roc.R

seto\_

2024-06-03

# Load necessary libraries  
library(caret)

## Zorunlu paket yükleniyor: ggplot2

## Zorunlu paket yükleniyor: lattice

library(xgboost)  
library(randomForest)

## randomForest 4.7-1.1

## Type rfNews() to see new features/changes/bug fixes.

##   
## Attaching package: 'randomForest'

## The following object is masked from 'package:ggplot2':  
##   
## margin

library(themis)

## Zorunlu paket yükleniyor: recipes

## Zorunlu paket yükleniyor: dplyr

##   
## Attaching package: 'dplyr'

## The following object is masked from 'package:randomForest':  
##   
## combine

## The following object is masked from 'package:xgboost':  
##   
## slice

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

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

##   
## Attaching package: 'recipes'

## The following object is masked from 'package:stats':  
##   
## step

library(dplyr)  
library(pROC)

## Type 'citation("pROC")' for a citation.

##   
## Attaching package: 'pROC'

## The following objects are masked from 'package:stats':  
##   
## cov, smooth, var

library(ROSE)

## Loaded ROSE 0.0-4

library(e1071)  
library(ada)

## Zorunlu paket yükleniyor: rpart

library(readr)  
  
BordeauxWines <- read\_csv("~/R/İleri istatistiksel yazılımlar/final/final/BordeauxWines.csv")

## Rows: 14349 Columns: 989

## ── Column specification ────────────────────────────────────────────────────────  
## Delimiter: ","  
## chr (2): Name, Price  
## dbl (987): Year, Score, BLOOD ORANGE, CITRUS, CITRUS PEEL, CITRUS ZEST, CLEM...  
##   
## ℹ Use `spec()` to retrieve the full column specification for this data.  
## ℹ Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

wine<-BordeauxWines  
str(wine) #Öncelikle karakter tiplerini görmek için veri setini inceliyoruz

## spc\_tbl\_ [14,349 × 989] (S3: spec\_tbl\_df/tbl\_df/tbl/data.frame)  
## $ Name : chr [1:14349] "ChÃ¢teau Croix Figeac St.-Emilion" "ChÃ¢teau Fonroque St.-Emilion" "ChÃ¢teau Grand Bertin de St.-Clair MÃ©doc" "ChÃ¢teau Lion Beaulieu Bordeaux White" ...  
## $ Year : num [1:14349] 2008 2008 2008 2008 2008 ...  
## $ Score : num [1:14349] 84 84 84 84 84 84 84 84 84 84 ...  
## $ Price : chr [1:14349] "$20" "$29" "$NA" "$NA" ...  
## $ BLOOD ORANGE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ CITRUS : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ CITRUS PEEL : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ CITRUS ZEST : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ CLEMENTINE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ LIME : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ GRAPEFRUIT : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ GRAPEFRUIT PEEL : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ ORANGE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ KEY LIME : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ LEMON : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ LEMON MOUSSE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
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## $ LEMON ZEST : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ LEMON-LIME : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ LIME PEEL : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ MARMALADE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ ORANGE CREAM : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ ORANGE PEEL : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ ORANGE ZEST : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ RED GRAPEFRUIT : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ TANGERINE : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ ACAI BERRY : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ BERRY : num [1:14349] 0 0 0 0 0 0 1 0 0 0 ...  
## $ BILBERRY : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
## $ BLACK CURRANT : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
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## $ BLACK RASPBERRY : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
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## $ BLUEBERRY CREAM : num [1:14349] 0 0 0 0 0 0 0 0 0 0 ...  
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## .. WALNUT = col\_double(),  
## .. `WALNUT PASTE` = col\_double(),  
## .. BEESWAX = col\_double(),  
## .. CHOCOLATE = col\_double(),  
## .. COCOA = col\_double(),  
## .. GANACHE = col\_double(),  
## .. BUTTER = col\_double(),  
## .. BUTTERSCOTCH = col\_double(),  
## .. CARAMEL = col\_double(),  
## .. `COCONUT BUTTER` = col\_double(),  
## .. HONEY = col\_double(),  
## .. CUSTARD = col\_double(),  
## .. `DARK CHOCOLATE` = col\_double(),  
## .. `DARKLY ROASTED COFFEE` = col\_double(),  
## .. `DIACETYL (BUTTER)` = col\_double(),  
## .. ESPRESSO = col\_double(),  
## .. `CHOCOLATE CAKE` = col\_double(),  
## .. `GINGERSNAP COOKIES` = col\_double(),  
## .. HOISIN = col\_double(),  
## .. `HONEY SYRUP` = col\_double(),  
## .. `LINZER TORTE` = col\_double(),  
## .. `MAPLE SYRUP` = col\_double(),  
## .. MARSHMALLOW = col\_double(),  
## .. MARZIPAN = col\_double(),  
## .. WAX = col\_double(),  
## .. MERINGUE = col\_double(),  
## .. MOCHA = col\_double(),  
## .. MOLASSES = col\_double(),  
## .. MOUSSE = col\_double(),  
## .. PANCAKES = col\_double(),  
## .. PASTRY = col\_double(),  
## .. PIE = col\_double(),  
## .. PIECRUST = col\_double(),  
## .. SOY = col\_double(),  
## .. `SOY SAUCE` = col\_double(),  
## .. SYRUP = col\_double(),  
## .. TART = col\_double(),  
## .. `TOASTY MOCHA` = col\_double(),  
## .. TOFFEE = col\_double(),  
## .. `TURKISH COFFEE` = col\_double(),  
## .. `TURKISH DELIGHT DESSERT` = col\_double(),  
## .. `WHITE CHOCOLATE` = col\_double(),  
## .. ALDER = col\_double(),  
## .. CEDAR = col\_double(),  
## .. `CEDARY OAK` = col\_double(),  
## .. `CREAMY OAK` = col\_double(),  
## .. OAK = col\_double(),  
## .. VANILLA = col\_double(),  
## .. MAHOGANY = col\_double(),  
## .. SANDALWOOD = col\_double(),  
## .. WOOD = col\_double(),  
## .. MEDICINAL = col\_double(),  
## .. PHENOLIC = col\_double(),  
## .. QUININE = col\_double(),  
## .. TALCUM = col\_double(),  
## .. COFFEE = col\_double(),  
## .. `BURNT TOAST` = col\_double(),  
## .. `CAFE AU LAIT` = col\_double(),  
## .. CAPPUCCINO = col\_double(),  
## .. CHARCOAL = col\_double(),  
## .. CIGAR = col\_double(),  
## .. `CIGAR SMOKE` = col\_double(),  
## .. `CIGAR TOBACCO` = col\_double(),  
## .. `COFFEE LIQUEUR` = col\_double(),  
## .. COLA = col\_double(),  
## .. `DARK ROASTED COFFEE` = col\_double(),  
## .. TOASTY = col\_double(),  
## .. `FRENCH ROAST COFFEE` = col\_double(),  
## .. `ROASTED COFFEE` = col\_double(),  
## .. `ROASTED ESPRESSO` = col\_double(),  
## .. `TOASTY OAK` = col\_double(),  
## .. LIQUEUR = col\_double(),  
## .. ROASTED = col\_double(),  
## .. `ROASTED APPLE WOOD` = col\_double(),  
## .. `ROASTED MARSHMALLOW` = col\_double(),  
## .. SMOKE = col\_double(),  
## .. `SMOKY OAK` = col\_double(),  
## .. TOAST = col\_double(),  
## .. `TOASTED BRIOCHE` = col\_double(),  
## .. `TOASTY WOOD` = col\_double(),  
## .. `WOOD SMOKE` = col\_double(),  
## .. ASPHALT = col\_double(),  
## .. TRUFFLE = col\_double(),  
## .. BLOOD = col\_double(),  
## .. BRICK = col\_double(),  
## .. `CARBONIC GAS` = col\_double(),  
## .. CHALK = col\_double(),  
## .. LOAM = col\_double(),  
## .. EARTHY = col\_double(),  
## .. `CRUSHED ROCK` = col\_double(),  
## .. `DRIED MUSHROOM` = col\_double(),  
## .. DUSTY = col\_double(),  
## .. IRON = col\_double(),  
## .. FLINT = col\_double(),  
## .. `FRESH MUSHROOM` = col\_double(),  
## .. `FRESH PORCINI` = col\_double(),  
## .. `PENCIL LEAD` = col\_double(),  
## .. GRAPHITE = col\_double(),  
## .. GUNFLINT = col\_double(),  
## .. `HOT EARTH` = col\_double(),  
## .. HUMUS = col\_double(),  
## .. IODINE = col\_double(),  
## .. MINERAL = col\_double(),  
## .. MUSHROOM = col\_double(),  
## .. PEBBLE = col\_double(),  
## .. PETROL = col\_double(),  
## .. `PORCINI MUSHROOM` = col\_double(),  
## .. SALINE = col\_double(),  
## .. `SAUTEED WILD MUSHROOM` = col\_double(),  
## .. SLATE = col\_double(),  
## .. STEEL = col\_double(),  
## .. STONE = col\_double(),  
## .. MOLDY = col\_double(),  
## .. `MOLDY CORK` = col\_double(),  
## .. DIESEL = col\_double(),  
## .. KEROSENE = col\_double(),  
## .. PLASTIC = col\_double(),  
## .. `SQUID INK` = col\_double(),  
## .. TAR = col\_double(),  
## .. BURN = col\_double(),  
## .. `BURNT MATCH` = col\_double(),  
## .. CABBAGE = col\_double(),  
## .. GARLIC = col\_double(),  
## .. `HYDROGEN SULFIDE` = col\_double(),  
## .. `NATURAL GAS MERCAPTAN` = col\_double(),  
## .. RUBBERY = col\_double(),  
## .. SKUNK = col\_double(),  
## .. `SULFUR DIOXIDE` = col\_double(),  
## .. `WET WOOL,WET DOG` = col\_double(),  
## .. `ACETIC ACID` = col\_double(),  
## .. ETHANOL = col\_double(),  
## .. `ETHYL ACETATE` = col\_double(),  
## .. ALCOHOL = col\_double(),  
## .. FROTH = col\_double(),  
## .. MENTHOL = col\_double(),  
## .. SHERRY = col\_double()  
## .. )  
## - attr(\*, "problems")=<externalptr>

#İlk dört sütun harici bütün değerlerin faktör olması gerekirken double olarak işaretlenmiş  
#Bunun dönüşümü için ilk dört sütun atılıyor.  
wine<-wine[,-1:-4]  
#Ardından double olan değişkenler faktöre dönüştürülüyor  
wine<- wine %>% mutate\_if(is.double,as.factor)  
str(wine)

## tibble [14,349 × 985] (S3: tbl\_df/tbl/data.frame)  
## $ BLOOD ORANGE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CITRUS : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CITRUS PEEL : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CITRUS ZEST : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CLEMENTINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LIME : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GRAPEFRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GRAPEFRUIT PEEL : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ KEY LIME : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON MOUSSE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON PEEL : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON SEED : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON ZEST : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON-LIME : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LIME PEEL : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MARMALADE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE CREAM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE PEEL : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE ZEST : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED GRAPEFRUIT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ TANGERINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ACAI BERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 2 1 1 1 ...  
## $ BILBERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CURRANT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CURRANT CONFITURE: Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK RASPBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACKBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACKBERRY CONFITURE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLUEBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLUEBERRY CREAM : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BOYSENBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BRAMBLEBERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CRANBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RASPBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CURRANT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK BERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK BLUEBERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK CURRANT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ HUCKLEBERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GOOSEBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LOGANBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MULBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ OLALLIEBERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RASPBERRY TART : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED BERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED CURRANT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ STRAWBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ WHITE CURRANT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLUE FRUITS : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ EXOTIC FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED FRUIT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ SWEET FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ TROPICAL FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ WHITE FRUIT : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 2 ...  
## $ APPLE PIE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APPLE TART : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APPLE TARTE TATIN : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APRICOT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BAKED APPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BAKED PEACH : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CHERRY : Factor w/ 2 levels "0","1": 2 1 2 1 1 1 2 1 1 1 ...  
## $ BLACK CHERRY COMPOTE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CHERRY COULIS : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CHERRY PUREE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CHERRY : Factor w/ 2 levels "0","1": 1 1 1 1 2 2 1 2 2 1 ...  
## $ COOKED APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK RED CHERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DATE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FUJI APPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GOLDEN APPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GOLDEN DELICIOUS APPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GRAPE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GREEN APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GUAVA : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ JONAGOLD APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ KUMQUAT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ NECTARINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PERSIMMON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED PEACH : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ROASTED APPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ROASTED PINEAPPLE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ WHITE CHERRY : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ YELLOW APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ASIAN PEAR : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BAKED PEAR : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BANANA : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CANTALOUPE : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PLUM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED PLUM : Factor w/ 1 level "0": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DAMSON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PEAR : Factor w/ 2 levels "0","1": 1 1 1 2 1 1 1 1 1 2 ...  
## [list output truncated]

#Bazı faktörler sadece 0 olarak işaretlenmiş modeli eğitmede bir katkıda bulunmayacağını düşündüğüm için  
#veri setinden çıkardım.  
cols\_to\_remove <- sapply(wine, function(x) is.factor(x) && length(levels(x)) == 1)  
wine\_main<-wine[,!cols\_to\_remove]  
#Hepsi faktör ve 0,1 olmak üzre iki levele sahip  
str(wine\_main)

## tibble [14,349 × 616] (S3: tbl\_df/tbl/data.frame)  
## $ BLOOD ORANGE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CITRUS : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CLEMENTINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LIME : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GRAPEFRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ KEY LIME : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON PEEL : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON ZEST : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MARMALADE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ ORANGE CREAM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ TANGERINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 2 1 1 1 ...  
## $ BLACK CURRANT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK RASPBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACKBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLUEBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BOYSENBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CRANBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RASPBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CURRANT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK BERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GOOSEBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LOGANBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MULBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ STRAWBERRY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DARK FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ EXOTIC FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ SWEET FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ TROPICAL FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 2 ...  
## $ APPLE PIE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APPLE TART : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ APRICOT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BAKED PEACH : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK CHERRY : Factor w/ 2 levels "0","1": 2 1 2 1 1 1 2 1 1 1 ...  
## $ CHERRY : Factor w/ 2 levels "0","1": 1 1 1 1 2 2 1 2 2 1 ...  
## $ COOKED APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DATE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GRAPE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GREEN APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ GUAVA : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ JONAGOLD APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ KUMQUAT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ NECTARINE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PERSIMMON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RED APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ YELLOW APPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BANANA : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PLUM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DAMSON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PEAR : Factor w/ 2 levels "0","1": 1 1 1 2 1 1 1 1 1 2 ...  
## $ PEACH : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MELON : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PINEAPPLE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LYCHEE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MACERATED PLUM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MANGO : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PASSION FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PLUM CAKE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PLUM SKIN : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ POMEGRANATE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ QUINCE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ STEEPED PLUM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ TOASTED COCONUT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BLACK FIG : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ MISSION FIG : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BRAISED FIG : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CRUSHED FIG : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DRIED FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DRIED TOMATO : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FIG : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FIG PASTE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ FRUIT CAKE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ JAM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEMON CURD : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PLUM SAUCE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ PRUNE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ RAISIN : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CANDIED FRUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ KIRSCH : Factor w/ 2 levels "0","1": 1 2 1 1 1 1 1 1 1 1 ...  
## $ BISCUIT : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BRIOCHE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CREAM : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BOTRYTIS : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LANOLIN : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LEATHER : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ BRIAR : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CELERY : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CHAMOMILE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CHIVE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ CLOVE : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ LAVENDER : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DRIED FLOWERS : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DRIED LAVENDER : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## $ DRIED ROSES : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...  
## [list output truncated]

#Çıkarılan sütunlar da veri setine geri ekleniyor ve son olarak YIL değişkeninin sınıf dönüşümü yapılıyor.  
birlestir<-BordeauxWines[,1:4]  
wine\_main<-data.frame(birlestir,wine\_main)  
wine\_main$Year<-as.Date(wine\_main$Year)  
  
#Skor değişkeni 90dan fazla olanlar ve 89dan az olanlar şeklinde ikiye ayrılıyor.  
Diagnose <- c(1:14349)  
wine\_main<-data.frame(wine\_main,Diagnose)  
wine\_main <- wine\_main %>%  
 mutate(Diagnose = case\_when(  
 Score <=89 ~"X0",  
 Score >=90 ~"X1",)) %>%   
 select(Diagnose,Score,Name,Year,Price,everything())  
wine\_main$Diagnose<-as.factor(wine\_main$Diagnose)  
wine\_main<- wine\_main %>% select(-Year,-Name,-Price,-Score) #olduğunca sade bir subset elde etmek amacıyla  
#skora etkisi olmayan değişkenler veri setinden atılıyor.  
str(wine\_main$Diagnose)

## Factor w/ 2 levels "X0","X1": 1 1 1 1 1 1 1 1 1 1 ...

#RFI ile boyut indirgeme için random forest modeli geliştirilmesi  
rf\_model <- randomForest(Diagnose ~ ., data = wine\_main, importance = TRUE, ntree = 100)  
  
  
print(rf\_model)

##   
## Call:  
## randomForest(formula = Diagnose ~ ., data = wine\_main, importance = TRUE, ntree = 100)   
## Type of random forest: classification  
## Number of trees: 100  
## No. of variables tried at each split: 24  
##   
## OOB estimate of error rate: 14.43%  
## Confusion matrix:  
## X0 X1 class.error  
## X0 9452 634 0.06285941  
## X1 1436 2827 0.33685198

# Önemli değişkenlerin kaydedilmesi ve özellikleri.  
importance\_scores <- importance(rf\_model, type = 1)  
  
head(importance\_scores)

## MeanDecreaseAccuracy  
## BLOOD.ORANGE -0.7191529  
## CITRUS 0.2843810  
## CLEMENTINE -1.1065073  
## LIME -0.7484254  
## GRAPEFRUIT -0.3698984  
## ORANGE 4.4941046

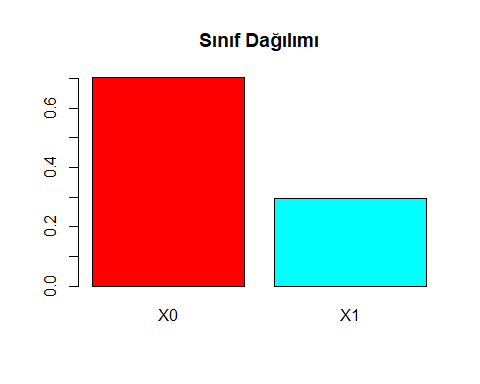
str(importance\_scores)

## num [1:616, 1] -0.719 0.284 -1.107 -0.748 -0.37 ...  
## - attr(\*, "dimnames")=List of 2  
## ..$ : chr [1:616] "BLOOD.ORANGE" "CITRUS" "CLEMENTINE" "LIME" ...  
## ..$ : chr "MeanDecreaseAccuracy"

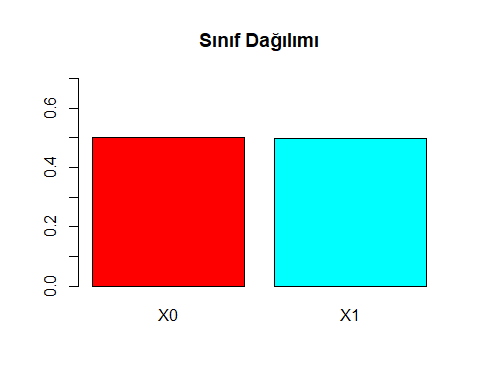
# If importance\_scores is a matrix, extract the correct column  
# Typically the first column contains MeanDecreaseAccuracy or MeanDecreaseGini  
if (is.matrix(importance\_scores)) {  
 importance\_values <- importance\_scores[, 1] # Change 1 if another column is needed  
} else {  
 importance\_values <- importance\_scores  
}  
  
#Azalan olarak önem düzeylerini sırala ve sonrasında ilk 50 tanesinin isimlerini kaydet.  
sorted\_importance <- sort(importance\_values, decreasing = TRUE)  
important\_features <- names(sorted\_importance)[1:50]  
  
  
  
  
  
print(important\_features)

## [1] "GREAT" "LONG" "LOVELY" "MEDIUM.BODIED"   
## [5] "RICH" "BEAUTY" "RANGE" "POWER"   
## [9] "FULL.BODIED" "DENSE" "FIG" "PENCIL.LEAD"   
## [13] "RACY" "LUSH" "GORGEOUS" "SERIOUS"   
## [17] "LENGTH" "BOYSENBERRY" "PURE" "CHARACTER"   
## [21] "DRIVE" "WONDERFUL" "EXCELLENT" "VELVET"   
## [25] "INTENSE" "BLACKBERRY" "MOUTHWATERING" "APPLE"   
## [29] "IMPRESSES" "BLACK.CURRANT" "GOOD" "REFINED"   
## [33] "BLACK.TEA" "PLUM" "ALMOND" "CHERRY"   
## [37] "BIG" "SOLID" "ALLURING" "GRIP"   
## [41] "TANNINS\_MEDIUM" "SUAVE" "BERRY" "TANNINS\_LOW"   
## [45] "PEACH" "WARM" "ELEGANT" "MINERAL"   
## [49] "CORE" "SUBTLE"

#İsmleri ve DİAGNOSE sütununu farklı bir veri setine al  
X\_reduced <- wine\_main[,c(important\_features)]  
Diagnose<-wine\_main$Diagnose  
X\_reduced<- data.frame(Diagnose,X\_reduced)   
  
# 2. Train-Test Split  
trainIndex <- createDataPartition(X\_reduced$Diagnose, p = .7,   
 list = FALSE,   
 times = 1)  
train\_data <- X\_reduced[ trainIndex,]  
test\_data <- X\_reduced[-trainIndex,]  
  
  
  
  
barplot(prop.table(table(X\_reduced$Diagnose)),  
 col = rainbow(2),  
 ylim = c(0, 0.7),  
 main = "Sınıf Dağılımı")



#Sınıflar arası denge sorunu olduğu görülüyor  
  
bothq <- ovun.sample(Diagnose~., data = train\_data, method = "both")  
train\_data<-bothq$data  
#Denge sorununu hem under hem oversampling yaparak çöz.  
  
barplot(prop.table(table( train\_data$Diagnose)),  
 col = rainbow(2),  
 ylim = c(0, 0.7),  
 main = "Sınıf Dağılımı")



train\_control <- trainControl(  
 method = "cv", # Cross-validation  
 number = 5, # 5-fold cross-validation  
 classProbs = TRUE, # Compute class probabilities  
 summaryFunction = twoClassSummary # Summary function for classification  
)  
  
tictoc::tic()  
logistic\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "glm",   
 family = binomial,   
 trControl = train\_control,   
 metric = "ROC"  
)  
  
# Random Forest  
rf\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "rf",   
 trControl = train\_control,   
 metric = "ROC"  
)  
  
# GBM  
gbm\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "gbm",   
 trControl = train\_control,   
 verbose = FALSE,  
 metric = "ROC"  
)  
  
# SVM  
svm\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "svmRadial",   
 trControl = train\_control,   
 metric = "ROC"  
)

## line search fails -1.817549 -0.1161376 1.036126e-05 -3.503481e-06 -1.310059e-08 3.963591e-09 -1.49625e-13

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

## Warning in data.frame(..., check.names = FALSE): row names were found from a  
## short variable and have been discarded

## line search fails -1.851359 -0.06418352 1.388853e-05 -5.032547e-06 -1.893171e-08 6.397156e-09 -2.951276e-13

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

## Warning in data.frame(..., check.names = FALSE): row names were found from a  
## short variable and have been discarded

## line search fails -1.831365 -0.08392676 1.600801e-05 -5.618876e-06 -2.082538e-08 6.833017e-09 -3.717668e-13

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

## Warning in data.frame(..., check.names = FALSE): row names were found from a  
## short variable and have been discarded

## line search fails -1.849414 -0.09609686 1.728405e-05 -5.618342e-06 -2.256415e-08 6.716172e-09 -4.277337e-13

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

## Warning in data.frame(..., check.names = FALSE): row names were found from a  
## short variable and have been discarded

## line search fails -1.873545 -0.1142234 1.358551e-05 -3.188688e-06 -1.753688e-08 3.320644e-09 -2.48836e-13

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

## Warning in data.frame(..., check.names = FALSE): row names were found from a  
## short variable and have been discarded

## Warning in nominalTrainWorkflow(x = x, y = y, wts = weights, info = trainInfo,  
## : There were missing values in resampled performance measures.

## line search fails -1.857327 -0.1007848 1.047366e-05 -1.956393e-06 -1.047058e-08 1.551588e-09 -1.127008e-13

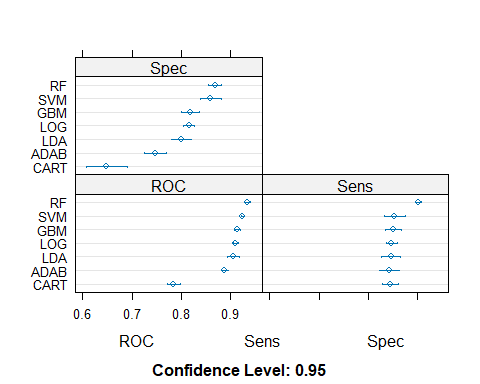
# AdaBoost  
ada\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "ada",   
 trControl = train\_control,   
 metric = "ROC"  
)  
  
  
# CART  
cart\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "rpart",   
 trControl = train\_control,   
 metric = "ROC"  
)  
  
# LDA  
lda\_model <- train(  
 Diagnose ~ ., data = train\_data,   
 method = "lda",   
 trControl = train\_control,   
 metric = "ROC"  
)  
tictoc::toc()

## 933.67 sec elapsed

# 5. Resample Comparison  
results <- resamples(list(  
 LOG = logistic\_model,   
 RF = rf\_model,   
 GBM = gbm\_model,   
 SVM = svm\_model,  
 ADAB = ada\_model,   
 CART = cart\_model,  
 LDA = lda\_model  
))  
  
# 6. Summary of the results  
summary(results)

##   
## Call:  
## summary.resamples(object = results)  
##   
## Models: LOG, RF, GBM, SVM, ADAB, CART, LDA   
## Number of resamples: 5   
##   
## ROC   
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's  
## LOG 0.9054571 0.9081668 0.9101425 0.9103285 0.9129628 0.9149133 0  
## RF 0.9274768 0.9316900 0.9337524 0.9339388 0.9367652 0.9400096 0  
## GBM 0.9055479 0.9147399 0.9154683 0.9136164 0.9159718 0.9163543 0  
## SVM 0.9225420 0.9233957 0.9246314 0.9244476 0.9256834 0.9259857 1  
## ADAB 0.8790844 0.8865335 0.8908771 0.8878536 0.8910035 0.8917695 0  
## CART 0.7691206 0.7771977 0.7895509 0.7840950 0.7906613 0.7939444 0  
## LDA 0.8909063 0.9047481 0.9073287 0.9061049 0.9093430 0.9181982 0  
##   
## Sens   
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's  
## LOG 0.8371400 0.8401192 0.8469185 0.8477779 0.8568588 0.8578529 0  
## RF 0.8956262 0.8996024 0.9036743 0.9022250 0.9046673 0.9075547 0  
## GBM 0.8359841 0.8480636 0.8480636 0.8513527 0.8518887 0.8727634 0  
## SVM 0.8429423 0.8451789 0.8489801 0.8534165 0.8572177 0.8727634 1  
## ADAB 0.8200795 0.8330020 0.8500497 0.8428028 0.8520357 0.8588469 0  
## CART 0.8291956 0.8379722 0.8449304 0.8449912 0.8479125 0.8649454 0  
## LDA 0.8190855 0.8460775 0.8479125 0.8459831 0.8578529 0.8589871 0  
##   
## Spec   
## Min. 1st Qu. Median Mean 3rd Qu. Max. NA's  
## LOG 0.8005982 0.8145563 0.8175474 0.8151193 0.8195414 0.8233533 0  
## RF 0.8584247 0.8624128 0.8624128 0.8679731 0.8713858 0.8852295 0  
## GBM 0.7954092 0.8095713 0.8265204 0.8179054 0.8285145 0.8295115 0  
## SVM 0.8454636 0.8498390 0.8598461 0.8596339 0.8696411 0.8733799 1  
## ADAB 0.7328016 0.7357926 0.7435130 0.7469080 0.7437687 0.7786640 0  
## CART 0.6061815 0.6211366 0.6590229 0.6483904 0.6776447 0.6779661 0  
## LDA 0.7864271 0.7866401 0.7976072 0.8001568 0.8025922 0.8275174 0

dotplot(results)



# 7. Evaluate Models  
# Logistic Regression  
logistic\_preds <- predict(logistic\_model, newdata = test\_data)  
logistic\_probs <- predict(logistic\_model, newdata = test\_data, type = "prob")  
  
# Random Forest  
rf\_preds <- predict(rf\_model, newdata = test\_data)  
rf\_probs <- predict(rf\_model, newdata = test\_data, type = "prob")  
  
  
  
  
#SVM  
svm\_preds <- predict(svm\_model, newdata = test\_data)

## Warning in method$predict(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class prediction calculations failed; returning NAs

svm\_probs <- predict(svm\_model, newdata = test\_data, type = "prob")

## Warning in method$prob(modelFit = modelFit, newdata = newdata, submodels =  
## param): kernlab class probability calculations failed; returning NAs

#GBM  
gbm\_preds <- predict(gbm\_model, newdata = test\_data)  
gbm\_probs <- predict(gbm\_model, newdata = test\_data, type = "prob")  
  
  
ada\_preds <- predict(ada\_model, newdata = test\_data)  
ada\_probs <- predict(ada\_model, newdata = test\_data, type = "prob")  
  
# Confusion Matrices  
print(confusionMatrix(logistic\_preds, test\_data$Diagnose))

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction X0 X1  
## X0 2580 217  
## X1 445 1061  
##   
## Accuracy : 0.8462   
## 95% CI : (0.835, 0.8568)  
## No Information Rate : 0.703   
## P-Value [Acc > NIR] : < 2.2e-16   
##   
## Kappa : 0.6496   
##   
## Mcnemar's Test P-Value : < 2.2e-16   
##   
## Sensitivity : 0.8529   
## Specificity : 0.8302   
## Pos Pred Value : 0.9224   
## Neg Pred Value : 0.7045   
## Prevalence : 0.7030   
## Detection Rate : 0.5996   
## Detection Prevalence : 0.6500   
## Balanced Accuracy : 0.8415   
##   
## 'Positive' Class : X0   
##

print(confusionMatrix(rf\_preds, test\_data$Diagnose))

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction X0 X1  
## X0 2568 308  
## X1 457 970  
##   
## Accuracy : 0.8222   
## 95% CI : (0.8105, 0.8335)  
## No Information Rate : 0.703   
## P-Value [Acc > NIR] : < 2.2e-16   
##   
## Kappa : 0.5881   
##   
## Mcnemar's Test P-Value : 8.749e-08   
##   
## Sensitivity : 0.8489   
## Specificity : 0.7590   
## Pos Pred Value : 0.8929   
## Neg Pred Value : 0.6797   
## Prevalence : 0.7030   
## Detection Rate : 0.5968   
## Detection Prevalence : 0.6684   
## Balanced Accuracy : 0.8040   
##   
## 'Positive' Class : X0   
##

print(confusionMatrix(svm\_preds, test\_data$Diagnose))

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction X0 X1  
## X0 0 0  
## X1 0 0  
##   
## Accuracy : NaN   
## 95% CI : (NA, NA)  
## No Information Rate : NA   
## P-Value [Acc > NIR] : NA   
##   
## Kappa : NaN   
##   
## Mcnemar's Test P-Value : NA   
##   
## Sensitivity : NA   
## Specificity : NA   
## Pos Pred Value : NA   
## Neg Pred Value : NA   
## Prevalence : NaN   
## Detection Rate : NaN   
## Detection Prevalence : NaN   
## Balanced Accuracy : NA   
##   
## 'Positive' Class : X0   
##

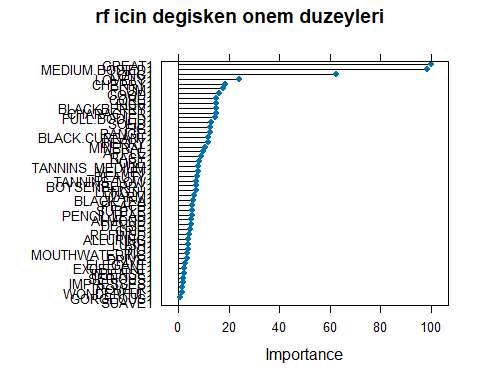
print(confusionMatrix(gbm\_preds, test\_data$Diagnose))

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction X0 X1  
## X0 2565 207  
## X1 460 1071  
##   
## Accuracy : 0.845   
## 95% CI : (0.8338, 0.8557)  
## No Information Rate : 0.703   
## P-Value [Acc > NIR] : < 2.2e-16   
##   
## Kappa : 0.6489   
##   
## Mcnemar's Test P-Value : < 2.2e-16   
##   
## Sensitivity : 0.8479   
## Specificity : 0.8380   
## Pos Pred Value : 0.9253   
## Neg Pred Value : 0.6995   
## Prevalence : 0.7030   
## Detection Rate : 0.5961   
## Detection Prevalence : 0.6442   
## Balanced Accuracy : 0.8430   
##   
## 'Positive' Class : X0   
##

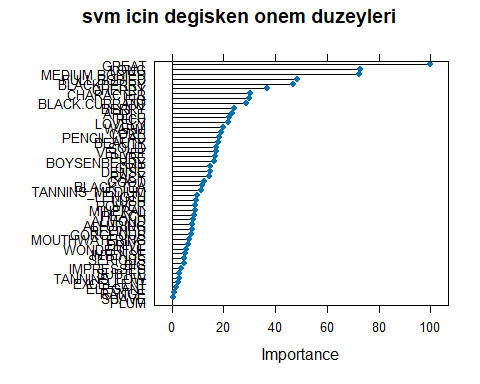
print(confusionMatrix(ada\_preds, test\_data$Diagnose))

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction X0 X1  
## X0 2539 313  
## X1 486 965  
##   
## Accuracy : 0.8143   
## 95% CI : (0.8024, 0.8258)  
## No Information Rate : 0.703   
## P-Value [Acc > NIR] : < 2.2e-16   
##   
## Kappa : 0.5721   
##   
## Mcnemar's Test P-Value : 1.165e-09   
##   
## Sensitivity : 0.8393   
## Specificity : 0.7551   
## Pos Pred Value : 0.8903   
## Neg Pred Value : 0.6651   
## Prevalence : 0.7030   
## Detection Rate : 0.5901   
## Detection Prevalence : 0.6628   
## Balanced Accuracy : 0.7972   
##   
## 'Positive' Class : X0   
##

varimp\_rf <- varImp(rf\_model)  
plot(varimp\_rf, main="rf icin degisken onem duzeyleri")



varimp\_svm <- varImp(svm\_model)  
plot(varimp\_svm, main="svm icin degisken onem duzeyleri")



varimp\_ada<-varImp(ada\_model)  
plot(varimp\_ada, main="adaboost icin degisken onem duzeyleri")

