IEOR Project

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## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

library(ggplot2)  
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

library(GGally)

##   
## Attaching package: 'GGally'

## The following object is masked from 'package:dplyr':  
##   
## nasa

library(caTools)  
library(ROCR)

## Loading required package: gplots

##   
## Attaching package: 'gplots'

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

library(MASS)

##   
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':  
##   
## select

library(caTools)   
library(tidyverse)

## -- Attaching packages -------------------------------------------------------------------------------------------------------- tidyverse 1.2.1 --

## v tibble 1.4.2 v purrr 0.2.5  
## v tidyr 0.8.2 v stringr 1.3.1  
## v readr 1.1.1 v forcats 0.3.0

## -- Conflicts ----------------------------------------------------------------------------------------------------------- tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()  
## x MASS::select() masks dplyr::select()

library(readxl)  
library(stringr)   
library(softImpute)

## Loading required package: Matrix

##   
## Attaching package: 'Matrix'

## The following object is masked from 'package:tidyr':  
##   
## expand

## Loaded softImpute 1.4

##   
## Attaching package: 'softImpute'

## The following object is masked from 'package:tidyr':  
##   
## complete

library(reshape2)

##   
## Attaching package: 'reshape2'

## The following object is masked from 'package:tidyr':  
##   
## smiths

library(plyr)

## -------------------------------------------------------------------------

## You have loaded plyr after dplyr - this is likely to cause problems.  
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:  
## library(plyr); library(dplyr)

## -------------------------------------------------------------------------

##   
## Attaching package: 'plyr'

## The following object is masked from 'package:purrr':  
##   
## compact

## The following objects are masked from 'package:dplyr':  
##   
## arrange, count, desc, failwith, id, mutate, rename, summarise,  
## summarize

library(dplyr)  
library(ranger)  
library(caret)

## Loading required package: lattice

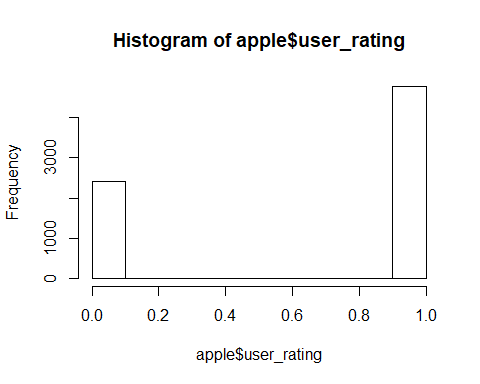
##   
## Attaching package: 'caret'

## The following object is masked from 'package:purrr':  
##   
## lift

OSR2 <- function(predictions, train, test) { SSE <- sum((test - predictions)^2)  
SST <- sum((test - mean(train))^2)  
r2 <- 1 - SSE/SST  
return(r2) }  
  
  
apple <- read.csv("Apple\_price(bro).csv")  
summary(apple)

## track\_name   
## Mannequin Challenge : 2   
## VR Roller Coaster : 2   
## -The ç©´é\200šã\201—3D- å\220›ã\201®è¨\230æ†¶åŠ›xå\217\215å°„ç¥žçµŒã‚’å•\217ã\201†! ï½žMr.CURVEã\201‹ã‚‰ã\201®æŒ‘æ\210¦çŠ¶ ï½ž: 1   
## ! OH Fantastic Free Kick + Kick Wall Challenge : 1   
## "Burn your fat with me!!" : 1   
## "HOOK" : 1   
## (Other) :7189   
## size\_bytes price rating\_count\_tot user\_rating   
## Min. :5.898e+05 Min. :0.0000 Min. : 0 Min. :0.0000   
## 1st Qu.:4.692e+07 1st Qu.:0.0000 1st Qu.: 28 1st Qu.:0.0000   
## Median :9.715e+07 Median :0.0000 Median : 300 Median :1.0000   
## Mean :1.991e+08 Mean :0.4364 Mean : 12893 Mean :0.6643   
## 3rd Qu.:1.819e+08 3rd Qu.:1.0000 3rd Qu.: 2793 3rd Qu.:1.0000   
## Max. :4.026e+09 Max. :1.0000 Max. :2974676 Max. :1.0000   
##   
## cont\_rating prime\_genre E E10   
## 12+:1155 Games :3862 Min. :0.000 Min. :0.0000   
## 17+: 622 Entertainment : 535 1st Qu.:0.000 1st Qu.:0.0000   
## 4+ :4433 Education : 453 Median :1.000 Median :0.0000   
## 9+ : 987 Photo & Video : 349 Mean :0.616 Mean :0.1371   
## Utilities : 248 3rd Qu.:1.000 3rd Qu.:0.0000   
## Health & Fitness: 180 Max. :1.000 Max. :1.0000   
## (Other) :1570   
## T M   
## Min. :0.0000 Min. :0.00000   
## 1st Qu.:0.0000 1st Qu.:0.00000   
## Median :0.0000 Median :0.00000   
## Mean :0.1605 Mean :0.08642   
## 3rd Qu.:0.0000 3rd Qu.:0.00000   
## Max. :1.0000 Max. :1.00000   
##

hist(apple$user\_rating)



train.ids <- sample(nrow(apple), 0.70\*nrow(apple))  
train <- apple[train.ids, ]  
test\_data <- apple[-train.ids, ]  
  
apple$size\_bytes

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## [7189] 168774656 537462784 22999040 27853824 126644224 120760320  
## [7195] 111322112 97235968 90898432

#train regression  
traindata\_X <- train[c("price", "rating\_count\_tot", "prime\_genre", "size\_bytes")]  
traindata\_Y <- train[c("user\_rating")]  
  
  
  
testdata\_X <- test\_data[c("price", "rating\_count\_tot", "prime\_genre", "size\_bytes")]  
testdata\_Y <- test\_data[c("user\_rating")]  
  
str

## function (object, ...)   
## UseMethod("str")  
## <bytecode: 0x0000000015359038>  
## <environment: namespace:utils>

linmod <- lm(user\_rating ~ prime\_genre + price + rating\_count\_tot + size\_bytes + cont\_rating, data = train)   
summary(linmod)

##   
## Call:  
## lm(formula = user\_rating ~ prime\_genre + price + rating\_count\_tot +   
## size\_bytes + cont\_rating, data = train)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.4939 -0.5113 0.2351 0.2958 0.7826   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 5.052e-01 5.563e-02 9.081 < 2e-16 \*\*\*  
## prime\_genreBusiness 1.251e-01 9.193e-02 1.361 0.173696   
## prime\_genreCatalogs 1.810e-01 1.931e-01 0.938 0.348444   
## prime\_genreEducation 5.662e-02 5.959e-02 0.950 0.342067   
## prime\_genreEntertainment -3.537e-02 5.826e-02 -0.607 0.543776   
## prime\_genreFinance -1.099e-01 7.668e-02 -1.434 0.151752   
## prime\_genreFood & Drink 1.688e-02 8.561e-02 0.197 0.843744   
## prime\_genreGames 2.122e-01 5.409e-02 3.924 8.82e-05 \*\*\*  
## prime\_genreHealth & Fitness 2.139e-01 6.669e-02 3.207 0.001351 \*\*   
## prime\_genreLifestyle 3.135e-03 6.895e-02 0.045 0.963734   
## prime\_genreMedical 3.322e-02 1.330e-01 0.250 0.802780   
## prime\_genreMusic 2.536e-01 7.208e-02 3.518 0.000438 \*\*\*  
## prime\_genreNavigation -1.705e-01 9.756e-02 -1.748 0.080511 .   
## prime\_genreNews 3.329e-02 8.191e-02 0.406 0.684489   
## prime\_genrePhoto & Video 2.132e-01 6.035e-02 3.532 0.000416 \*\*\*  
## prime\_genreProductivity 2.765e-01 6.727e-02 4.110 4.02e-05 \*\*\*  
## prime\_genreReference 7.157e-02 8.310e-02 0.861 0.389111   
## prime\_genreShopping 1.511e-01 7.333e-02 2.060 0.039440 \*   
## prime\_genreSocial Networking -8.143e-03 6.787e-02 -0.120 0.904509   
## prime\_genreSports -1.425e-01 7.383e-02 -1.929 0.053726 .   
## prime\_genreTravel 3.595e-02 7.888e-02 0.456 0.648637   
## prime\_genreUtilities 6.293e-02 6.388e-02 0.985 0.324593   
## prime\_genreWeather 2.900e-02 8.270e-02 0.351 0.725885   
## price 5.798e-02 1.371e-02 4.229 2.39e-05 \*\*\*  
## rating\_count\_tot 3.372e-07 7.712e-08 4.372 1.26e-05 \*\*\*  
## size\_bytes 2.724e-11 1.892e-11 1.440 0.149962   
## cont\_rating17+ -1.235e-01 2.789e-02 -4.426 9.80e-06 \*\*\*  
## cont\_rating4+ -1.682e-02 1.858e-02 -0.905 0.365397   
## cont\_rating9+ 1.296e-02 2.380e-02 0.545 0.585926   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4545 on 5008 degrees of freedom  
## Multiple R-squared: 0.07453, Adjusted R-squared: 0.06936   
## F-statistic: 14.4 on 28 and 5008 DF, p-value: < 2.2e-16

Lin\_Model\_Predictions = predict(linmod, newdata = test\_data)   
summary(Lin\_Model\_Predictions)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.2395 0.5830 0.7047 0.6629 0.7615 1.1423

MAE\_Lin = mean(abs(Lin\_Model\_Predictions - test\_data$user\_rating))  
RMSE\_Lin = sqrt(mean((Lin\_Model\_Predictions - test\_data$user\_rating)^2))  
OSR\_Lin = OSR2(Lin\_Model\_Predictions, train$user\_rating, test\_data$user\_rating)  
MAE\_Lin

## [1] 0.4139757

RMSE\_Lin

## [1] 0.4552976

OSR\_Lin

## [1] 0.08064242

#Predictions are weak in a regression sense. We can not use a linear model

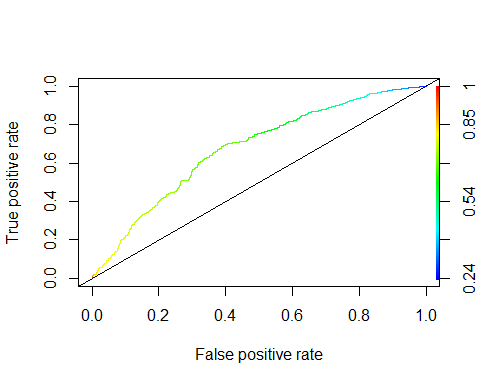
## Including Plots

You can also embed plots, for example:

##   
## Call:  
## glm(formula = user\_rating ~ price + rating\_count\_tot + prime\_genre +   
## size\_bytes + cont\_rating, family = "binomial", data = train)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -5.4102 -1.1842 0.7271 0.8462 1.7381   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.476e-02 2.496e-01 -0.099 0.920987   
## price 3.114e-01 6.740e-02 4.620 3.83e-06 \*\*\*  
## rating\_count\_tot 4.954e-06 1.041e-06 4.758 1.96e-06 \*\*\*  
## prime\_genreBusiness 5.163e-01 4.196e-01 1.230 0.218541   
## prime\_genreCatalogs 7.975e-01 9.026e-01 0.884 0.376954   
## prime\_genreEducation 2.220e-01 2.656e-01 0.836 0.403217   
## prime\_genreEntertainment -1.510e-01 2.591e-01 -0.583 0.560069   
## prime\_genreFinance -4.520e-01 3.462e-01 -1.306 0.191576   
## prime\_genreFood & Drink 4.717e-02 3.810e-01 0.124 0.901457   
## prime\_genreGames 9.256e-01 2.413e-01 3.836 0.000125 \*\*\*  
## prime\_genreHealth & Fitness 9.290e-01 3.110e-01 2.987 0.002813 \*\*   
## prime\_genreLifestyle 3.490e-02 3.066e-01 0.114 0.909376   
## prime\_genreMedical 1.258e-01 5.959e-01 0.211 0.832860   
## prime\_genreMusic 1.138e+00 3.523e-01 3.229 0.001241 \*\*   
## prime\_genreNavigation -7.375e-01 4.486e-01 -1.644 0.100177   
## prime\_genreNews 1.186e-01 3.656e-01 0.324 0.745617   
## prime\_genrePhoto & Video 9.392e-01 2.763e-01 3.399 0.000676 \*\*\*  
## prime\_genreProductivity 1.279e+00 3.271e-01 3.911 9.17e-05 \*\*\*  
## prime\_genreReference 2.602e-01 3.755e-01 0.693 0.488366   
## prime\_genreShopping 6.241e-01 3.322e-01 1.879 0.060299 .   
## prime\_genreSocial Networking -4.975e-02 3.042e-01 -0.164 0.870078   
## prime\_genreSports -6.171e-01 3.356e-01 -1.839 0.065931 .   
## prime\_genreTravel 1.379e-01 3.515e-01 0.392 0.694808   
## prime\_genreUtilities 2.451e-01 2.848e-01 0.860 0.389567   
## prime\_genreWeather 6.487e-02 3.695e-01 0.176 0.860653   
## size\_bytes 1.504e-10 1.035e-10 1.453 0.146107   
## cont\_rating17+ -5.359e-01 1.310e-01 -4.092 4.28e-05 \*\*\*  
## cont\_rating4+ -8.478e-02 9.126e-02 -0.929 0.352902   
## cont\_rating9+ 8.514e-02 1.214e-01 0.701 0.483066   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 6406.7 on 5036 degrees of freedom  
## Residual deviance: 6018.6 on 5008 degrees of freedom  
## AIC: 6076.6  
##   
## Number of Fisher Scoring iterations: 5

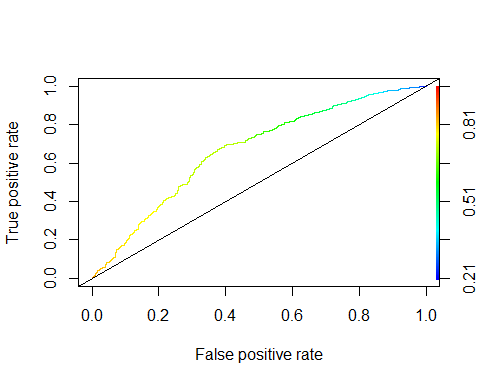
##   
## FALSE TRUE  
## 0 399 1276  
## 1 263 3099

##   
## FALSE TRUE  
## 0 183 558  
## 1 127 1292

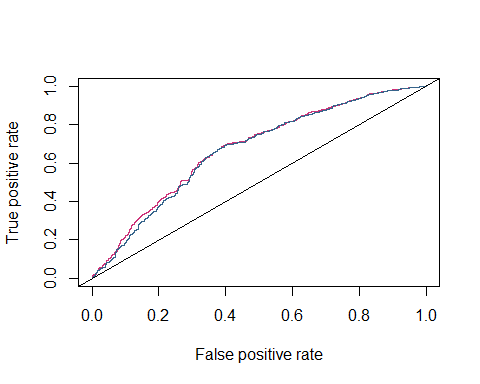


## [1] 0.6748827

## Length Class Mode   
## prior 2 -none- numeric   
## counts 2 -none- numeric   
## means 56 -none- numeric   
## scaling 28 -none- numeric   
## lev 2 -none- character  
## svd 1 -none- numeric   
## N 1 -none- numeric   
## call 3 -none- call   
## terms 3 terms call   
## xlevels 2 -none- list



## [1] 0.6669139



Note that the echo = FALSE parameter was added to the code chunk to prevent printing of the R code that generated the plot.

#use cart model and random forest  
tableAccuracy <- function(test, pred) {  
 t = table(test, pred)  
 a = sum(diag(t))/length(test)  
 return(a)  
}  
library(caTools) # splits  
library(rpart) # CART  
library(rpart.plot) # CART plotting  
library(caret) # cross validation  
train$user\_rating

## [1] 1 0 0 1 1 1 0 0 1 0 1 1 1 1 1 0 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 0  
## [35] 0 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 0 1 1 0 1 0 1 0 0 0 0 1 1 1 1 0  
## [69] 1 1 0 1 1 1 1 1 0 1 1 1 1 1 1 0 0 1 1 1 1 0 1 1 1 0 0 0 1 1 0 1 1 0  
## [103] 0 1 0 1 0 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 0 1 1 1 1 0 1 1 1 1 1 1 0 1  
## [137] 1 0 1 0 0 0 1 1 1 1 1 1 1 0 1 0 1 0 0 1 1 1 1 1 0 1 1 0 1 1 1 1 1 0  
## [171] 0 0 1 1 1 1 0 1 1 1 1 1 0 0 1 1 0 1 0 1 1 1 1 0 1 1 1 1 1 1 0 1 0 1  
## [205] 1 0 0 1 0 1 1 0 0 1 0 1 0 1 1 1 1 0 1 1 1 0 1 1 1 1 1 1 0 1 0 0 1 1  
## [239] 0 1 0 0 1 1 1 1 0 1 0 1 1 1 1 0 1 1 1 1 0 1 1 0 1 1 1 1 1 0 1 1 0 1  
## [273] 1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 0 0 1 1 0 1 1 1 1 1 1 0 1 0 0 1 0 1 1  
## [307] 1 1 1 1 0 0 1 0 0 1 1 1 0 1 1 1 0 1 0 1 0 0 1 1 1 0 1 0 0 1 0 1 1 1  
## [341] 1 1 0 1 1 0 1 0 1 1 1 0 0 1 1 0 0 0 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 0  
## [375] 0 1 0 0 1 1 1 1 0 0 1 1 0 0 1 1 1 0 1 1 0 0 0 1 0 0 1 1 1 1 1 0 0 0  
## [409] 1 0 0 0 1 1 1 1 1 0 0 1 0 1 1 1 1 1 0 1 0 1 0 1 0 0 1 1 1 1 0 1 1 1  
## [443] 1 0 0 1 0 0 0 0 1 1 1 0 1 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 0 0 1 1 1 0  
## [477] 0 0 1 1 0 1 1 0 1 0 1 1 0 1 0 1 1 1 0 0 1 1 0 1 0 0 1 1 1 1 1 1 0 0  
## [511] 1 0 0 1 1 0 0 0 0 1 1 1 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 1 1 1 0 1 1 0  
## [545] 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 1 1 1 0 0 0 1 1 0 1 1 1 1 0 1 1 0 1 0  
## [579] 1 0 1 1 1 0 1 0 1 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 1 1 1 0 1 1 1 1 1 0  
## [613] 1 1 0 1 0 1 1 1 0 0 0 0 0 0 0 1 1 1 1 0 1 1 0 1 1 1 1 1 0 1 0 0 0 1  
## [647] 1 0 0 0 1 1 1 1 0 1 1 0 1 1 0 0 0 0 1 1 1 1 1 1 1 0 1 0 0 1 0 1 1 1  
## [681] 1 0 1 0 1 0 1 1 0 0 1 1 1 1 1 1 0 1 0 0 1 0 1 1 1 0 1 1 0 1 1 0 1 1  
## [715] 0 1 0 0 1 1 1 1 1 1 1 1 1 1 1 0 1 1 0 1 1 0 1 0 1 1 1 0 0 1 1 1 1 0  
## [749] 1 1 1 0 1 1 1 0 0 0 1 1 0 1 1 0 1 1 0 1 1 1 1 0 1 0 0 0 0 1 0 0 1 1  
## [783] 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 1 0 1 1 1 0 0 1 1 1 1 1 1 0 1 0  
## [817] 0 1 1 1 1 1 1 0 0 1 0 1 1 1 0 1 1 1 1 1 0 1 1 1 0 1 1 1 1 1 0 1 0 1  
## [851] 1 1 0 1 0 0 1 1 1 1 1 0 1 1 0 0 0 0 1 1 1 0 1 1 0 1 1 1 1 1 0 0 1 1  
## [885] 0 1 1 0 0 1 1 1 1 1 1 0 0 1 1 1 0 0 0 1 0 0 0 0 1 1 1 0 1 0 0 1 0 1  
## [919] 0 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 1 0 1 1 0 1 0 0 1 0 1 1 1 1 0 1 1 1  
## [953] 1 1 1 1 1 1 1 1 1 0 0 1 1 1 1 0 1 0 1 1 1 1 0 0 1 1 0 1 1 1 0 1 1 1  
## [987] 0 1 1 0 0 0 0 1 1 1 0 0 0 1 1 0 1 0 1 1 1 1 1 0 1 1 1 0 1 1 1 1 0 1  
## [1021] 0 0 1 1 1 1 1 1 1 1 1 0 1 0 1 1 0 0 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0 0  
## [1055] 1 1 1 0 1 0 0 1 1 1 1 1 1 1 1 1 0 1 0 1 0 0 1 1 1 1 1 0 1 1 1 0 1 1  
## [1089] 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 0 1 0 0 0 0 1 0 1 1 0 1 1 1 0 0  
## [1123] 1 0 1 0 0 0 1 1 1 1 0 1 1 1 0 0 0 1 1 0 1 1 1 0 0 1 1 1 1 1 0 1 0 1  
## [1157] 0 1 1 0 1 1 1 0 1 1 1 1 0 1 0 1 1 1 1 0 0 1 0 1 0 1 1 1 0 1 1 0 1 0  
## [1191] 0 1 1 0 1 0 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 0 1 1 1 1  
## [1225] 1 1 0 1 0 1 0 1 1 1 1 1 0 1 1 1 0 1 0 1 0 1 0 0 1 1 0 1 0 1 0 1 1 1  
## [1259] 1 1 1 0 1 1 0 1 1 0 1 0 1 1 1 0 1 1 0 0 0 1 0 1 0 1 1 1 1 0 1 1 1 1  
## [1293] 0 1 0 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 1 1 0 0 1 1 1 0 1 0 1 1 1 1 1  
## [1327] 0 1 1 0 0 0 0 1 1 1 1 0 1 1 1 0 0 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1  
## [1361] 0 0 1 1 1 0 1 1 1 0 1 1 0 0 1 0 1 1 0 1 0 1 1 1 1 1 0 1 1 1 1 1 1 1  
## [1395] 1 1 1 1 1 1 0 1 1 1 1 1 1 0 0 1 1 1 0 1 1 0 0 1 1 1 0 1 0 0 1 0 0 0  
## [1429] 0 1 0 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 0 1 0 1 0 0 0 1 1 0 0 1 1 1 0 0  
## [1463] 1 0 1 1 1 1 1 0 0 1 1 1 0 1 0 1 1 1 0 1 0 0 0 1 1 1 1 1 0 1 0 1 1 1  
## [1497] 1 1 1 0 0 1 1 1 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 0 1 1  
## [1531] 1 1 1 1 1 1 0 0 1 1 1 1 0 1 1 1 0 1 1 1 0 1 1 0 1 0 1 0 1 0 1 0 0 1  
## [1565] 1 1 0 1 1 1 0 1 1 1 0 0 1 0 1 1 0 1 0 1 0 0 0 1 1 0 1 1 0 1 1 1 0 1  
## [1599] 0 1 0 1 0 1 0 0 1 1 1 1 0 1 1 1 1 1 1 1 0 0 1 1 1 1 0 0 0 1 1 0 1 1  
## [1633] 1 0 1 1 0 1 1 0 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 1 1 0 0 0 0 1 1 1 1 1  
## [1667] 0 1 0 0 1 1 1 0 0 1 1 1 1 1 0 0 1 1 1 1 0 1 1 1 1 0 0 0 0 0 0 1 1 0  
## [1701] 1 0 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 0 0 1 0 0 1 1 0 0 1 1 0 0 1 1 1 0  
## [1735] 1 1 1 1 1 0 1 0 1 0 0 1 1 1 0 1 0 1 0 1 1 0 0 0 1 0 1 0 1 1 0 1 0 1  
## [1769] 0 0 1 1 1 1 1 1 1 1 0 1 1 0 1 1 1 1 0 1 1 1 1 0 1 0 0 1 1 0 0 1 1 0  
## [1803] 1 0 0 1 1 1 1 1 1 1 0 1 0 1 0 1 0 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 1  
## [1837] 1 1 0 1 0 1 1 1 0 1 1 1 1 1 1 1 0 0 0 0 1 0 1 1 1 0 1 1 1 0 1 0 1 1  
## [1871] 1 1 0 1 1 0 1 1 1 1 0 1 1 1 1 0 1 1 1 0 1 0 1 1 0 1 0 1 0 0 1 1 0 1  
## [1905] 0 0 1 1 0 0 0 1 1 1 0 1 1 1 0 0 1 1 1 0 0 1 0 1 0 1 1 1 1 0 0 1 1 1  
## [1939] 1 0 0 1 1 1 1 0 0 1 0 0 0 1 1 0 1 1 0 1 1 1 0 1 1 1 1 1 1 0 1 0 1 0  
## [1973] 1 0 1 1 1 0 0 0 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 0 1 0  
## [2007] 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 0 0 1 0 1 0 0 1 0 0 1 1 1 1 1 0 1 1 1  
## [2041] 0 1 1 1 1 1 1 1 1 1 0 1 1 1 0 0 1 0 1 0 1 1 0 1 1 1 1 1 0 1 0 1 0 0  
## [2075] 0 0 1 1 1 1 1 1 1 0 0 1 1 1 1 0 1 1 0 1 1 1 0 1 0 1 1 1 0 1 1 0 1 1  
## [2109] 0 0 0 0 1 1 1 1 0 0 1 1 0 1 1 1 1 1 1 0 0 0 1 1 1 1 0 0 0 0 1 1 1 1  
## [2143] 1 1 0 1 1 1 1 1 1 0 1 1 0 1 1 1 1 1 1 1 0 1 1 1 0 1 0 1 0 1 1 0 1 0  
## [2177] 1 1 0 0 1 0 1 0 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 0 1 0  
## [2211] 1 1 0 0 0 0 0 0 0 0 1 0 0 1 1 0 1 1 0 0 0 1 0 1 0 1 1 0 1 1 1 1 0 1  
## [2245] 1 0 1 1 0 1 1 1 1 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 1 0 0 1 0 1 1 1 0 0  
## [2279] 1 1 1 1 1 1 1 0 1 1 1 1 0 1 1 1 0 0 1 1 0 1 0 1 1 1 0 1 1 0 0 1 1 1  
## [2313] 0 1 0 1 1 1 1 1 0 0 1 1 1 1 1 1 0 1 1 0 1 0 1 1 0 1 1 0 0 1 1 1 1 1  
## [2347] 1 0 1 1 1 0 1 1 1 0 1 1 0 1 0 1 0 1 1 1 0 1 1 1 1 1 0 1 1 0 0 0 1 0  
## [2381] 1 0 0 1 1 0 0 1 1 1 1 0 1 1 1 1 0 0 1 1 0 1 1 1 1 1 0 1 1 0 1 0 1 0  
## [2415] 1 1 1 1 1 1 0 1 1 0 1 1 0 1 0 0 1 1 1 1 1 0 1 0 0 0 1 1 1 1 0 1 1 0  
## [2449] 1 1 0 1 0 0 1 0 0 1 1 1 1 1 1 0 1 1 0 1 1 0 1 1 1 1 1 0 1 0 0 0 1 1  
## [2483] 0 0 1 0 1 0 1 1 0 1 1 1 0 0 1 0 0 0 1 1 0 1 0 1 1 0 1 0 0 1 1 0 0 1  
## [2517] 0 0 0 1 1 1 1 0 0 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 0 0 1 1 1 1 1  
## [2551] 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 1 0 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1  
## [2585] 0 0 1 1 1 0 1 1 0 1 0 0 0 1 1 1 0 1 1 0 0 1 1 1 1 0 1 1 1 0 0 1 1 0  
## [2619] 1 1 1 1 1 1 1 0 1 0 0 1 1 1 1 1 0 1 1 1 1 0 0 1 1 0 1 1 1 1 1 1 0 1  
## [2653] 1 0 1 1 0 0 1 1 1 1 1 0 0 0 1 0 1 1 1 0 1 1 1 0 0 0 0 0 1 1 0 0 1 0  
## [2687] 0 1 1 1 1 1 1 0 1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 1 1 0 0 1 0 0 1 0 0  
## [2721] 1 1 1 1 0 0 0 0 1 0 0 0 1 1 1 1 0 1 1 1 0 1 1 1 0 1 0 0 1 1 1 1 0 1  
## [2755] 1 1 0 0 1 1 1 1 1 1 1 0 1 0 1 0 0 0 1 0 0 1 1 1 1 1 1 0 1 0 1 1 0 1  
## [2789] 1 1 0 1 0 1 1 0 0 1 0 1 1 1 0 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 0 1  
## [2823] 0 1 1 1 0 1 1 1 1 1 1 0 1 1 0 0 1 0 1 1 1 0 1 0 0 1 1 1 1 1 0 1 1 0  
## [2857] 1 1 1 1 1 1 1 0 1 1 0 1 1 1 0 0 0 0 1 1 0 1 1 1 1 1 1 1 1 1 0 1 0 0  
## [2891] 1 1 1 1 0 1 1 1 0 1 0 1 1 1 1 1 0 0 0 1 1 1 0 1 1 0 0 1 1 1 1 1 0 1  
## [2925] 1 1 0 1 1 1 1 1 1 0 1 1 0 1 0 1 1 0 1 1 1 0 1 1 1 1 1 1 1 1 0 0 1 1  
## [2959] 0 1 1 0 1 1 1 0 1 0 0 1 0 0 0 1 1 0 1 1 1 0 1 0 1 1 1 1 1 1 0 0 1 1  
## [2993] 1 1 1 0 1 0 0 1 0 1 1 0 0 1 1 1 1 1 0 0 1 1 1 0 1 1 1 1 0 0 1 0 1 1  
## [3027] 0 1 0 1 1 0 0 1 1 1 1 0 1 0 0 1 1 1 1 0 0 1 0 0 1 0 1 1 0 0 0 0 1 0  
## [3061] 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 0  
## [3095] 1 0 1 1 1 0 0 0 0 1 1 1 1 0 1 1 0 1 0 0 0 1 1 1 0 0 1 0 1 0 1 1 1 1  
## [3129] 0 1 0 0 1 1 1 0 1 1 0 1 1 1 1 0 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [3163] 0 1 1 1 0 0 0 1 1 1 0 1 1 1 1 1 0 1 1 1 1 1 0 1 0 0 1 1 1 1 1 1 0 0  
## [3197] 1 1 0 1 1 0 1 1 0 0 0 1 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 1 1 0 0 1 1  
## [3231] 1 1 1 0 0 1 1 1 1 0 1 0 0 1 1 1 1 1 1 1 1 0 0 1 1 1 1 0 0 0 0 0 1 1  
## [3265] 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0 1 0 1 0 1 1 0 1 1 1 1 1 0 1 0 1 0 0 1  
## [3299] 0 1 1 1 0 0 1 1 1 1 0 1 0 1 0 1 1 1 0 0 1 0 0 0 1 1 1 1 1 1 1 1 1 1  
## [3333] 1 1 1 1 1 1 1 0 1 1 1 0 0 1 1 1 1 0 1 1 1 1 1 1 1 1 0 1 1 0 1 1 1 1  
## [3367] 1 0 1 0 1 0 1 1 1 1 1 1 1 0 1 1 1 1 1 0 1 0 1 1 0 1 1 1 1 0 1 1 1 1  
## [3401] 1 1 1 1 0 1 0 1 1 1 1 1 0 1 1 1 0 0 0 1 0 1 0 0 1 0 1 1 1 0 0 1 1 1  
## [3435] 0 0 1 1 1 0 0 1 1 0 0 1 1 0 1 0 1 1 0 0 0 0 0 1 1 1 1 1 0 1 1 0 0 0  
## [3469] 0 0 1 1 1 1 0 1 0 0 1 0 1 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 0 1 1 0 1 1  
## [3503] 1 0 1 1 0 1 0 1 1 1 0 1 1 0 0 0 0 0 1 1 0 1 0 0 1 1 1 1 1 1 0 1 1 1  
## [3537] 0 1 1 1 1 1 1 1 0 0 0 0 1 1 1 1 1 1 0 1 1 1 0 1 1 0 1 0 0 0 1 1 0 1  
## [3571] 1 1 1 1 0 1 1 0 1 1 0 1 1 1 1 1 1 0 0 0 0 1 0 0 1 1 1 0 0 1 1 0 1 0  
## [3605] 1 0 1 0 1 1 0 1 0 0 1 1 1 1 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 1 1  
## [3639] 0 0 1 1 1 0 0 1 0 1 1 1 1 0 0 1 0 1 1 0 1 1 1 1 1 1 1 0 1 0 1 1 0 0  
## [3673] 1 1 1 0 1 0 1 1 1 1 1 1 0 1 1 0 1 1 1 1 1 0 1 1 0 1 1 1 0 1 1 1 1 0  
## [3707] 1 1 1 0 1 0 1 1 1 0 1 1 1 1 1 1 0 1 1 1 0 0 0 1 0 1 1 1 1 1 0 1 1 0  
## [3741] 1 1 1 1 1 1 1 1 1 0 1 1 1 0 1 1 1 0 1 1 1 0 0 1 1 0 0 0 0 1 0 1 0 0  
## [3775] 0 1 0 0 1 0 1 1 0 0 1 1 0 1 1 1 0 1 1 0 1 0 1 1 0 1 0 0 1 0 1 0 1 1  
## [3809] 1 0 1 1 1 0 1 1 1 1 1 1 0 1 1 1 0 0 0 0 0 1 1 1 1 1 1 0 0 0 1 1 1 1  
## [3843] 1 0 1 1 1 0 1 1 1 1 0 1 0 1 0 1 1 1 0 1 1 1 0 0 0 0 1 1 1 0 1 1 1 1  
## [3877] 1 1 0 1 0 1 1 1 0 1 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 0 1 1  
## [3911] 0 1 0 1 1 1 0 1 1 1 0 1 0 1 0 1 1 1 1 1 0 1 1 1 1 1 0 1 1 1 0 1 1 1  
## [3945] 1 1 1 1 0 1 1 1 1 1 1 1 1 1 0 1 0 0 0 0 0 1 0 1 1 0 1 1 0 0 1 1 0 1  
## [3979] 1 0 0 0 0 1 1 1 0 1 1 1 1 0 0 1 1 1 1 1 1 0 0 1 1 0 1 0 1 1 0 1 0 1  
## [4013] 0 1 1 1 0 0 1 1 0 1 1 1 1 1 1 1 1 0 1 1 1 0 1 0 1 1 0 0 1 1 0 0 1 1  
## [4047] 1 0 0 1 1 1 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 0 1 0 1 1 1 0 1 0 1 0 0 1  
## [4081] 0 1 1 1 1 1 1 0 1 1 0 1 1 1 0 1 1 1 1 1 0 1 0 1 1 0 0 1 1 0 0 1 0 1  
## [4115] 1 1 0 1 1 1 1 0 1 0 1 0 1 1 0 1 1 1 1 1 1 1 0 1 0 1 0 1 0 1 0 1 1 0  
## [4149] 1 1 1 0 1 0 1 0 1 0 1 0 0 1 1 0 1 0 1 1 1 1 0 1 0 1 1 1 1 1 0 1 0 1  
## [4183] 1 0 1 1 1 1 1 0 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 0 0 0 1 1  
## [4217] 1 0 1 0 0 1 0 0 0 0 1 0 0 1 1 1 0 1 1 0 0 1 1 1 1 0 0 1 0 1 0 1 1 1  
## [4251] 1 1 1 1 1 1 0 0 0 1 1 1 0 0 1 0 1 0 0 1 1 1 0 0 0 1 1 1 0 1 1 1 0 1  
## [4285] 1 1 0 1 1 1 0 1 1 0 1 0 1 0 1 1 1 1 1 0 1 1 1 1 0 0 1 0 1 0 1 1 1 1  
## [4319] 1 1 0 1 0 0 0 1 1 1 0 0 1 1 0 1 1 1 1 0 0 0 1 0 1 0 1 1 1 1 1 1 1 1  
## [4353] 1 1 1 0 1 1 1 1 0 1 0 0 1 1 1 0 1 1 0 1 1 0 1 1 0 1 1 1 1 0 0 0 1 1  
## [4387] 1 1 1 1 1 1 0 1 0 1 0 1 1 1 1 1 1 1 0 1 0 1 0 1 1 1 1 1 0 0 1 0 1 0  
## [4421] 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 1  
## [4455] 1 1 1 1 0 0 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 0 0 1 1 0 1 0 1 0 1 1 1 0  
## [4489] 0 1 0 1 1 0 0 1 1 0 1 1 1 1 1 1 1 0 1 1 1 0 1 1 0 1 0 0 1 0 1 0 1 0  
## [4523] 0 1 0 0 1 1 0 1 1 1 1 0 1 0 1 1 1 1 0 1 1 1 1 1 1 1 0 1 1 0 0 0 1 1  
## [4557] 1 1 1 0 1 1 1 1 1 0 1 1 1 1 0 1 0 0 1 1 1 0 0 0 1 1 0 1 1 1 1 0 1 0  
## [4591] 1 1 1 0 1 1 0 1 1 1 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0 0 1 1 1 0 0 1  
## [4625] 1 1 1 0 0 1 1 1 1 1 1 0 1 0 1 0 1 1 0 1 1 1 1 1 1 1 0 1 1 0 1 0 0 0  
## [4659] 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0 0 1 1 0 1 1  
## [4693] 0 1 0 1 1 1 1 0 1 0 1 0 1 1 1 0 1 1 1 0 1 1 1 0 0 1 1 1 1 1 0 0 1 1  
## [4727] 1 1 1 1 1 1 0 1 1 0 1 1 0 1 1 1 1 1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 1 0  
## [4761] 0 1 1 1 1 0 1 1 0 0 0 1 0 0 1 1 0 1 0 1 1 0 1 0 0 1 1 1 1 1 0 0 1 0  
## [4795] 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 1 0 1 0 1 0 1 1 1 1 1 0 1 1 1 1 0 1 0  
## [4829] 1 1 1 1 0 1 0 0 1 0 1 0 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 0 0  
## [4863] 0 0 1 0 0 1 0 1 1 1 1 0 0 1 0 1 1 0 1 1 1 0 1 1 0 0 1 0 1 1 0 0 1 0  
## [4897] 1 1 1 0 1 0 0 1 1 1 0 1 0 0 1 1 1 0 1 0 0 0 1 0 0 0 0 1 0 1 0 1 1 1  
## [4931] 1 1 1 1 1 1 0 1 0 0 1 1 1 0 1 1 1 1 0 0 1 0 0 1 1 1 1 1 1 1 1 0 1 0  
## [4965] 1 1 0 0 1 1 0 1 1 1 0 0 0 1 1 1 0 1 1 1 0 1 0 0 1 1 1 1 0 0 1 0 0 1  
## [4999] 0 0 1 1 1 1 1 1 1 1 0 1 1 0 1 0 1 1 0 0 1 1 1 1 1 1 1 0 1 1 1 1 1 1  
## [5033] 1 0 0 1 1

str(train)

## 'data.frame': 5037 obs. of 11 variables:  
## $ track\_name : Factor w/ 7195 levels "-The ç©´é\200šã\201—3D- å\220›ã\201®è¨\230æ†¶åŠ›xå\217\215å°„ç¥žçµŒã‚’å•\217ã\201†! ï½žMr.CURVEã\201‹ã‚‰ã\201®æŒ‘æ\210¦çŠ¶ ï½ž",..: 7102 5887 3832 5437 6282 1391 204 390 5503 749 ...  
## $ size\_bytes : num 9.44e+07 1.87e+07 1.35e+08 1.33e+08 4.94e+07 ...  
## $ price : num 1 1 0 0 1 1 0 0 0 0 ...  
## $ rating\_count\_tot: int 25 169 67 4283 2798 48 0 0 3936 0 ...  
## $ user\_rating : num 1 0 0 1 1 1 0 0 1 0 ...  
## $ cont\_rating : Factor w/ 4 levels "12+","17+","4+",..: 1 3 3 3 3 4 3 3 3 4 ...  
## $ prime\_genre : Factor w/ 23 levels "Book","Business",..: 8 15 8 9 16 8 5 8 22 8 ...  
## $ E : int 0 1 1 1 1 0 1 1 1 0 ...  
## $ E10 : int 0 0 0 0 0 1 0 0 0 1 ...  
## $ T : int 1 0 0 0 0 0 0 0 0 0 ...  
## $ M : int 0 0 0 0 0 0 0 0 0 0 ...

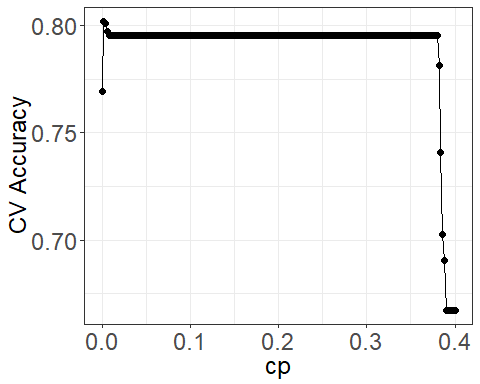
train$user\_rating <- factor(train$user\_rating, levels = c(0, 1), ordered = TRUE)  
  
  
set.seed(3100)  
train.cart = train(user\_rating ~ price + rating\_count\_tot + prime\_genre + size\_bytes + cont\_rating,  
 data = train,  
 method = "rpart",  
 tuneGrid = data.frame(cp = seq(0,0.4,0.002)),  
 trControl = trainControl(method = "cv", number = 10),  
 metric = "Accuracy")  
train.cart

## CART   
##   
## 5037 samples  
## 5 predictor  
## 2 classes: '0', '1'   
##   
## No pre-processing  
## Resampling: Cross-Validated (10 fold)   
## Summary of sample sizes: 4534, 4534, 4533, 4532, 4533, 4532, ...   
## Resampling results across tuning parameters:  
##   
## cp Accuracy Kappa   
## 0.000 0.7692966 0.46114825  
## 0.002 0.8018560 0.49924325  
## 0.004 0.8008663 0.49442686  
## 0.006 0.7970957 0.47886803  
## 0.008 0.7955127 0.45512283  
## 0.010 0.7955127 0.45512283  
## 0.012 0.7955127 0.45512283  
## 0.014 0.7955127 0.45512283  
## 0.016 0.7955127 0.45512283  
## 0.018 0.7955127 0.45512283  
## 0.020 0.7955127 0.45512283  
## 0.022 0.7955127 0.45512283  
## 0.024 0.7955127 0.45512283  
## 0.026 0.7955127 0.45512283  
## 0.028 0.7955127 0.45512283  
## 0.030 0.7955127 0.45512283  
## 0.032 0.7955127 0.45512283  
## 0.034 0.7955127 0.45512283  
## 0.036 0.7955127 0.45512283  
## 0.038 0.7955127 0.45512283  
## 0.040 0.7955127 0.45512283  
## 0.042 0.7955127 0.45512283  
## 0.044 0.7955127 0.45512283  
## 0.046 0.7955127 0.45512283  
## 0.048 0.7955127 0.45512283  
## 0.050 0.7955127 0.45512283  
## 0.052 0.7955127 0.45512283  
## 0.054 0.7955127 0.45512283  
## 0.056 0.7955127 0.45512283  
## 0.058 0.7955127 0.45512283  
## 0.060 0.7955127 0.45512283  
## 0.062 0.7955127 0.45512283  
## 0.064 0.7955127 0.45512283  
## 0.066 0.7955127 0.45512283  
## 0.068 0.7955127 0.45512283  
## 0.070 0.7955127 0.45512283  
## 0.072 0.7955127 0.45512283  
## 0.074 0.7955127 0.45512283  
## 0.076 0.7955127 0.45512283  
## 0.078 0.7955127 0.45512283  
## 0.080 0.7955127 0.45512283  
## 0.082 0.7955127 0.45512283  
## 0.084 0.7955127 0.45512283  
## 0.086 0.7955127 0.45512283  
## 0.088 0.7955127 0.45512283  
## 0.090 0.7955127 0.45512283  
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## 0.382 0.7812553 0.40509809  
## 0.384 0.7409247 0.26246536  
## 0.386 0.7027793 0.12668226  
## 0.388 0.6906761 0.08349642  
## 0.390 0.6674614 0.00000000  
## 0.392 0.6674614 0.00000000  
## 0.394 0.6674614 0.00000000  
## 0.396 0.6674614 0.00000000  
## 0.398 0.6674614 0.00000000  
## 0.400 0.6674614 0.00000000  
##   
## Accuracy was used to select the optimal model using the largest value.  
## The final value used for the model was cp = 0.002.

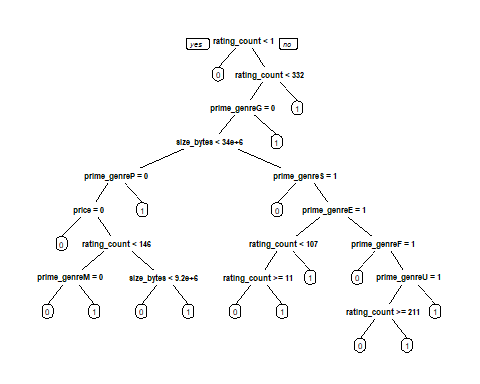
train.cart$results

## cp Accuracy Kappa AccuracySD KappaSD  
## 1 0.000 0.7692966 0.46114825 0.0219385249 0.04221854  
## 2 0.002 0.8018560 0.49924325 0.0140632427 0.03872908  
## 3 0.004 0.8008663 0.49442686 0.0129580229 0.03323288  
## 4 0.006 0.7970957 0.47886803 0.0090008820 0.02864224  
## 5 0.008 0.7955127 0.45512283 0.0087252047 0.02751600  
## 6 0.010 0.7955127 0.45512283 0.0087252047 0.02751600  
## 7 0.012 0.7955127 0.45512283 0.0087252047 0.02751600  
## 8 0.014 0.7955127 0.45512283 0.0087252047 0.02751600  
## 9 0.016 0.7955127 0.45512283 0.0087252047 0.02751600  
## 10 0.018 0.7955127 0.45512283 0.0087252047 0.02751600  
## 11 0.020 0.7955127 0.45512283 0.0087252047 0.02751600  
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## 180 0.358 0.7955127 0.45512283 0.0087252047 0.02751600  
## 181 0.360 0.7955127 0.45512283 0.0087252047 0.02751600  
## 182 0.362 0.7955127 0.45512283 0.0087252047 0.02751600  
## 183 0.364 0.7955127 0.45512283 0.0087252047 0.02751600  
## 184 0.366 0.7955127 0.45512283 0.0087252047 0.02751600  
## 185 0.368 0.7955127 0.45512283 0.0087252047 0.02751600  
## 186 0.370 0.7955127 0.45512283 0.0087252047 0.02751600  
## 187 0.372 0.7955127 0.45512283 0.0087252047 0.02751600  
## 188 0.374 0.7955127 0.45512283 0.0087252047 0.02751600  
## 189 0.376 0.7955127 0.45512283 0.0087252047 0.02751600  
## 190 0.378 0.7955127 0.45512283 0.0087252047 0.02751600  
## 191 0.380 0.7955127 0.45512283 0.0087252047 0.02751600  
## 192 0.382 0.7812553 0.40509809 0.0406571620 0.14410258  
## 193 0.384 0.7409247 0.26246536 0.0633386777 0.22628870  
## 194 0.386 0.7027793 0.12668226 0.0567929131 0.20402603  
## 195 0.388 0.6906761 0.08349642 0.0490542974 0.17603830  
## 196 0.390 0.6674614 0.00000000 0.0006090985 0.00000000  
## 197 0.392 0.6674614 0.00000000 0.0006090985 0.00000000  
## 198 0.394 0.6674614 0.00000000 0.0006090985 0.00000000  
## 199 0.396 0.6674614 0.00000000 0.0006090985 0.00000000  
## 200 0.398 0.6674614 0.00000000 0.0006090985 0.00000000  
## 201 0.400 0.6674614 0.00000000 0.0006090985 0.00000000

ggplot(train.cart$results, aes(x = cp, y = Accuracy)) + geom\_point(size = 2) + geom\_line() +   
 ylab("CV Accuracy") + theme\_bw() +   
 theme(axis.title=element\_text(size=18), axis.text=element\_text(size=18))



mod.cart = train.cart$finalModel  
prp(mod.cart)



test\_data.mm = as.data.frame((model.matrix(user\_rating~.+0,data= test\_data)))  
predict.cart = predict(mod.cart, newdata = test\_data.mm, type = "class")  
  
table(test\_data$user\_rating, predict.cart)

## predict.cart  
## 0 1  
## 0 361 380  
## 1 62 1357

tableAccuracy(test\_data$user\_rating, predict.cart)

## [1] 0.7953704