Lab_7

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Dataset: Cleaned-data Design a Support Vector Machine (for the given Dataset) - Binary Classifier using Linear and Radial Kernel and Cross validation to determine optimized values for the hyper-parameters of the model.

The task is to develop a binary classifier to predict each of the severity levels of i) mild ii) moderate iii) severe

```
Cleaned.Data=read.csv("/Users/tarunsidhu/Desktop/Sem 4/ML/ML(Lab)/Data Sets/Cleane
d-Data.csv")
summary(Cleaned.Data)
```

```
##      Fever            Tiredness        Dry.Cough        Difficulty.in.Breathing
##  Min.   :0.0000   Min.   :0.0    Min.   :0.0000   Min.   :0.0
##  1st Qu.:0.0000   1st Qu.:0.0    1st Qu.:0.0000   1st Qu.:0.0
##  Median :0.0000   Median :0.5    Median :1.0000   Median :0.5
##  Mean   :0.3125   Mean   :0.5    Mean   :0.5625   Mean   :0.5
##  3rd Qu.:1.0000   3rd Qu.:1.0    3rd Qu.:1.0000   3rd Qu.:1.0
##  Max.   :1.0000   Max.   :1.0    Max.   :1.0000   Max.   :1.0
##   Sore.Throat      None_Sympton       Pains          Nasal.Congestion
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.0000   Median :0.0000   Median :0.0000   Median :1.0000
##  Mean   :0.3125   Mean   :0.0625   Mean   :0.3636   Mean   :0.5455
##  3rd Qu.:1.0000   3rd Qu.:0.0000   3rd Qu.:1.0000   3rd Qu.:1.0000
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
##    Runny.Nose        Diarrhea       None_Experiencing   Age_0.9
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.00000   Min.   :0.0
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.00000   1st Qu.:0.0
##  Median :1.0000   Median :0.0000   Median :0.00000   Median :0.0
##  Mean   :0.5455   Mean   :0.3636   Mean   :0.09091   Mean   :0.2
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.00000   3rd Qu.:0.0
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.00000   Max.   :1.0
##    Age_10.19        Age_20.24        Age_25.59         Age_60.      Gender_Female
##  Min.   :0.0    Min.   :0.0    Min.   :0.0    Min.   :0.0    Min.   :0.0000
##  1st Qu.:0.0    1st Qu.:0.0    1st Qu.:0.0    1st Qu.:0.0    1st Qu.:0.0000
##  Median :0.0    Median :0.0    Median :0.0    Median :0.0    Median :0.0000
##  Mean   :0.2    Mean   :0.2    Mean   :0.2    Mean   :0.2    Mean   :0.3333
##  3rd Qu.:0.0    3rd Qu.:0.0    3rd Qu.:0.0    3rd Qu.:0.0    3rd Qu.:1.0000
##  Max.   :1.0    Max.   :1.0    Max.   :1.0    Max.   :1.0    Max.   :1.0000
##   Gender_Male     Gender_Transgender Severity_Mild   Severity_Moderate
##  Min.   :0.0000   Min.   :0.0000   Min.   :0.00    Min.   :0.00
##  1st Qu.:0.0000   1st Qu.:0.0000   1st Qu.:0.00    1st Qu.:0.00
##  Median :0.0000   Median :0.0000   Median :0.00    Median :0.00
##  Mean   :0.3333   Mean   :0.3333   Mean   :0.25    Mean   :0.25
##  3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:0.25    3rd Qu.:0.25
##  Max.   :1.0000   Max.   :1.0000   Max.   :1.00    Max.   :1.00
##  Severity_None    Severity_Severe  Contact_Dont.Know   Contact_No
##  Min.   :0.00    Min.   :0.00    Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.00    1st Qu.:0.00    1st Qu.:0.0000   1st Qu.:0.0000
##  Median :0.00    Median :0.00    Median :0.0000   Median :0.0000
##  Mean   :0.25    Mean   :0.25    Mean   :0.3333   Mean   :0.3333
##  3rd Qu.:0.25    3rd Qu.:0.25    3rd Qu.:1.0000   3rd Qu.:1.0000
##  Max.   :1.00    Max.   :1.00    Max.   :1.0000   Max.   :1.0000
##   Contact_Yes        Country
##  Min.   :0.0000   Length:316800
##  1st Qu.:0.0000   Class :character
##  Median :0.0000   Mode  :character
##  Mean   :0.3333
##  3rd Qu.:1.0000
##  Max.   :1.0000
```

```r
Cleaned_Data_1 <- Cleaned.Data[1:10000,]
attach(Cleaned_Data_1)
plot(Fever,Sore.Throat)
library(e1071)
svm.fit <- svm(Severity_Mild ~ Fever+Sore.Throat, data = Cleaned_Data_1, type='C-c
lassification', kernel='linear', cost=10, scale=FALSE)
plot(svm.fit, Cleaned_Data_1)
```

```
## Error in plot.svm(svm.fit, Cleaned_Data_1): missing formula.
```

```r
summary(svm.fit)
```

```
##
## Call:
## svm(formula = Severity_Mild ~ Fever + Sore.Throat, data = Cleaned_Data_1,
##     type = "C-classification", kernel = "linear", cost = 10, scale = FALSE)
##
##
## Parameters:
##    SVM-Type:  C-classification
##  SVM-Kernel:  linear
##        cost:  10
##
## Number of Support Vectors:  5004
##
##  ( 2502 2502 )
##
##
## Number of Classes:  2
##
## Levels:
##  0 1
```
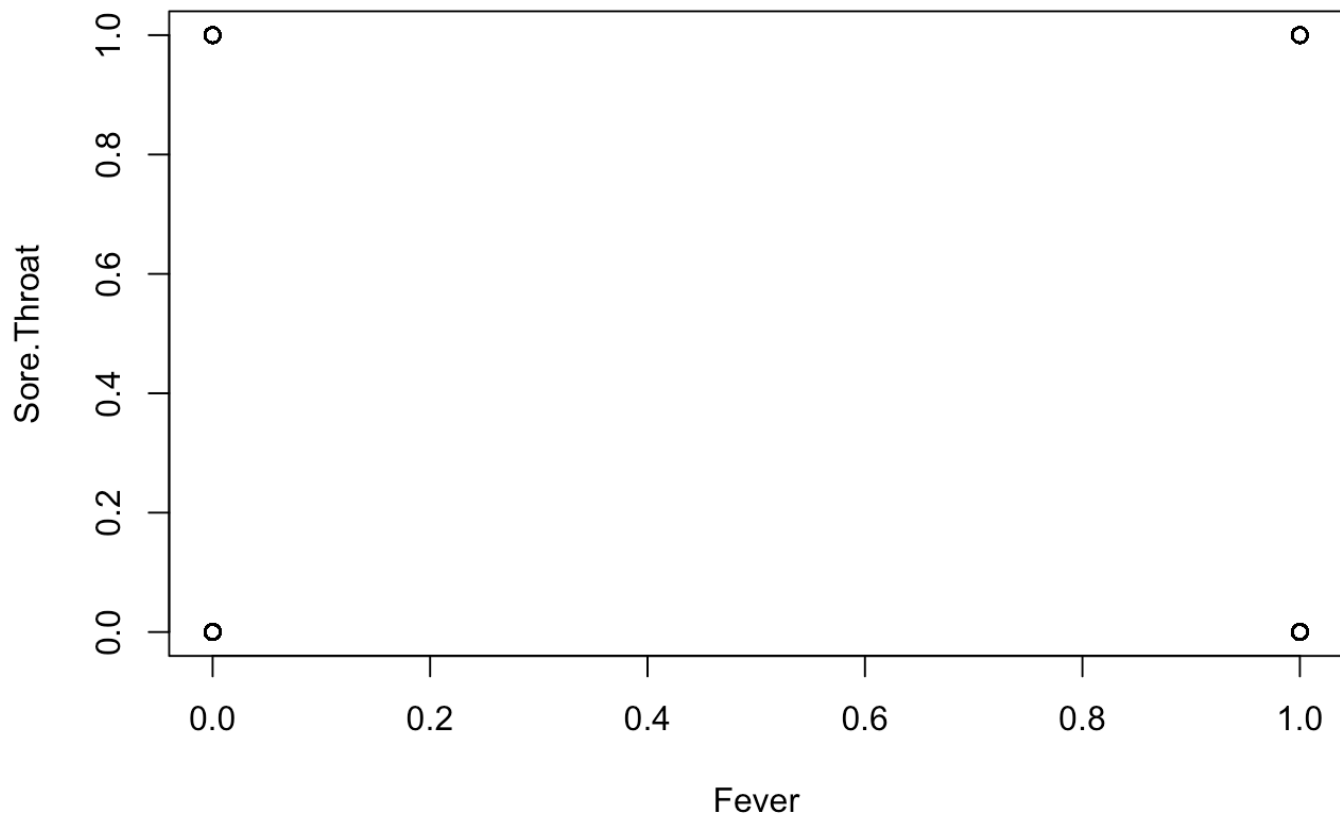
```r
yhat <- predict(svm.fit, Cleaned_Data_1)
table(predict=yhat, truth=Severity_Mild)
```

```
##        truth
## predict    0    1
##       0 7498 2502
##       1    0    0
```

```r
library(caret)
```

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

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



```
confusionMatrix(yhat, as.factor(Cleaned_Data_1$Severity_Mild))
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction    0    1
##          0 7498 2502
##          1    0    0
##
##                  Accuracy : 0.7498
##                    95% CI : (0.7412, 0.7583)
##       No Information Rate : 0.7498
##       P-Value [Acc > NIR] : 0.5054
##
##                     Kappa : 0
##
##   Mcnemar's Test P-Value : <2e-16
##
##               Sensitivity : 1.0000
##               Specificity : 0.0000
##            Pos Pred Value : 0.7498
##            Neg Pred Value :    NaN
##                Prevalence : 0.7498
##            Detection Rate : 0.7498
##      Detection Prevalence : 1.0000
##         Balanced Accuracy : 0.5000
##
##          'Positive' Class : 0
##
```