```
#############################################################
#UNIVERSITY : STEVENS INSTITUE OF TECHNOLOGY
#Project : HW_09_SVM
#Purpose : Use SVM methodology to develop a classification model
#First Name : Sarthak
#Last Name : Ahir
#CWID : 10479028
#Date : 12/06/2021
#############################################################
rm(list=ls())
dev.off
#Clear all graphs
try(dev.off(),silent=TRUE)


#Load the "wisc_bc_ContinuousVar" from canvas into R and perform the analysis

newDataSet<-read.csv("~/Downloads/wisc_bc_ContinuousVar.csv")

#Summarizing each column
summary(newDataSet)
table(newDataSet$Class)

View(newDataSet)

#deleting first row
newDataSet = subset(newDataSet, select = -c(id) )

#Fasctorising the diagnoasis column
newDataSet$diagnosis <- factor(newDataSet$diagnosis, levels = c('M','B'),labels = c(1,2))

#Splitting the dataet into training and testing
index<-sort(sample(nrow(newDataSet),as.integer(.70*nrow(newDataSet))))
train<-newDataSet[index,]
test<-newDataSet[-index,]

#Perfroming SVM
library(e1071)
svm.model <- svm( diagnosis~ ., data =train  )
svm.pred <- predict(svm.model,  test )

#Confusion matrix
confusion_matrix <- table(predict_svm=svm.pred,class=testing$diagnosis)
print(confusion_matrix)
#Accuracy
accuracy <- function(x){sum(diag(x)/(sum(rowSums(x)))) * 100}
accuracy(confusion_matrix)
```

Source

Console | **Terminal** | **Jobs**

R 4.1.2 · ~/

```
> ###############################################################
> #UNIVERSITY : STEVENS INSTITUE OF TECHNOLOGY
> #Project : HW_09_SVM
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> #Date : 12/06/2021
> ###############################################################
> rm(list=ls())
> dev.off
function (which = dev.cur())
{
    if (which == 1)
        stop("cannot shut down device 1 (the null device)")
    .External(C_devoff, as.integer(which))
    dev.cur()
}
<bytecode: 0x7f96cbd9f288>
<environment: namespace:grDevices>
> #Clear all graphs
> try(dev.off(),silent=TRUE)
>
>
> #Load the "wisc_bc_ContinuousVar" from canvas into R and perform the analysis
>
> newDataSet<-read.csv("~/Downloads/wisc_bc_ContinuousVar.csv")
>
> #Summarizing each column
> summary(newDataSet)
       id            diagnosis          radius_mean      texture_mean
 Min.   :    8670   Length:569        Min.   : 6.981   Min.   : 9.71
 1st Qu.:  869218   Class :character  1st Qu.:11.700   1st Qu.:16.17
 Median :  906024   Mode  :character  Median :13.370   Median :18.84
 Mean   : 30371831                    Mean   :14.127   Mean   :19.29
```

Environment | **History** | **Connections** | **Tutorial**

Import Dataset · 83 MiB

R · Global Environment

svm.model	List of 30
test	171 obs. of 31 variables
train	398 obs. of 31 variables

Values

confusion_matrix	'table' int [1:2, 1:2] 64 0 2 105
index	int [1:398] 1 2 3 4 5 6 8 9 13 17 ...
svm.pred	Factor w/ 2 levels "1","2": 1 1 1 1 1 1 1 2...

Functions

Files | **Plots** | **Packages** | **Help** | **Viewer**

Zoom · Export

Source

Console | **Terminal** | **Jobs**

R 4.1.2 · ~/

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> summary(newDataSet)
       id            diagnosis          radius_mean      texture_mean
 Min.   :    8670   Length:569        Min.   : 6.981   Min.   : 9.71
 1st Qu.:  869218   Class :character  1st Qu.:11.700   1st Qu.:16.17
 Median :  906024   Mode  :character  Median :13.370   Median :18.84
 Mean   : 30371831                    Mean   :14.127   Mean   :19.29
 3rd Qu.: 8813129                     3rd Qu.:15.780   3rd Qu.:21.80
 Max.   :911320502                    Max.   :28.110   Max.   :39.28
 perimeter_mean     area_mean       smoothness_mean   compactness_mean
 Min.   : 43.79   Min.   : 143.5   Min.   :0.05263   Min.   :0.01938
 1st Qu.: 75.17   1st Qu.: 420.3   1st Qu.:0.08637   1st Qu.:0.06492
 Median : 86.24   Median : 551.1   Median :0.09587   Median :0.09263
 Mean   : 91.97   Mean   : 654.9   Mean   :0.09636   Mean   :0.10434
 3rd Qu.:104.10   3rd Qu.: 782.7   3rd Qu.:0.10530   3rd Qu.:0.13040
 Max.   :188.50   Max.   :2501.0   Max.   :0.16340   Max.   :0.34540
 concavity_mean    concave.points_mean symmetry_mean    fractal_dimension_mean
 Min.   :0.00000   Min.   :0.00000     Min.   :0.1060   Min.   :0.04996
 1st Qu.:0.02956   1st Qu.:0.02031     1st Qu.:0.1619   1st Qu.:0.05770
 Median :0.06154   Median :0.03350     Median :0.1792   Median :0.06154
 Mean   :0.08880   Mean   :0.04892     Mean   :0.1812   Mean   :0.06280
 3rd Qu.:0.13070   3rd Qu.:0.07400     3rd Qu.:0.1957   3rd Qu.:0.06612
 Max.   :0.42680   Max.   :0.20120     Max.   :0.3040   Max.   :0.09744
   radius_se        texture_se      perimeter_se     area_se
 Min.   :0.1115   Min.   :0.3602   Min.   : 0.757   Min.   :  6.802
 1st Qu.:0.2324   1st Qu.:0.8339   1st Qu.: 1.606   1st Qu.: 17.850
 Median :0.3242   Median :1.1080   Median : 2.287   Median : 24.530
 Mean   :0.4052   Mean   :1.2169   Mean   : 2.866   Mean   : 40.337
 3rd Qu.:0.4789   3rd Qu.:1.4740   3rd Qu.: 3.357   3rd Qu.: 45.190
 Max.   :2.8730   Max.   :4.8850   Max.   :21.980   Max.   :542.200
 smoothness_se      compactness_se     concavity_se      concave.points_se
 Min.   :0.001713   Min.   :0.002252   Min.   :0.00000   Min.   :0.000000
 1st Qu.:0.005169   1st Qu.:0.013080   1st Qu.:0.01509   1st Qu.:0.007638
 Median :0.006380   Median :0.020450   Median :0.02589   Median :0.010930
 Mean   :0.007041   Mean   :0.025478   Mean   :0.03189   Mean   :0.011796
 3rd Qu.:0.008146   3rd Qu.:0.032450   3rd Qu.:0.04205   3rd Qu.:0.014710
```

Environment | **History** | **Connections** | **Tutorial**

Import Dataset · 82 MiB

R · Global Environment

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confusion_matrix	'table' int [1:2, 1:2] 64 0 2 105
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Functions

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Zoom · Export

Top window - Console output:

```
                smoothness_se      compactness_se      concavity_se       concave.points_se
 Min.    :0.001713   Min.    :0.002252   Min.    :0.00000   Min.    :0.000000
 1st Qu.:0.005169   1st Qu.:0.013080   1st Qu.:0.01509   1st Qu.:0.007638
 Median :0.006380   Median :0.020450   Median :0.02589   Median :0.010930
 Mean    :0.007041   Mean    :0.025478   Mean    :0.03189   Mean    :0.011796
 3rd Qu.:0.008146   3rd Qu.:0.032450   3rd Qu.:0.04205   3rd Qu.:0.014710
 Max.    :0.031130   Max.    :0.135400   Max.    :0.39600   Max.    :0.052790
  symmetry_se       fractal_dimension_se  radius_worst     texture_worst
 Min.    :0.007882   Min.    :0.0008948   Min.    : 7.93   Min.    :12.02
 1st Qu.:0.015160   1st Qu.:0.0022480   1st Qu.:13.01   1st Qu.:21.08
 Median :0.018730   Median :0.0031870   Median :14.97   Median :25.41
 Mean    :0.020542   Mean    :0.0037949   Mean    :16.27   Mean    :25.68
 3rd Qu.:0.023480   3rd Qu.:0.0045580   3rd Qu.:18.79   3rd Qu.:29.72
 Max.    :0.078950   Max.    :0.0298400   Max.    :36.04   Max.    :49.54
 perimeter_worst    area_worst        smoothness_worst   compactness_worst
 Min.    : 50.41   Min.    : 185.2   Min.    :0.07117   Min.    :0.02729
 1st Qu.: 84.11   1st Qu.: 515.3   1st Qu.:0.11660   1st Qu.:0.14720
 Median : 97.66   Median : 686.5   Median :0.13130   Median :0.21190
 Mean    :107.26   Mean    : 880.6   Mean    :0.13237   Mean    :0.25427
 3rd Qu.:125.40   3rd Qu.:1084.0   3rd Qu.:0.14600   3rd Qu.:0.33910
 Max.    :251.20   Max.    :4254.0   Max.    :0.22260   Max.    :1.05800
 concavity_worst   concave.points_worst symmetry_worst
 Min.    :0.0000   Min.    :0.00000   Min.    :0.1565
 1st Qu.:0.1145   1st Qu.:0.06493   1st Qu.:0.2504
 Median :0.2267   Median :0.09993   Median :0.2822
 Mean    :0.2722   Mean    :0.11461   Mean    :0.2901
 3rd Qu.:0.3829   3rd Qu.:0.16140   3rd Qu.:0.3179
 Max.    :1.2520   Max.    :0.29100   Max.    :0.6638
 fractal_dimension_worst
 Min.    :0.05504
 1st Qu.:0.07146
 Median :0.08004
 Mean    :0.08395
 3rd Qu.:0.09208
 Max    :0.20750
```

Environment panel (top):
- svm.model : List of 30
- test : 171 obs. of 31 variables
- train : 398 obs. of 31 variables

Values
- confusion_matrix : 'table' int [1:2, 1:2] 64 0 2 105
- index : int [1:398] 1 2 3 4 5 6 8 9 13 17 ...
- svm.pred : Factor w/ 2 levels "1","2": 1 1 1 1 1 1 1 2…

Functions

Files Plots Packages Help Viewer

Bottom window - Console:

```
> table(newDataSet$Class)
< table of extent 0 >
>
> View(newDataSet)
>
> #deleting first row
> newDataSet = subset(newDataSet, select = -c(id) )
>
> #Fasctorising the diagnoasis column
> newDataSet$diagnosis <- factor(newDataSet$diagnosis, levels = c('M','B'),labels = c
(1,2))
>
> #Splitting the dataet into training and testing
> index<-sort(sample(nrow(newDataSet),as.integer(.70*nrow(newDataSet))))
> train<-newDataSet[index,]
> test<-newDataSet[-index,]
>
> #Perfroming SVM
> library(e1071)
> svm.model <- svm( diagnosis~ ., data =train  )
> svm.pred <- predict(svm.model,  test )
>
> #Confusion matrix
> confusion_matrix <- table(predict_svm=svm.pred,class=test$diagnosis)
> print(confusion_matrix)
          class
predict_svm   1    2
          1  64    2
          2   0  105
>
> #Accuracy
> accuracy <- function(x){sum(diag(x)/(sum(rowSums(x)))) * 100}
> accuracy(confusion_matrix)
[1] 98.83041
>
```

Environment panel (bottom):
- svm.model : List of 30
- test : 171 obs. of 31 variables
- train : 398 obs. of 31 variables

Values
- confusion_matrix : 'table' int [1:2, 1:2] 64 0 2 105
- index : int [1:398] 1 2 3 4 5 6 8 9 13 17 ...
- svm.pred : Factor w/ 2 levels "1","2": 1 1 1 1 1 1 1 2…

Functions

Files Plots Packages Help Viewer