proj-Breast Cancer Detection

2023-04-04

Loading the dataset

```
path <- file.choose()
```

```
df <- read.csv(path)
df <- df[,-33]
head(df)
```

```
##         id diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1   842302         M       17.99        10.38         122.80    1001.0
## 2   842517         M       20.57        17.77         132.90    1326.0
## 3 84300903         M       19.69        21.25         130.00    1203.0
## 4 84348301         M       11.42        20.38          77.58     386.1
## 5 84358402         M       20.29        14.34         135.10    1297.0
## 6   843786         M       12.45        15.70          82.57     477.1
##   smoothness_mean compactness_mean concavity_mean concave.points_mean
## 1         0.11840          0.27760         0.3001             0.14710
## 2         0.08474          0.07864         0.0869             0.07017
## 3         0.10960          0.15990         0.1974             0.12790
## 4         0.14250          0.28390         0.2414             0.10520
## 5         0.10030          0.13280         0.1980             0.10430
## 6         0.12780          0.17000         0.1578             0.08089
##   symmetry_mean fractal_dimension_mean radius_se texture_se perimeter_se
## 1        0.2419                0.07871    1.0950     0.9053        8.589
## 2        0.1812                0.05667    0.5435     0.7339        3.398
## 3        0.2069                0.05999    0.7456     0.7869        4.585
## 4        0.2597                0.09744    0.4956     1.1560        3.445
## 5        0.1809                0.05883    0.7572     0.7813        5.438
## 6        0.2087                0.07613    0.3345     0.8902        2.217
##   area_se smoothness_se compactness_se concavity_se concave.points_se
## 1  153.40      0.006399        0.04904      0.05373           0.01587
## 2   74.08      0.005225        0.01308      0.01860           0.01340
## 3   94.03      0.006150        0.04006      0.03832           0.02058
## 4   27.23      0.009110        0.07458      0.05661           0.01867
## 5   94.44      0.011490        0.02461      0.05688           0.01885
## 6   27.19      0.007510        0.03345      0.03672           0.01137
##   symmetry_se fractal_dimension_se radius_worst texture_worst perimeter_worst
## 1     0.03003             0.006193        25.38         17.33          184.60
## 2     0.01389             0.003532        24.99         23.41          158.80
## 3     0.02250             0.004571        23.57         25.53          152.50
## 4     0.05963             0.009208        14.91         26.50           98.87
## 5     0.01756             0.005115        22.54         16.67          152.20
## 6     0.02165             0.005082        15.47         23.75          103.40
##   area_worst smoothness_worst compactness_worst concavity_worst
## 1     2019.0           0.1622            0.6656          0.7119
## 2     1956.0           0.1238            0.1866          0.2416
## 3     1709.0           0.1444            0.4245          0.4504
## 4      567.7           0.2098            0.8663          0.6869
## 5     1575.0           0.1374            0.2050          0.4000
## 6      741.6           0.1791            0.5249          0.5355
##   concave.points_worst symmetry_worst fractal_dimension_worst
## 1               0.2654         0.4601                 0.11890
## 2               0.1860         0.2750                 0.08902
## 3               0.2430         0.3613                 0.08758
## 4               0.2575         0.6638                 0.17300
## 5               0.1625         0.2364                 0.07678
## 6               0.1741         0.3985                 0.12440
```

Handling the NA Values with mean of the feature records and also omitting remaining NA value's records

```
df$radius_mean <- ifelse(is.na(df$radius_mean),
                     ave(df$radius_mean, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$radius_mean)
df$area_mean <- ifelse(is.na(df$area_mean),
                     ave(df$area_mean, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$area_mean)
df$concave.points_worst <- ifelse(is.na(df$concave.points_worst),
                     ave(df$concave.points_worst, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$concave.points_worst)
df$area_worst = ifelse(is.na(df$area_worst),
                     ave(df$area_worst, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$area_worst)
df$concave.points_mean = ifelse(is.na(df$concave.points_mean),
                     ave(df$concave.points_mean, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$concave.points_mean)
df$area_se = ifelse(is.na(df$area_se),
                     ave(df$area_se, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$area_se)
df$concavity_se = ifelse(is.na(df$concavity_se),
                     ave(df$concavity_se, FUN = function(x)mean(x, na.rm = TRUE)),
                     df$concavity_se)
```

Removing the ID Column as this doesn't affect the result

```
df <- df[,-1]
```

Encoding the Categorical data for Diagnosis where 1 represents M (Malignant) and 2 represents B (Benign)

```
df$diagnosis <- factor(df$diagnosis,levels = c('M','B'),labels = c(1, 2))
head(df)
```

```
##   diagnosis radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## 1         1       17.99        10.38         122.80    1001.0         0.11840
## 2         1       20.57        17.77         132.90    1326.0         0.08474
## 3         1       19.69        21.25         130.00    1203.0         0.10960
## 4         1       11.42        20.38          77.58     386.1         0.14250
## 5         1       20.29        14.34         135.10    1297.0         0.10030
## 6         1       12.45        15.70          82.57     477.1         0.12780
##   compactness_mean concavity_mean concave.points_mean symmetry_mean
## 1          0.27760         0.3001             0.14710        0.2419
## 2          0.07864         0.0869             0.07017        0.1812
## 3          0.15990         0.1974             0.12790        0.2069
## 4          0.28390         0.2414             0.10520        0.2597
## 5          0.13280         0.1980             0.10430        0.1809
## 6          0.17000         0.1578             0.08089        0.2087
##   fractal_dimension_mean radius_se texture_se perimeter_se area_se
## 1                0.07871    1.0950     0.9053        8.589  153.40
## 2                0.05667    0.5435     0.7339        3.398   74.08
## 3                0.05999    0.7456     0.7869        4.585   94.03
## 4                0.09744    0.4956     1.1560        3.445   27.23
## 5                0.05883    0.7572     0.7813        5.438   94.44
## 6                0.07613    0.3345     0.8902        2.217   27.19
##   smoothness_se compactness_se concavity_se concave.points_se symmetry_se
## 1      0.006399        0.04904      0.05373           0.01587     0.03003
## 2      0.005225        0.01308      0.01860           0.01340     0.01389
## 3      0.006150        0.04006      0.03832           0.02058     0.02250
## 4      0.009110        0.07458      0.05661           0.01867     0.05963
## 5      0.011490        0.02461      0.05688           0.01885     0.01756
## 6      0.007510        0.03345      0.03672           0.01137     0.02165
##   fractal_dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1             0.006193        25.38         17.33          184.60     2019.0
## 2             0.003532        24.99         23.41          158.80     1956.0
## 3             0.004571        23.57         25.53          152.50     1709.0
## 4             0.009208        14.91         26.50           98.87      567.7
## 5             0.005115        22.54         16.67          152.20     1575.0
## 6             0.005082        15.47         23.75          103.40      741.6
##   smoothness_worst compactness_worst concavity_worst concave.points_worst
## 1           0.1622            0.6656          0.7119               0.2654
## 2           0.1238            0.1866          0.2416               0.1860
## 3           0.1444            0.4245          0.4504               0.2430
## 4           0.2098            0.8663          0.6869               0.2575
## 5           0.1374            0.2050          0.4000               0.1625
## 6           0.1791            0.5249          0.5355               0.1741
##   symmetry_worst fractal_dimension_worst
## 1         0.4601                 0.11890
## 2         0.2750                 0.08902
## 3         0.3613                 0.08758
## 4         0.6638                 0.17300
## 5         0.2364                 0.07678
## 6         0.3985                 0.12440
```

Splitting the data into train and test data using dplyr package

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 4.2.3
```

```
##
## 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
```

```r
df$id <- 1:nrow(df)

# Splitting into 80-training and 20-test dataset
trn <- df%>%dplyr::sample_frac(0.80)
tst <- dplyr::anti_join(df,trn,by='id')
```

```r
trn <- trn[,-32]
tst <- trn[,-32]
df <- df[,-32]
```

```r
head(trn)
```

```
##   diagnosis radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## 1         2      11.890        18.35          77.32     432.2         0.09363
## 2         2       8.734        16.84          55.27     234.3         0.10390
## 3         2      12.890        15.70          84.08     516.6         0.07818
## 4         1      17.990        10.38         122.80    1001.0         0.11840
## 5         2      11.800        17.26          75.26     431.9         0.09087
## 6         1      15.340        14.26         102.50     704.4         0.10730
##   compactness_mean concavity_mean concave.points_mean symmetry_mean
## 1          0.11540        0.06636             0.03142        0.1967
## 2          0.07428        0.00000             0.00000        0.1985
## 3          0.09580        0.11150             0.03390        0.1432
## 4          0.27760        0.30010             0.14710        0.2419
## 5          0.06232        0.02853             0.01638        0.1847
## 6          0.21350        0.20770             0.09756        0.2521
##   fractal_dimension_mean radius_se texture_se perimeter_se area_se
## 1                0.06314    0.2963     1.5630        2.087   21.46
## 2                0.07098    0.5169     2.0790        3.167   28.85
## 3                0.05935    0.2913     1.3890        2.347   23.29
## 4                0.07871    1.0950     0.9053        8.589  153.40
## 5                0.06019    0.3438     1.1400        2.225   25.06
## 6                0.07032    0.4388     0.7096        3.384   44.91
##   smoothness_se compactness_se concavity_se concave.points_se symmetry_se
## 1      0.008872        0.04192      0.05946          0.017850     0.02793
## 2      0.015820        0.01966      0.00000          0.000000     0.01865
## 3      0.006418        0.03961      0.07927          0.017740     0.01878
## 4      0.006399        0.04904      0.05373          0.015870     0.03003
## 5      0.005463        0.01964      0.02079          0.005398     0.01477
## 6      0.006789        0.05328      0.06446          0.022520     0.03672
##   fractal_dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1             0.004775        13.25         27.10           86.20      531.2
## 2             0.006736        10.17         22.80           64.01      317.0
## 3             0.003696        13.90         19.69           92.12      595.6
## 4             0.006193        25.38         17.33          184.60     2019.0
## 5             0.003071        13.45         24.49           86.00      562.0
## 6             0.004394        18.07         19.08          125.10      980.9
##   smoothness_worst compactness_worst concavity_worst concave.points_worst
## 1          0.14050            0.3046          0.2806              0.11380
## 2          0.14600            0.1310          0.0000              0.00000
## 3          0.09926            0.2317          0.3344              0.10170
## 4          0.16220            0.6656          0.7119              0.26540
## 5          0.12440            0.1726          0.1449              0.05356
## 6          0.13900            0.5954          0.6305              0.23930
##   symmetry_worst fractal_dimension_worst
## 1         0.3397                 0.08365
## 2         0.2445                 0.08865
## 3         0.1999                 0.07127
## 4         0.4601                 0.11890
## 5         0.2779                 0.08121
## 6         0.4667                 0.09946
```

```
head(tst)
```

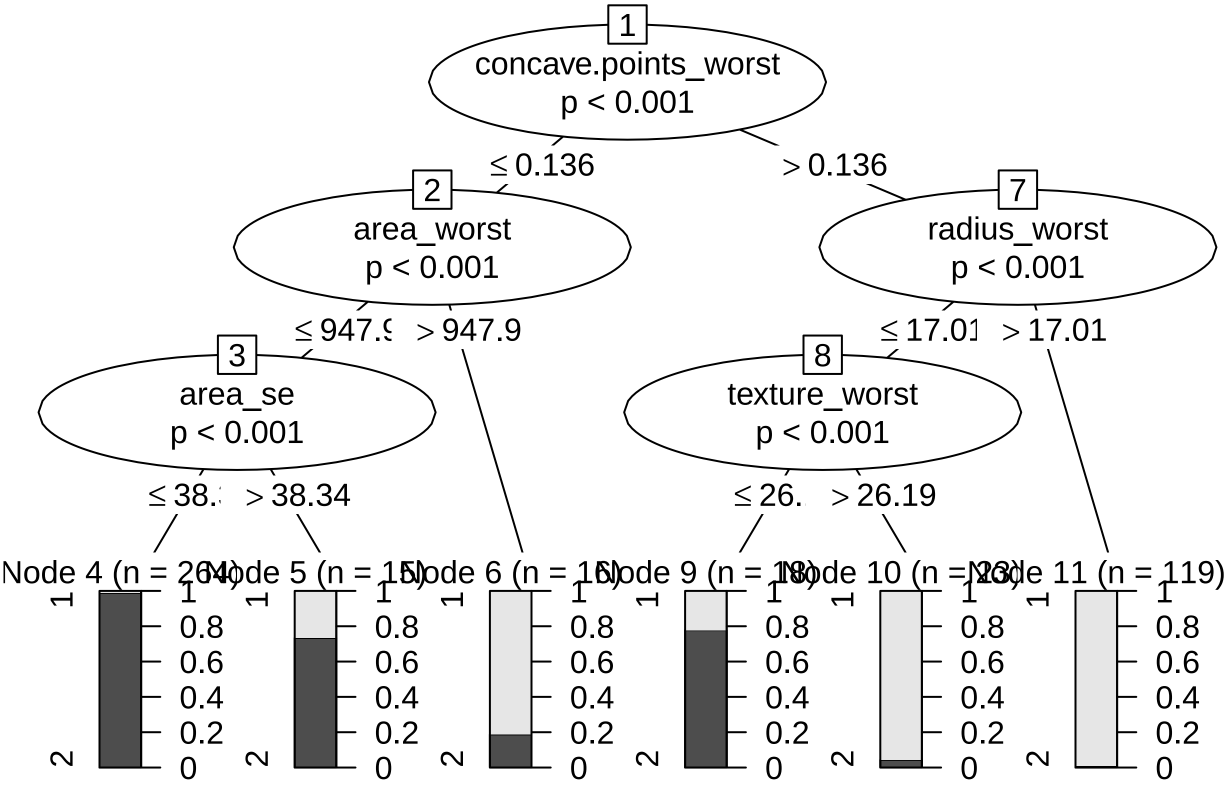
```
##   diagnosis radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## 1         2      11.890        18.35          77.32     432.2         0.09363
## 2         2       8.734        16.84          55.27     234.3         0.10390
## 3         2      12.890        15.70          84.08     516.6         0.07818
## 4         1      17.990        10.38         122.80    1001.0         0.11840
## 5         2      11.800        17.26          75.26     431.9         0.09087
## 6         1      15.340        14.26         102.50     704.4         0.10730
##   compactness_mean concavity_mean concave.points_mean symmetry_mean
## 1          0.11540        0.06636             0.03142        0.1967
## 2          0.07428        0.00000             0.00000        0.1985
## 3          0.09580        0.11150             0.03390        0.1432
## 4          0.27760        0.30010             0.14710        0.2419
## 5          0.06232        0.02853             0.01638        0.1847
## 6          0.21350        0.20770             0.09756        0.2521
##   fractal_dimension_mean radius_se texture_se perimeter_se area_se
## 1                0.06314    0.2963     1.5630        2.087   21.46
## 2                0.07098    0.5169     2.0790        3.167   28.85
## 3                0.05935    0.2913     1.3890        2.347   23.29
## 4                0.07871    1.0950     0.9053        8.589  153.40
## 5                0.06019    0.3438     1.1400        2.225   25.06
## 6                0.07032    0.4388     0.7096        3.384   44.91
##   smoothness_se compactness_se concavity_se concave.points_se symmetry_se
## 1      0.008872        0.04192      0.05946          0.017850     0.02793
## 2      0.015820        0.01966      0.00000          0.000000     0.01865
## 3      0.006418        0.03961      0.07927          0.017740     0.01878
## 4      0.006399        0.04904      0.05373          0.015870     0.03003
## 5      0.005463        0.01964      0.02079          0.005398     0.01477
## 6      0.006789        0.05328      0.06446          0.022520     0.03672
##   fractal_dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1             0.004775        13.25         27.10           86.20      531.2
## 2             0.006736        10.17         22.80           64.01      317.0
## 3             0.003696        13.90         19.69           92.12      595.6
## 4             0.006193        25.38         17.33          184.60     2019.0
## 5             0.003071        13.45         24.49           86.00      562.0
## 6             0.004394        18.07         19.08          125.10      980.9
##   smoothness_worst compactness_worst concavity_worst concave.points_worst
## 1          0.14050            0.3046          0.2806              0.11380
## 2          0.14600            0.1310          0.0000              0.00000
## 3          0.09926            0.2317          0.3344              0.10170
## 4          0.16220            0.6656          0.7119              0.26540
## 5          0.12440            0.1726          0.1449              0.05356
## 6          0.13900            0.5954          0.6305              0.23930
##   symmetry_worst fractal_dimension_worst
## 1         0.3397                 0.08365
## 2         0.2445                 0.08865
## 3         0.1999                 0.07127
## 4         0.4601                 0.11890
## 5         0.2779                 0.08121
## 6         0.4667                 0.09946
```

Implementing decision tree classifier

```
library(party)
```

```
## Warning: package 'party' was built under R version 4.2.3

## Loading required package: grid

## Loading required package: mvtnorm

## Loading required package: modeltools

## Loading required package: stats4

## Loading required package: strucchange

## Warning: package 'strucchange' was built under R version 4.2.3

## Loading required package: zoo

## Warning: package 'zoo' was built under R version 4.2.3

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

## Loading required package: sandwich

## Warning: package 'sandwich' was built under R version 4.2.3

##
## Attaching package: 'party'

## The following object is masked from 'package:dplyr':
##
##     where
```

```
dt <- ctree(diagnosis~., trn)
plot(dt)
```



```
dt
```

```
##
##   Conditional inference tree with 6 terminal nodes
##
## Response:  diagnosis
## Inputs:  radius_mean, texture_mean, perimeter_mean, area_mean, smoothness_mean, compactness_mean, co
## Number of observations:  455
##
## 1) concave.points_worst <= 0.1357; criterion = 1, statistic = 286.707
##   2) area_worst <= 947.9; criterion = 1, statistic = 108.068
##     3) area_se <= 38.34; criterion = 1, statistic = 28.407
##       4)*  weights = 264
##     3) area_se > 38.34
##       5)*  weights = 15
##   2) area_worst > 947.9
##     6)*  weights = 16
## 1) concave.points_worst > 0.1357
##   7) radius_worst <= 17.01; criterion = 1, statistic = 28.921
##     8) texture_worst <= 26.19; criterion = 1, statistic = 19.78
##       9)*  weights = 18
##     8) texture_worst > 26.19
##       10)*  weights = 23
##   7) radius_worst > 17.01
##     11)*  weights = 119
```

Predicted output of test data

```
dt_pred <- predict(dt,tst)
dt_pred
```

```
##   [1] 2 2 2 1 2 1 2 2 2 2 1 2 2 2 2 2 2 1 1 2 2 1 2 2 1 2 2 1 1 1 2 2 2 2 1 2 1
##  [38] 1 2 1 1 1 2 2 1 2 2 2 1 1 1 2 1 2 2 2 2 2 2 1 1 1 1 2 2 2 1 2 2 2 2 2 1 2
##  [75] 1 2 2 2 2 2 2 2 2 2 2 1 2 2 2 1 2 1 2 1 2 2 2 1 2 2 2 2 1 2 1 1 1 2 2 1 1
## [112] 1 1 2 1 2 2 2 1 1 1 2 2 2 1 2 2 2 2 1 2 2 2 1 2 1 1 2 1 1 2 1 2 1 2 2 2 2
## [149] 1 1 2 1 1 2 2 1 2 2 2 1 1 2 2 1 2 2 2 2 1 2 1 1 2 1 2 1 2 2 2 2 2 2 1 1 2
## [186] 1 1 2 2 2 1 2 2 2 2 2 2 1 2 2 1 1 1 1 1 2 1 2 2 2 1 2 2 2 1 2 2 2 2 1 2 2
## [223] 2 2 2 2 1 2 1 1 1 2 2 2 1 2 2 2 2 2 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 1 2 2 2
## [260] 1 2 2 2 2 2 1 2 2 2 1 2 2 2 1 2 2 2 2 2 2 2 1 1 2 1 2 1 2 2 2 2 1 2 2 2 2
## [297] 1 1 1 2 2 2 2 2 2 1 2 1 2 1 1 2 2 1 1 2 1 2 2 2 2 1 2 2 2 1 1 1 2 2 1 2 1
## [334] 1 2 1 2 1 2 1 2 2 1 2 2 2 1 2 1 2 2 2 2 2 2 1 2 2 1 2 2 2 2 2 1 2 2 1 2 2
## [371] 2 2 2 2 2 2 1 2 2 2 1 2 1 1 2 2 2 2 1 1 2 1 1 2 1 2 2 2 2 1 2 2 1 2 1 2 2
## [408] 1 2 1 2 2 2 2 1 2 1 2 2 2 2 2 2 1 2 1 1 2 2 2 2 1 2 1 2 2 2 1 1 1 1 2 2 2
## [445] 1 1 2 1 1 1 2 2 2 2 2
## Levels: 1 2
```

Confusion matrix for the decision tree model

```
library(caret)
```

```
## Warning: package 'caret' was built under R version 4.2.3
```

```
## Loading required package: ggplot2
```

```
## Loading required package: lattice
```

```
confusionMatrix(dt_pred, tst$diagnosis)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   1   2
##          1 153   5
##          2  11 286
##
##                Accuracy : 0.9648
##                  95% CI : (0.9435, 0.9798)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.9231
##
##  Mcnemar's Test P-Value : 0.2113
```

```
##
##             Sensitivity : 0.9329
##             Specificity : 0.9828
##          Pos Pred Value : 0.9684
##          Neg Pred Value : 0.9630
##              Prevalence : 0.3604
##          Detection Rate : 0.3363
##    Detection Prevalence : 0.3473
##       Balanced Accuracy : 0.9579
##
##        'Positive' Class : 1
##
```

Naive Bayes model

```
library(e1071)
```

```
## Warning: package 'e1071' was built under R version 4.2.3
```

```
nb <- naiveBayes(diagnosis ~ ., data = trn)
nb_pred <- predict(nb, newdata = tst)
confusionMatrix(nb_pred, tst$diagnosis)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   1   2
##          1 149  11
##          2  15 280
##
##                Accuracy : 0.9429
##                  95% CI : (0.9174, 0.9623)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.8754
##
##  Mcnemar's Test P-Value : 0.5563
##
##             Sensitivity : 0.9085
##             Specificity : 0.9622
##          Pos Pred Value : 0.9313
##          Neg Pred Value : 0.9492
##              Prevalence : 0.3604
##          Detection Rate : 0.3275
##    Detection Prevalence : 0.3516
##       Balanced Accuracy : 0.9354
##
##        'Positive' Class : 1
##
```

SVM model for different kernels

```r
library(e1071)
# Linear kernel
svm <- svm(diagnosis ~ ., data = trn, kernel = "linear")
svm_pred <- predict(svm, newdata = tst)
confusionMatrix(svm_pred, as.factor(tst$diagnosis))
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   1   2
##          1 160   1
##          2   4 290
##
##                Accuracy : 0.989
##                  95% CI : (0.9745, 0.9964)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.9761
##
##  Mcnemar’s Test P-Value : 0.3711
##
##             Sensitivity : 0.9756
##             Specificity : 0.9966
##          Pos Pred Value : 0.9938
##          Neg Pred Value : 0.9864
##              Prevalence : 0.3604
##          Detection Rate : 0.3516
##    Detection Prevalence : 0.3538
##       Balanced Accuracy : 0.9861
##
##        ’Positive’ Class : 1
##
```

```r
# Radial kernel
svm <- svm(diagnosis ~ ., data = trn, kernel = "radial")
svm_pred <- predict(svm, newdata = tst)
confusionMatrix(svm_pred, tst$diagnosis)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   1   2
##          1 160   0
##          2   4 291
##
##                Accuracy : 0.9912
##                  95% CI : (0.9776, 0.9976)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.9808
```

```
##
##  Mcnemar's Test P-Value : 0.1336
##
##             Sensitivity : 0.9756
##             Specificity : 1.0000
##          Pos Pred Value : 1.0000
##          Neg Pred Value : 0.9864
##              Prevalence : 0.3604
##          Detection Rate : 0.3516
##    Detection Prevalence : 0.3516
##       Balanced Accuracy : 0.9878
##
##        'Positive' Class : 1
##
```

```r
# Sigmoid kernel
svm <- svm(diagnosis ~ ., data = trn, kernel = "sigmoid")
svm_pred <- predict(svm, newdata = tst)
confusionMatrix(svm_pred, tst$diagnosis)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction   1   2
##          1 149  10
##          2  15 281
##
##                Accuracy : 0.9451
##                  95% CI : (0.92, 0.9641)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : <2e-16
##
##                   Kappa : 0.88
##
##  Mcnemar's Test P-Value : 0.4237
##
##             Sensitivity : 0.9085
##             Specificity : 0.9656
##          Pos Pred Value : 0.9371
##          Neg Pred Value : 0.9493
##              Prevalence : 0.3604
##          Detection Rate : 0.3275
##    Detection Prevalence : 0.3495
##       Balanced Accuracy : 0.9371
##
##        'Positive' Class : 1
##
```

```r
# Polynomial kernel
svm <- svm(diagnosis ~ ., data = trn, kernel = "polynomial")
svm_pred <- predict(svm, newdata = tst)
confusionMatrix(svm_pred, tst$diagnosis)
```

```
## Confusion Matrix and Statistics
```

```
##
##           Reference
## Prediction   1   2
##          1 126   0
##          2  38 291
##
##                Accuracy : 0.9165
##                  95% CI : (0.8872, 0.9402)
##     No Information Rate : 0.6396
##     P-Value [Acc > NIR] : < 2.2e-16
##
##                   Kappa : 0.8092
##
##  Mcnemar’s Test P-Value : 1.947e-09
##
##             Sensitivity : 0.7683
##             Specificity : 1.0000
##          Pos Pred Value : 1.0000
##          Neg Pred Value : 0.8845
##              Prevalence : 0.3604
##          Detection Rate : 0.2769
##    Detection Prevalence : 0.2769
##       Balanced Accuracy : 0.8841
##
##        ’Positive’ Class : 1
##
```