1_ksvm___support_vector_machines.R

win10

2021-05-14

```
# ##############################################################################
rm(list = ls())
options(digits = 5)
# if (!is.null(dev.list())){dev.off()}
# ##############################################################################

library(kernlab) # Kernel-based machine learning methods
library(ggplot2)
```

```
##
## Attaching package: 'ggplot2'
```

```
## The following object is masked from 'package:kernlab':
##
##     alpha
```

```
library(reshape2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
# read file. Use credit_card_data.txt
my_data <- read.table(file.choose(), header=FALSE, sep = "", dec=".")

# no train-test split. use all data. demonstration of svm.
# predictors/features/variables
x =as.matrix(my_data[, 1:10])

# target/response
y = as.factor(my_data[, 11])

#results=list()
results <- vector(mode = "list", length = 1)
C_set_values <- vector(mode = "list", length = 1)
Accuracy_set_values <- vector(mode = "list", length = 1)
Kernel_set_values <- vector(mode = "list", length = 1)
```

```
i_index <- 1
test_range <-  c(0.000001, 0.00001, 0.0001, 0.001, 0.1, 1, 10, 100, 1000, 10000)

class(test_range)
```

```
## [1] "numeric"
```

```
kernel_list <- c("rbfdot","polydot","vanilladot","tanhdot","laplacedot","besseldot","anovadot",
                 "splinedot")
#kernel_list <- c("rbfdot","polydot","vanilladot","tanhdot")

df_of_values <-NA # initialize results df

func_C_val_test <-function(kernel_name, C_value)
{
  model <- ksvm(y~x,scaled=TRUE, type="C-svc", kernel= kernel_name, C=C_value, kpar="automatic")
  a <- colSums(model@xmatrix[[1]] * model@coef[[1]])
  a0 <- model@b * (-1)
  predict_y <- predict(model,x)
  qty_predict_is_actual <- sum(predict_y == y)
  total_observations <- nrow(my_data)
  match_predict <-  qty_predict_is_actual / total_observations
  C_set_values[i_index] <- C_value
  Accuracy_set_values[i_index] <- match_predict
  Kernel_set_values[i_index] <- kernel_name
  i_index <- i_index + 1

  df_of_values <- rbind(df_of_values,
                        data.frame("kernel_name"= kernel_name,
                                   c("C_value"=C_set_values[1],
                                     "match_predict" = Accuracy_set_values[1]
                                   )
                        )
  )
  return(df_of_values)
}

for (kernel_name in kernel_list)
{
  for (C_value in test_range)
  {
    df_of_values <-func_C_val_test(kernel_name, C_value)
  }
}
```

```
##  Setting default kernel parameters
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```

```
df_of_values
```

```
##    kernel_name C_value match_predict
```

```
## 1         <NA>      NA           NA
## 2       rbfdot   1e-06      0.54740
## 3       rbfdot   1e-05      0.54740
## 4       rbfdot   1e-04      0.54740
## 5       rbfdot   1e-03      0.54740
## 6       rbfdot   1e-01      0.85933
## 7       rbfdot   1e+00      0.87003
## 8       rbfdot   1e+01      0.90520
## 9       rbfdot   1e+02      0.95872
## 10      rbfdot   1e+03      0.98471
## 11      rbfdot   1e+04      0.99541
## 12     polydot   1e-06      0.54740
## 13     polydot   1e-05      0.54740
## 14     polydot   1e-04      0.54740
## 15     polydot   1e-03      0.83792
## 16     polydot   1e-01      0.86391
## 17     polydot   1e+00      0.86391
## 18     polydot   1e+01      0.86391
## 19     polydot   1e+02      0.86391
## 20     polydot   1e+03      0.86239
## 21     polydot   1e+04      0.86239
## 22  vanilladot   1e-06      0.54740
## 23  vanilladot   1e-05      0.54740
## 24  vanilladot   1e-04      0.54740
## 25  vanilladot   1e-03      0.83792
## 26  vanilladot   1e-01      0.86391
## 27  vanilladot   1e+00      0.86391
## 28  vanilladot   1e+01      0.86391
## 29  vanilladot   1e+02      0.86391
## 30  vanilladot   1e+03      0.86239
## 31  vanilladot   1e+04      0.86239
## 32     tanhdot   1e-06      0.54740
## 33     tanhdot   1e-05      0.54740
## 34     tanhdot   1e-04      0.54740
## 35     tanhdot   1e-03      0.54740
## 36     tanhdot   1e-01      0.74312
## 37     tanhdot   1e+00      0.72171
## 38     tanhdot   1e+01      0.72171
## 39     tanhdot   1e+02      0.72171
## 40     tanhdot   1e+03      0.72171
## 41     tanhdot   1e+04      0.72171
## 42  laplacedot   1e-06      0.54740
## 43  laplacedot   1e-05      0.54740
## 44  laplacedot   1e-04      0.54740
## 45  laplacedot   1e-03      0.54740
## 46  laplacedot   1e-01      0.86086
## 47  laplacedot   1e+00      0.86391
## 48  laplacedot   1e+01      0.96024
## 49  laplacedot   1e+02      1.00000
## 50  laplacedot   1e+03      1.00000
## 51  laplacedot   1e+04      1.00000
## 52   besseldot   1e-06      0.54740
## 53   besseldot   1e-05      0.54740
## 54   besseldot   1e-04      0.54740
```

```
## 55   besseldot   1e-03       0.54740
## 56   besseldot   1e-01       0.85627
## 57   besseldot   1e+00       0.86850
## 58   besseldot   1e+01       0.89602
## 59   besseldot   1e+02       0.92508
## 60   besseldot   1e+03       0.92049
## 61   besseldot   1e+04       0.92049
## 62    anovadot   1e-06       0.54740
## 63    anovadot   1e-05       0.54740
## 64    anovadot   1e-04       0.54740
## 65    anovadot   1e-03       0.58869
## 66    anovadot   1e-01       0.86239
## 67    anovadot   1e+00       0.86391
## 68    anovadot   1e+01       0.87309
## 69    anovadot   1e+02       0.90673
## 70    anovadot   1e+03       0.90673
## 71    anovadot   1e+04       0.90826
## 72   splinedot   1e-06       0.55810
## 73   splinedot   1e-05       0.57798
## 74   splinedot   1e-04       0.62385
## 75   splinedot   1e-03       0.78287
## 76   splinedot   1e-01       0.94495
## 77   splinedot   1e+00       0.96636
## 78   splinedot   1e+01       0.97859
## 79   splinedot   1e+02       0.97859
## 80   splinedot   1e+03       0.97859
## 81   splinedot   1e+04       0.97859
```