , test.spam$type)
t
round((t[1,1]+t[2,2])/length(test.spam$type),3)*100
confusionMatrix(prd.c50, test.spam$type)

##多クラス分類
##手書き数 data
test.su <- ("https://archive.ics.uci.edu/ml/machine-learning-databases/optdigits//optdigits.tes")
test.su <- read.table(test.su  , sep = ",")
train.su <- ("https://archive.ics.uci.edu/ml/machine-learning-databases/optdigits//optdigits.tra")
train.su <- read.table(train.su , sep = ",")
str(train.su)
colnames(train.su)
str(test.su)
colnames(test.su)
table(test.su$V65)
table(train.su$V65)
#y:factor変換
train.su$V65 <- factor(train.su$V65)
str(train.su)
test.su$V65 <- factor(test.su$V65)
str(test.su)
colnames(train.su)
colnames(test.su)
table(test.su$V65)
table(train.su$V65)
#C5.0
library(C50)
c50.out.su <- C5.0(V65 ~ .,data=train.su ,
                   rules = F,#Tree model,rules = T:rule model
                   control = C5.0Control(winnow = T),
                   trials = 10) #number of boosting iterations
names(c50.out.su)
summary(c50.out.su)
library(partykit)
as.party(c50.out.su)
plot(c50.out.su)
plot(c50.out.su , subtree = 3)
C5imp(c50.out.su, metric = "usage")
C5imp(c50.out.su , metric = "splits")
###Test
prd.c50.su <- predict(c50.out.su , test.su)
t.su <- table(prd.c50.su , test.su$V65)
t.su
round(sum(diag(t.su)) /sum(t.su),3)*100
confusionMatrix(prd.c50.su, test.su$V65)

```