

Group 1_Hotel Cancellation

Chaitanya Kunapareddi, Chaithra Kopparam Cheluvaiah, Ruchak Nilesh Vira, Shourya Goel, Vinit Sha

09/12/2021

```
# importing required libraries  
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.1.3
```

```
## -- Attaching packages ----- tidyverse 1.3.1 --
```

```
## v ggplot2 3.3.6    v purrr  0.3.4  
## v tibble  3.1.7    v dplyr  1.0.9  
## v tidyr   1.2.0    v stringr 1.4.0  
## v readr   2.1.2    v forcats 0.5.1
```

```
## Warning: package 'ggplot2' was built under R version 4.1.3
```

```
## Warning: package 'tibble' was built under R version 4.1.3
```

```
## Warning: package 'tidyr' was built under R version 4.1.3
```

```
## Warning: package 'readr' was built under R version 4.1.3
```

```
## Warning: package 'dplyr' was built under R version 4.1.3
```

```
## -- Conflicts ----- tidyverse_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag()    masks stats::lag()
```

```
library(caret)
```

```
## Warning: package 'caret' was built under R version 4.1.3
```

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

```
##
```

```
## Attaching package: 'caret'
```

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

```
##
```

```
## lift
```

```
library(dplyr)
library(ggplot2)
library(e1071)
```

```
## Warning: package 'e1071' was built under R version 4.1.3
```

```
library(kernlab)
```

```
## Warning: package 'kernlab' was built under R version 4.1.3
```

```
##
## Attaching package: 'kernlab'
```

```
## The following object is masked from 'package:purrr':
##
##     cross
```

```
## The following object is masked from 'package:ggplot2':
##
##     alpha
```

```
library(arules)
```

```
## Warning: package 'arules' was built under R version 4.1.3
```

```
## Loading required package: Matrix
```

```
##
## Attaching package: 'Matrix'
```

```
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
```

```
##
## Attaching package: 'arules'
```

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

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

```
## The following objects are masked from 'package:base':
##
##     abbreviate, write
```

```
library(arulesViz)
```

```
## Warning: package 'arulesViz' was built under R version 4.1.3
```

```
library(maps)
```

```
##
```

```
## Attaching package: 'maps'
```

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

```
##
```

```
##      map
```

```
library(ggmap)
```

```
## Google's Terms of Service: https://cloud.google.com/maps-platform/terms/.
```

```
## Please cite ggmap if you use it! See citation("ggmap") for details.
```

```
library(mapproj)
```

```
## Warning: package 'mapproj' was built under R version 4.1.3
```

```
library(rworldmap)
```

```
## Warning: package 'rworldmap' was built under R version 4.1.2
```

```
## Loading required package: sp
```

```
## Warning: package 'sp' was built under R version 4.1.3
```

```
## ### Welcome to rworldmap ###
```

```
## For a short introduction type :  vignette('rworldmap')
```

```
library(rpart)
```

```
## Warning: package 'rpart' was built under R version 4.1.3
```

```
# Reading the csv data into a dataframe
```

```
hotelData <- read_csv("https://intro-datascience.s3.us-east-2.amazonaws.com/Resort01.csv")
```

```
## Rows: 40060 Columns: 20
```

```
## -- Column specification -----
```

```
## Delimiter: ","
```

```
## chr (7): Meal, Country, MarketSegment, ReservedRoomType, AssignedRoomType, ...
```

```
## dbl (13): IsCanceled, LeadTime, StaysInWeekendNights, StaysInWeekNights, Adu...
```

```
##
```

```
## 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.
```

```
# exploring structure of the data
str(hotelData)
```

```
## spec_tbl_df [40,060 x 20] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
## $ IsCanceled          : num [1:40060] 0 0 0 0 0 0 0 0 1 1 ...
## $ LeadTime            : num [1:40060] 342 737 7 13 14 14 0 9 85 75 ...
## $ StaysInWeekendNights : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ StaysInWeekNights   : num [1:40060] 0 0 1 1 2 2 2 2 3 3 ...
## $ Adults              : num [1:40060] 2 2 1 1 2 2 2 2 2 2 ...
## $ Children            : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ Babies              : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ Meal                : chr [1:40060] "BB" "BB" "BB" "BB" ...
## $ Country             : chr [1:40060] "PRT" "PRT" "GBR" "GBR" ...
## $ MarketSegment       : chr [1:40060] "Direct" "Direct" "Direct" "Corporate" ...
## $ IsRepeatedGuest      : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ PreviousCancellations : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ PreviousBookingsNotCanceled: num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ ReservedRoomType     : chr [1:40060] "C" "C" "A" "A" ...
## $ AssignedRoomType     : chr [1:40060] "C" "C" "C" "A" ...
## $ BookingChanges       : num [1:40060] 3 4 0 0 0 0 0 0 0 0 ...
## $ DepositType          : chr [1:40060] "No Deposit" "No Deposit" "No Deposit" "No Deposit" ..
## $ CustomerType         : chr [1:40060] "Transient" "Transient" "Transient" "Transient" ...
## $ RequiredCarParkingSpaces : num [1:40060] 0 0 0 0 0 0 0 0 0 0 ...
## $ TotalOfSpecialRequests : num [1:40060] 0 0 0 0 1 1 0 1 1 0 ...
## - attr(*, "spec")=
## .. cols(
## ..   IsCanceled = col_double(),
## ..   LeadTime = col_double(),
## ..   StaysInWeekendNights = col_double(),
## ..   StaysInWeekNights = col_double(),
## ..   Adults = col_double(),
## ..   Children = col_double(),
## ..   Babies = col_double(),
## ..   Meal = col_character(),
## ..   Country = col_character(),
## ..   MarketSegment = col_character(),
## ..   IsRepeatedGuest = col_double(),
## ..   PreviousCancellations = col_double(),
## ..   PreviousBookingsNotCanceled = col_double(),
## ..   ReservedRoomType = col_character(),
## ..   AssignedRoomType = col_character(),
## ..   BookingChanges = col_double(),
## ..   DepositType = col_character(),
## ..   CustomerType = col_character(),
## ..   RequiredCarParkingSpaces = col_double(),
## ..   TotalOfSpecialRequests = col_double()
## .. )
## - attr(*, "problems")=<externalptr>
```

```
# Descriptive statistics
summary(hotelData)
```

```
##      IsCanceled      LeadTime      StaysInWeekendNights StaysInWeekNights
```

```

## Min. :0.0000 Min. : 0.00 Min. : 0.00 Min. : 0.000
## 1st Qu.:0.0000 1st Qu.: 10.00 1st Qu.: 0.00 1st Qu.: 1.000
## Median :0.0000 Median : 57.00 Median : 1.00 Median : 3.000
## Mean :0.2776 Mean : 92.68 Mean : 1.19 Mean : 3.129
## 3rd Qu.:1.0000 3rd Qu.:155.00 3rd Qu.: 2.00 3rd Qu.: 5.000
## Max. :1.0000 Max. :737.00 Max. :19.00 Max. :50.000
## Adults Children Babies Meal
## Min. : 0.000 Min. : 0.0000 Min. :0.0000 Length:40060
## 1st Qu.: 2.000 1st Qu.: 0.0000 1st Qu.:0.0000 Class :character
## Median : 2.000 Median : 0.0000 Median :0.0000 Mode :character
## Mean : 1.867 Mean : 0.1287 Mean :0.0139
## 3rd Qu.: 2.000 3rd Qu.: 0.0000 3rd Qu.:0.0000
## Max. :55.000 Max. :10.0000 Max. :2.0000
## Country MarketSegment IsRepeatedGuest PreviousCancellations
## Length:40060 Length:40060 Min. :0.00000 Min. : 0.0000
## Class :character Class :character 1st Qu.:0.00000 1st Qu.: 0.0000
## Mode :character Mode :character Median :0.00000 Median : 0.0000
## Mean :0.04438 Mean : 0.1017
## 3rd Qu.:0.00000 3rd Qu.: 0.0000
## Max. :1.00000 Max. :26.0000
## PreviousBookingsNotCanceled ReservedRoomType AssignedRoomType
## Min. : 0.0000 Length:40060 Length:40060
## 1st Qu.: 0.0000 Class :character Class :character
## Median : 0.0000 Mode :character Mode :character
## Mean : 0.1465
## 3rd Qu.: 0.0000
## Max. :30.0000
## BookingChanges DepositType CustomerType
## Min. : 0.000 Length:40060 Length:40060
## 1st Qu.: 0.000 Class :character Class :character
## Median : 0.000 Mode :character Mode :character
## Mean : 0.288
## 3rd Qu.: 0.000
## Max. :17.000
## RequiredCarParkingSpaces TotalOfSpecialRequests
## Min. :0.0000 Min. :0.0000
## 1st Qu.:0.0000 1st Qu.:0.0000
## Median :0.0000 Median :0.0000
## Mean :0.1381 Mean :0.6198
## 3rd Qu.:0.0000 3rd Qu.:1.0000
## Max. :8.0000 Max. :5.0000

```

```
# creating table for categorical variables
```

```
table(hotelData$IsCanceled)
```

```

##
##      0      1
## 28938 11122

```

```
table(hotelData$Meal)
```

```
##
```

```
##      BB      FB      HB      SC Undefined
## 30005    754    8046    86      1169
```

```
table(hotelData$Country)
```

```
##
## AGO ALB AND ARE ARG ARM AUS AUT AZE BDI BEL BGR BHR
## 24 3 5 11 57 2 87 210 3 1 448 5 1
## BHS BIH BLR BRA BWA CAF CHE CHL CHN CIV CMR CN COL
## 1 1 7 430 1 3 435 17 134 2 2 710 16
## COM CPV CRI CUB CYM CYP CZE DEU DJI DNK DOM DZA ECU
## 1 5 2 4 1 8 27 1203 1 65 3 12 2
## EGY ESP EST FIN FJI FRA GBR GEO GGY GIB GRC HKG HRV
## 1 3957 33 151 1 1611 6814 11 1 13 10 4 11
## HUN IDN IND IRL IRN ISL ISR ITA JAM JEY JOR JPN KAZ
## 47 5 37 2166 5 6 28 459 5 3 2 9 5
## KOR KWT LBN LKA LTU LUX LVA MAC MAR MDG MDV MEX MKD
## 9 3 6 1 46 80 33 1 75 1 6 6 1
## MLT MOZ MUS MWI MYS NGA NLD NOR NPL NULL NZL OMN PAK
## 2 6 1 2 10 10 514 123 1 464 14 11 4
## PER PHL PLW POL PRI PRT QAT ROU RUS SAU SEN SGP SMR
## 1 16 1 333 9 17630 1 177 189 1 1 4 1
## SRB SUR SVK SVN SWE SYC SYR TGO THA TUN TUR TWN UGA
## 7 4 12 11 304 1 1 1 6 1 23 12 1
## UKR URY USA UZB VEN VNM ZAF ZMB ZWE
## 23 8 479 1 3 2 18 1 2
```

```
table(hotelData$MarketSegment)
```

```
##
## Complementary Corporate Direct Groups Offline TA/TO
## 201 2309 6513 5836 7472
## Online TA
## 17729
```

```
table(hotelData$IsRepeatedGuest)
```

```
##
## 0 1
## 38282 1778
```

```
table(hotelData$ReservedRoomType)
```

```
##
## A B C D E F G H L P
## 23399 3 918 7433 4982 1106 1610 601 6 2
```

```
table(hotelData$AssignedRoomType)
```

```
##
## A B C D E F G H I L P
## 17046 159 2214 10339 5638 1733 1853 712 363 1 2
```

```
table(hotelData$DepositType)
```

```
##  
## No Deposit Non Refund Refundable  
##      38199      1719      142
```

```
table(hotelData$CustomerType)
```

```
##  
##      Contract      Group      Transient Transient-Party  
##      1776      284      30209      7791
```

```
# Data Cleaning - calculating NA values in the data  
sum(is.na(hotelData$IsCanceled))
```

```
## [1] 0
```

```
sum(is.na(hotelData$LeadTime))
```

```
## [1] 0
```

```
sum(is.na(hotelData$StaysInWeekendNights))
```

```
## [1] 0
```

```
sum(is.na(hotelData$StaysInWeekNights))
```

```
## [1] 0
```

```
sum(is.na(hotelData$Adults))
```

```
## [1] 0
```

```
sum(is.na(hotelData$Children))
```

```
## [1] 0
```

```
sum(is.na(hotelData$Babies))
```

```
## [1] 0
```

```
sum(is.na(hotelData$Meal))
```

```
## [1] 0
```

```
sum(is.na(hotelData$Country))
```

```
## [1] 0
```

```
sum(is.na(hotelData$MarketSegment))
```

```
## [1] 0
```

```
sum(is.na(hotelData$IsRepeatedGuest))
```

```
## [1] 0
```

```
sum(is.na(hotelData$PreviousCancellations))
```

```
## [1] 0
```

```
sum(is.na(hotelData$PreviousBookingsNotCanceled))
```

```
## [1] 0
```

```
sum(is.na(hotelData$ReservedRoomType))
```

```
## [1] 0
```

```
sum(is.na(hotelData$AssignedRoomType))
```

```
## [1] 0
```

```
sum(is.na(hotelData$BookingChanges))
```

```
## [1] 0
```

```
sum(is.na(hotelData$DepositType))
```

```
## [1] 0
```

```
sum(is.na(hotelData$CustomerType))
```

```
## [1] 0
```

```
sum(is.na(hotelData$RequiredCarParkingSpaces))
```

```
## [1] 0
```



```
sum(is.na(hotelData$TotalOfSpecialRequests))
```

```
## [1] 0
```

```
#Converting "NULL" string to NA
```

```
hotelData$Country[hotelData$Country=="NULL"] <- NA
```

```
#correcting country code for canada - CN to CAN
```

```
hotelData$Country[hotelData$Country=="CN"] <- "CAN"
```

```
table(hotelData$Country)
```

```
##
## AGO ALB AND ARE ARG ARM AUS AUT AZE BDI BEL BGR BHR
## 24 3 5 11 57 2 87 210 3 1 448 5 1
## BHS BIH BLR BRA BWA CAF CAN CHE CHL CHN CIV CMR COL
## 1 1 7 430 1 3 710 435 17 134 2 2 16
## COM CPV CRI CUB CYM CYP CZE DEU DJI DNK DOM DZA ECU
## 1 5 2 4 1 8 27 1203 1 65 3 12 2
## EGY ESP EST FIN FJI FRA GBR GEO GGY GIB GRC HKG HRV
## 1 3957 33 151 1 1611 6814 11 1 13 10 4 11
## HUN IDN IND IRL IRN ISL ISR ITA JAM JEY JOR JPN KAZ
## 47 5 37 2166 5 6 28 459 5 3 2 9 5
## KOR KWT LBN LKA LTU LUX LVA MAC MAR MDG MDV MEX MKD
## 9 3 6 1 46 80 33 1 75 1 6 6 1
## MLT MOZ MUS MWI MYS NGA NLD NOR NPL NZL OMN PAK PER
## 2 6 1 2 10 10 514 123 1 14 11 4 1
## PHL PLW POL PRI PRT QAT ROU RUS SAU SEN SGP SMR SRB
## 16 1 333 9 17630 1 177 189 1 1 4 1 7
## SUR SVK SVN SWE SYC SYR TGO THA TUN TUR TWN UGA UKR
## 4 12 11 304 1 1 1 6 1 23 12 1 23
## URY USA UZB VEN VNM ZAF ZMB ZWE
## 8 479 1 3 2 18 1 2
```

```
# verifying whether NA is replaced in place of NULL string in Country column
```

```
table(is.na(hotelData$Country))
```

```
##
```

```
## FALSE TRUE
```

```
## 39596 464
```

```
# plotting NA values for each column
```

```
hotelData %>%
```

```
summarise_all(list(~is.na(.)))%>%
```

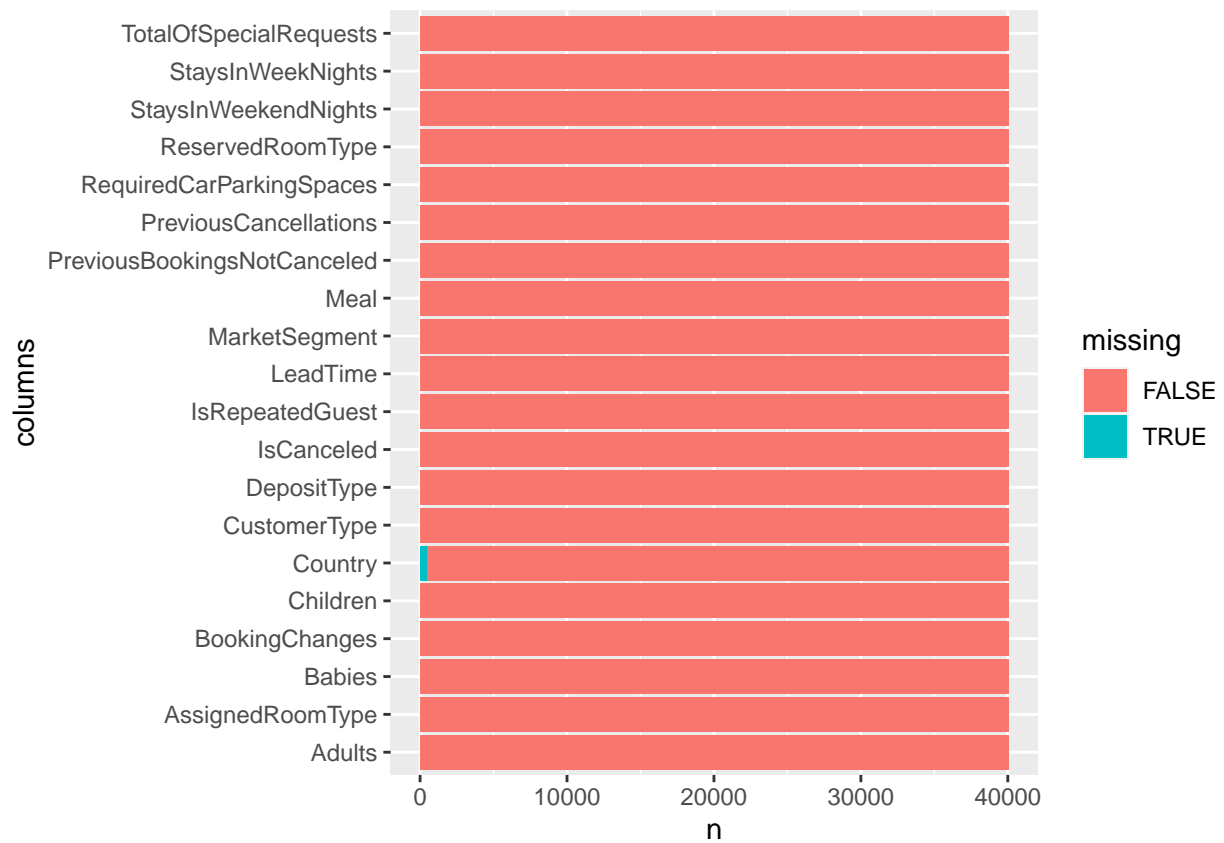
```
pivot_longer(everything(),
```

```
names_to = "columns", values_to="missing") %>%
```

```
count(columns, missing) %>%
```

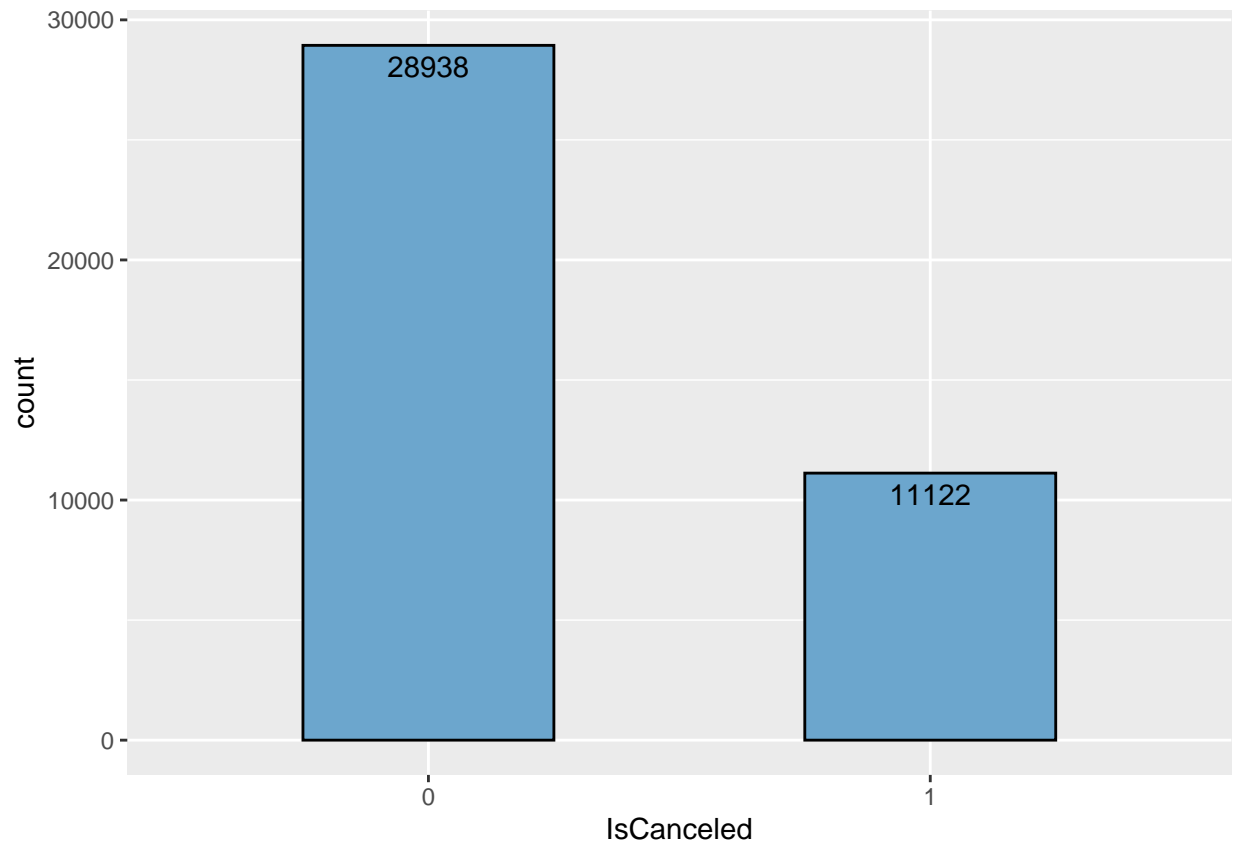
```
ggplot(aes(y=columns,x=n,fill=missing))+
```

```
geom_col()
```

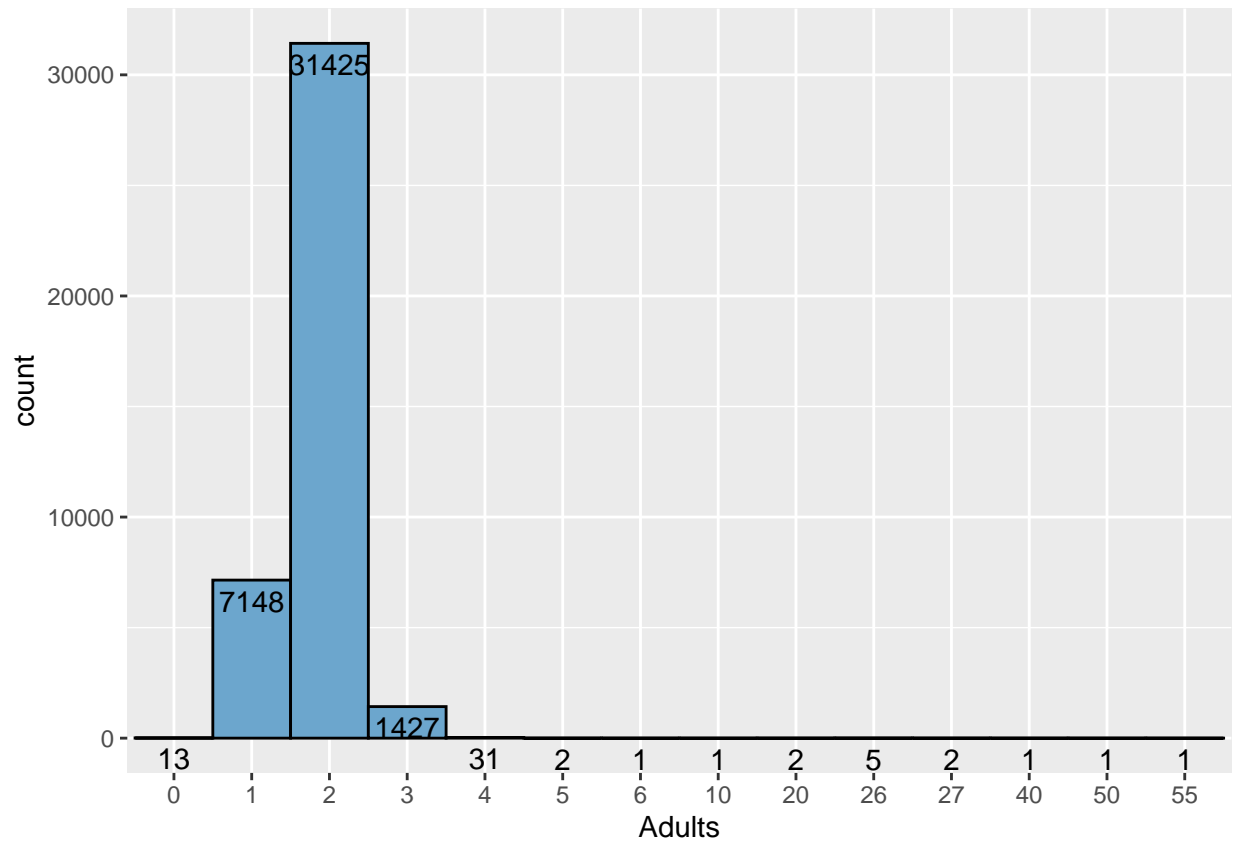


Exploratory Data Analysis

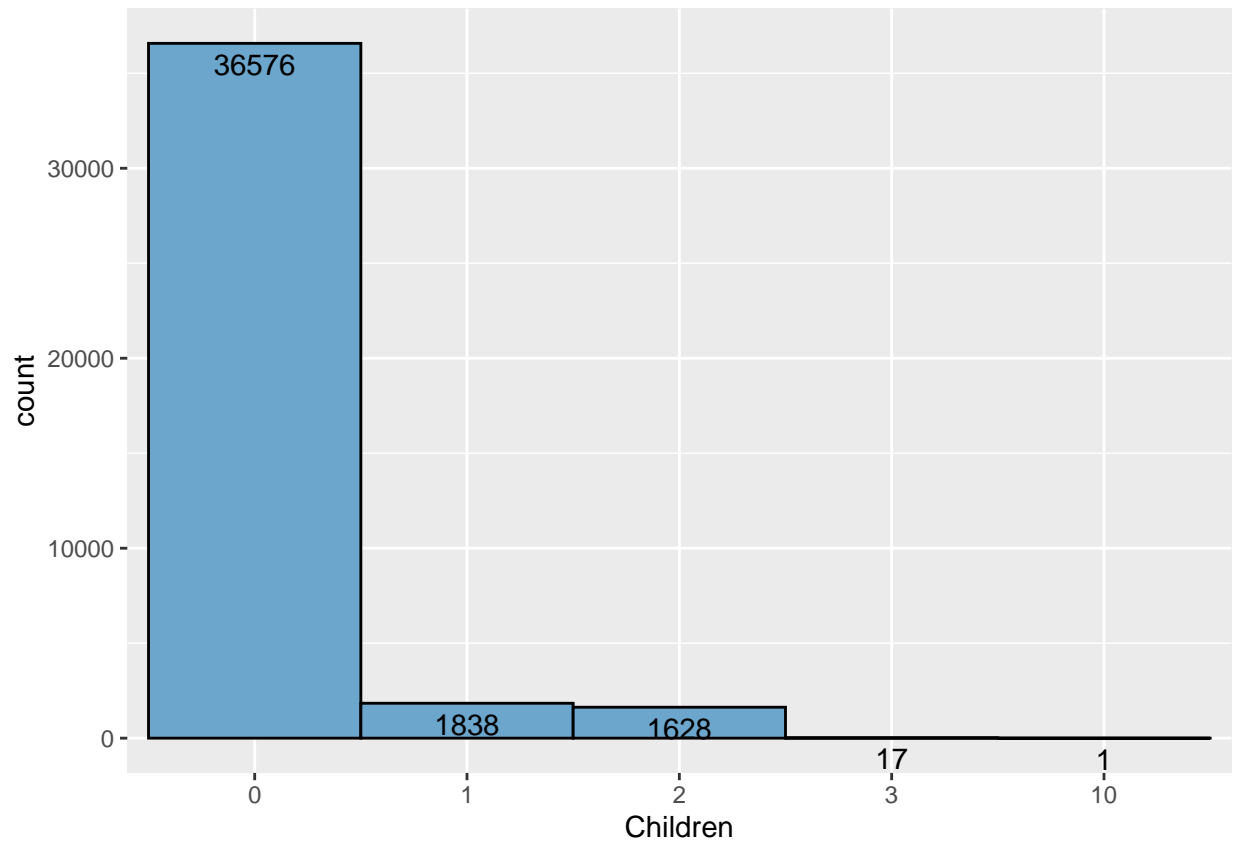
```
# plotting "IsCanceled" on a bar graph
ggplot(hotelData, aes(x=factor(IsCanceled)))+geom_bar(fill="skyblue3", color="black", width = 0.5)+scale_x_discrete(labels=c("Not Canceled", "Canceled"))
```



```
# plotting "Adults" on a bar graph  
ggplot(hotelData, aes(x=factor(Adults)))+geom_bar(fill="skyblue3", color="black", width = 1.0)+scale_x_c
```

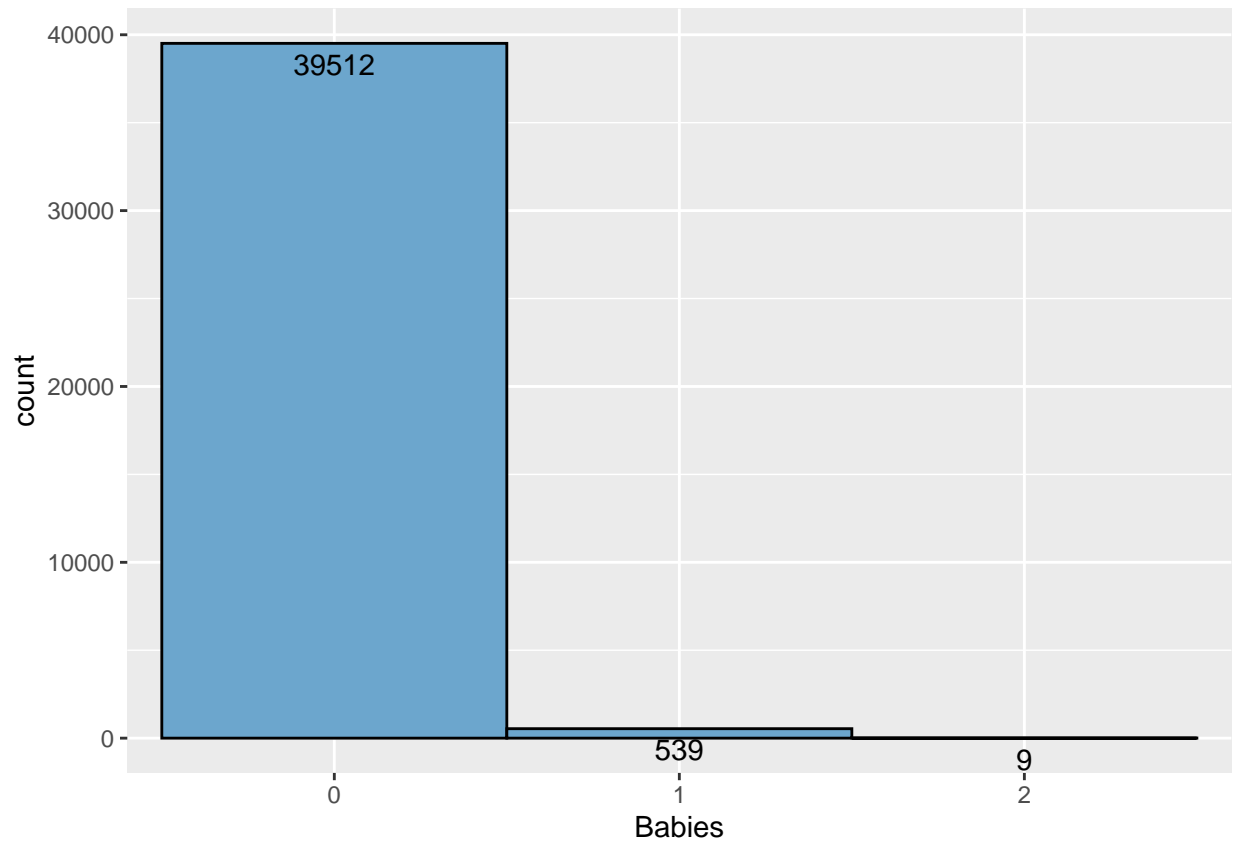


```
# plotting "Children" on a bar graph
ggplot(hotelData, aes(x=factor(Children)))+geom_bar(fill="skyblue3", color="black", width = 1.0)+scale_y_
```



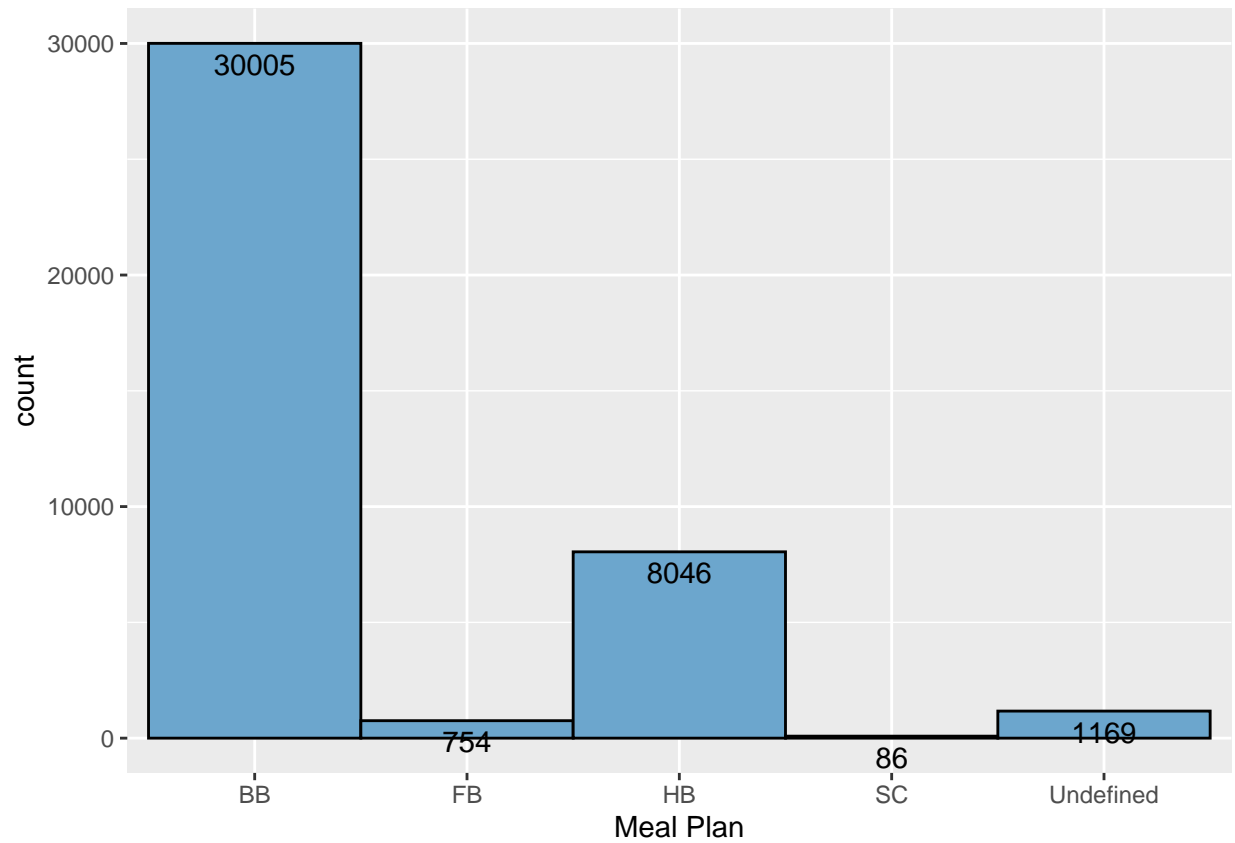
plotting "Babies" on a bar graph

```
ggplot(hotelData, aes(x=factor(Babies)))+geom_bar(fill="skyblue3", color="black", width = 1.0)+scale_x_c
```



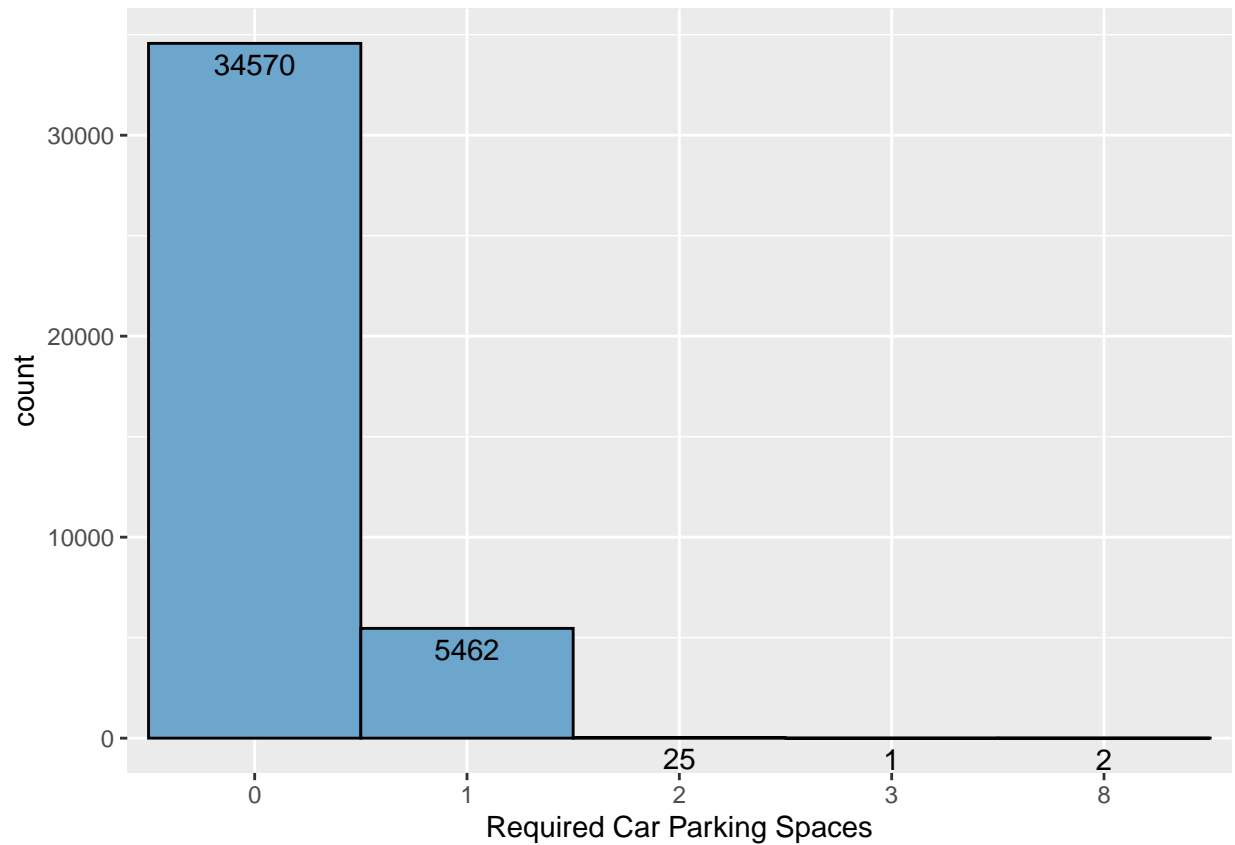
plotting "Meal Plan" on a bar graph

```
ggplot(hotelData, aes(x=factor(Meal)))+geom_bar(fill="skyblue3", color="black", width = 1.0)+scale_x_discrete()
```



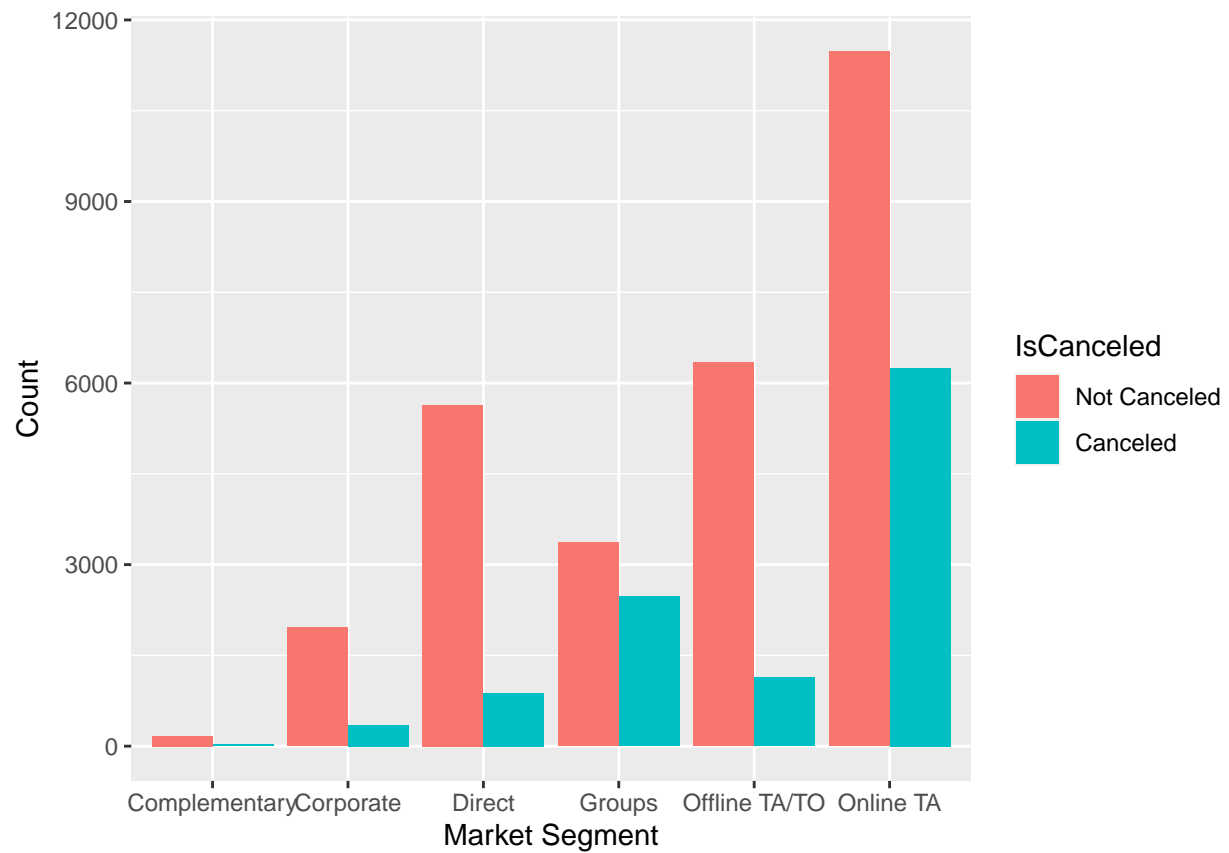
plotting "Required Car Parking Spaces" on a bar graph

```
ggplot(hotelData, aes(x=factor(RequiredCarParkingSpaces)))+geom_bar(fill="skyblue3", color="black", width=0.8)
```

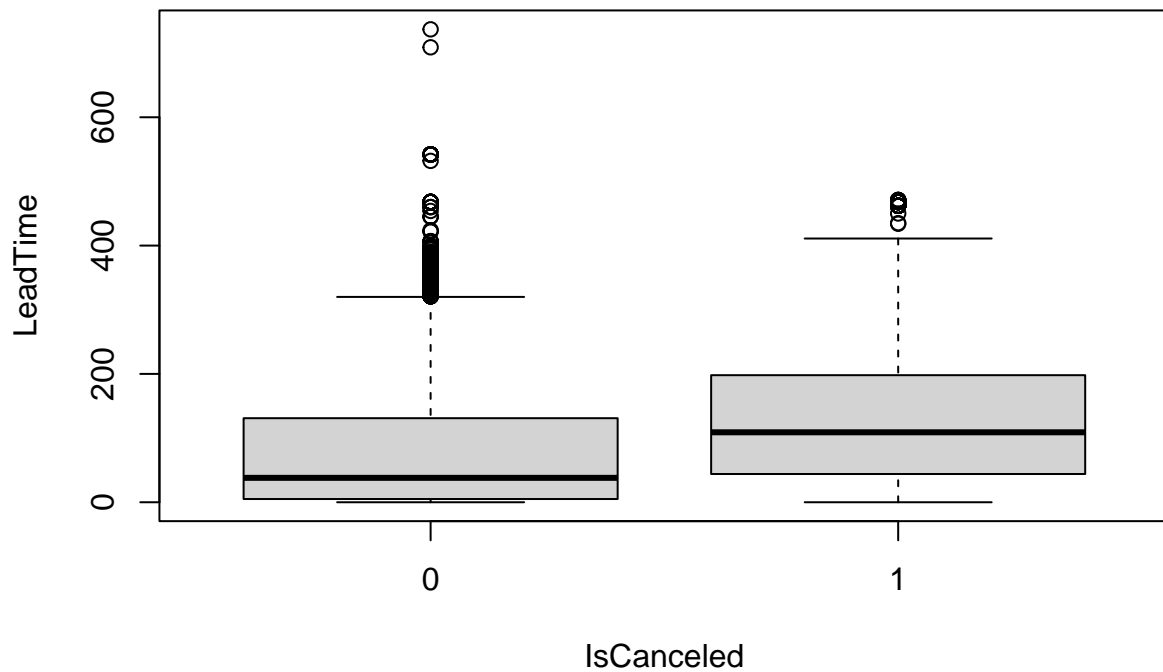


plotting "IsCanceled" Vs Market Segment" on a bar graph

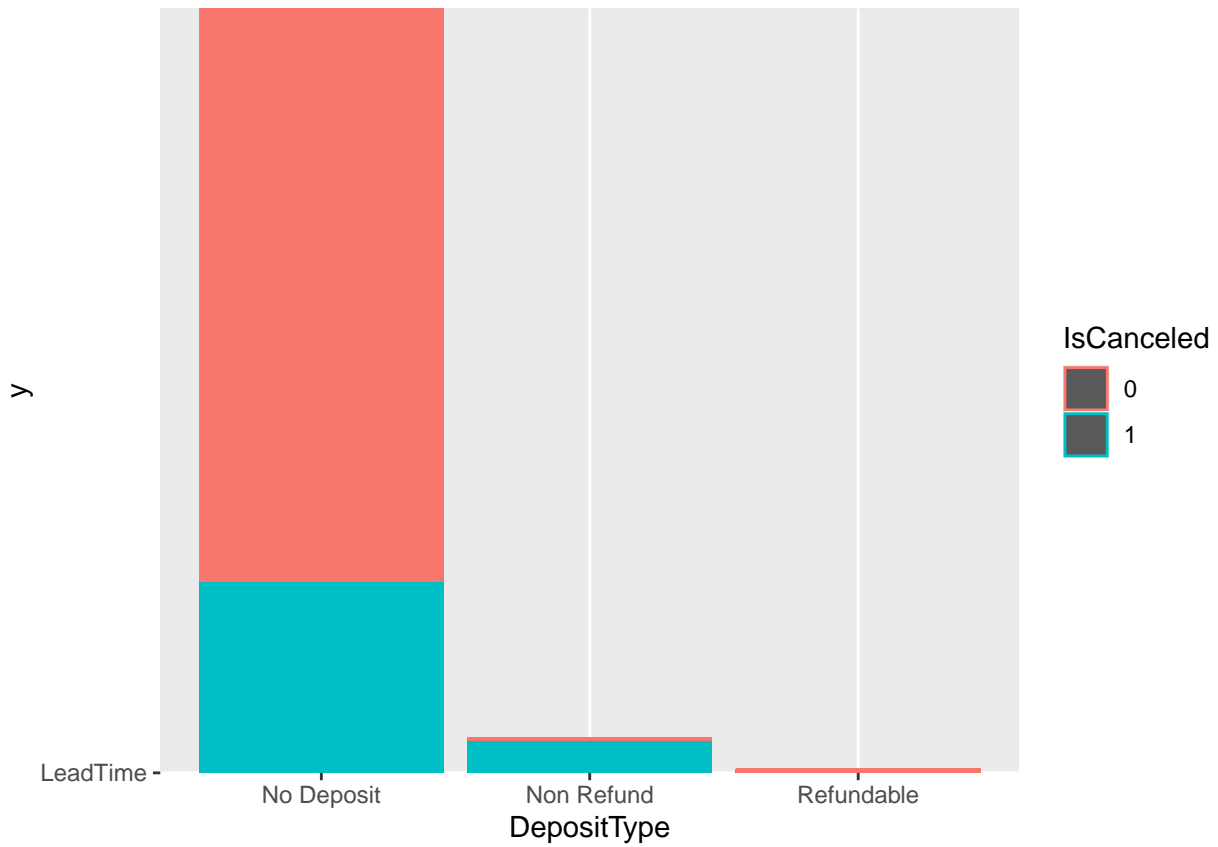
```
ggplot(hotelData, aes(x=factor(MarketSegment), fill=factor(IsCanceled)))+  
  geom_bar(position="dodge")+labs(x="Market Segment", y="Count")+  
  scale_fill_discrete(name="IsCanceled", labels=c("Not Canceled", "Canceled"))
```

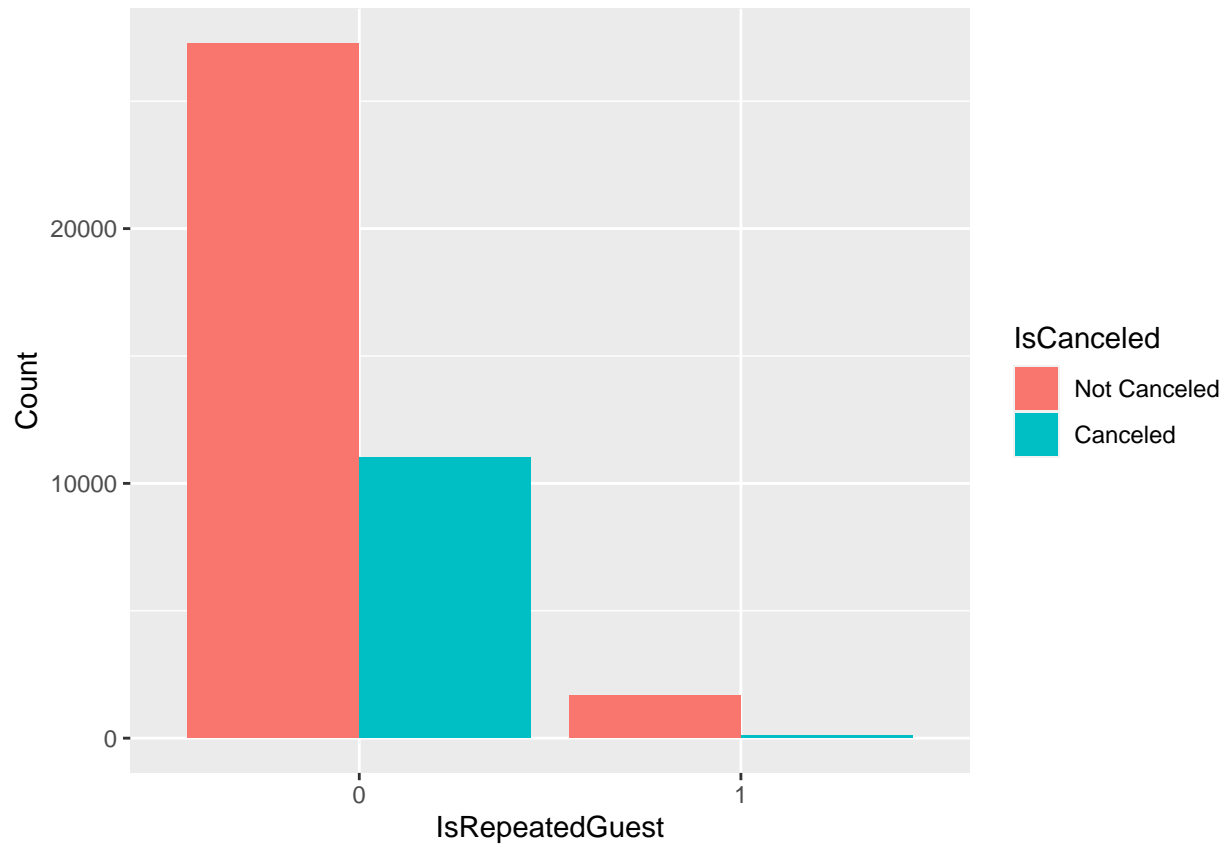
```
# box plot of "LeadTime" w.r.t "ISCanceled"  
boxplot(LeadTime~ISCanceled, data=hotelData)
```



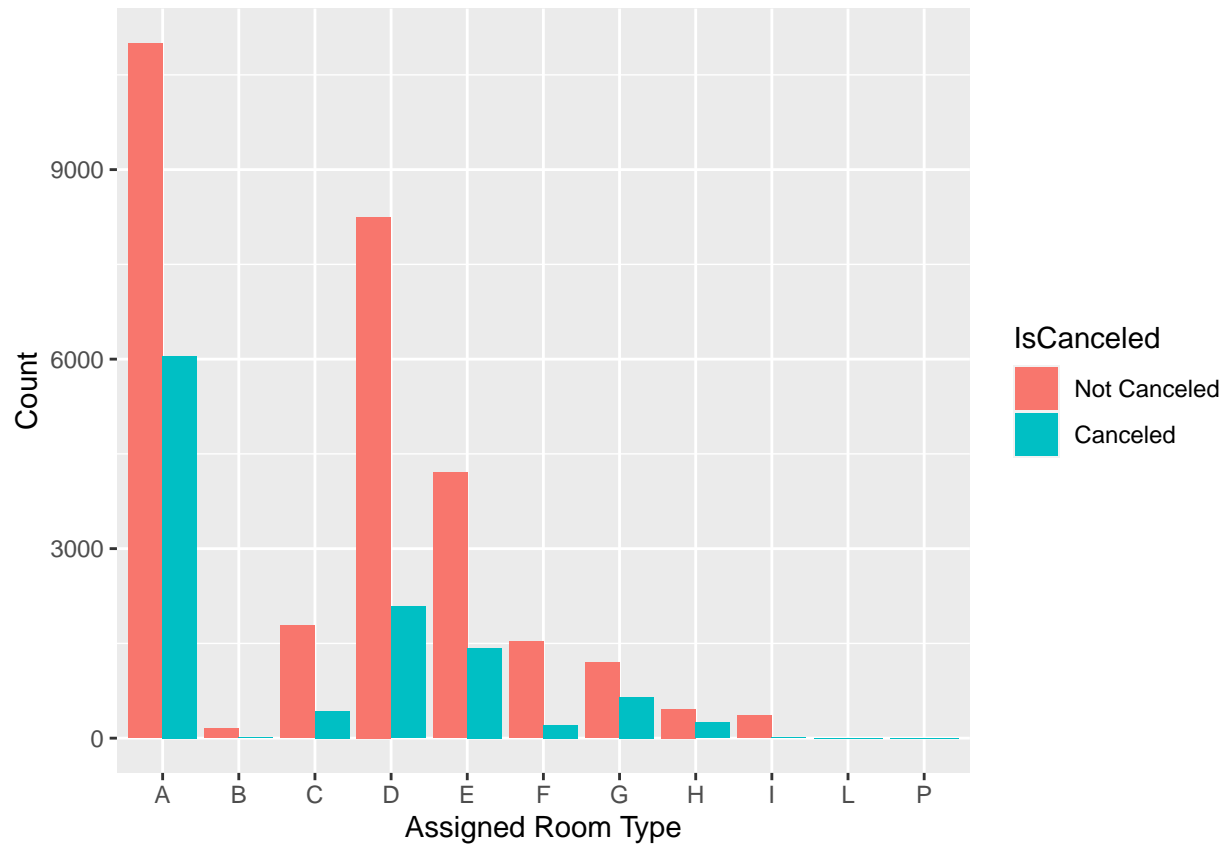
```
# step 1: factorizing "IsCanceled"
# step 2: plotting Stacked bar graph DepositType Vs LeadTime
hotelData$IsCanceled<-as.factor(hotelData$IsCanceled)
ggplot(data = hotelData, aes(x=DepositType, y="LeadTime", color=IsCanceled))+geom_bar(stat="identity")
```



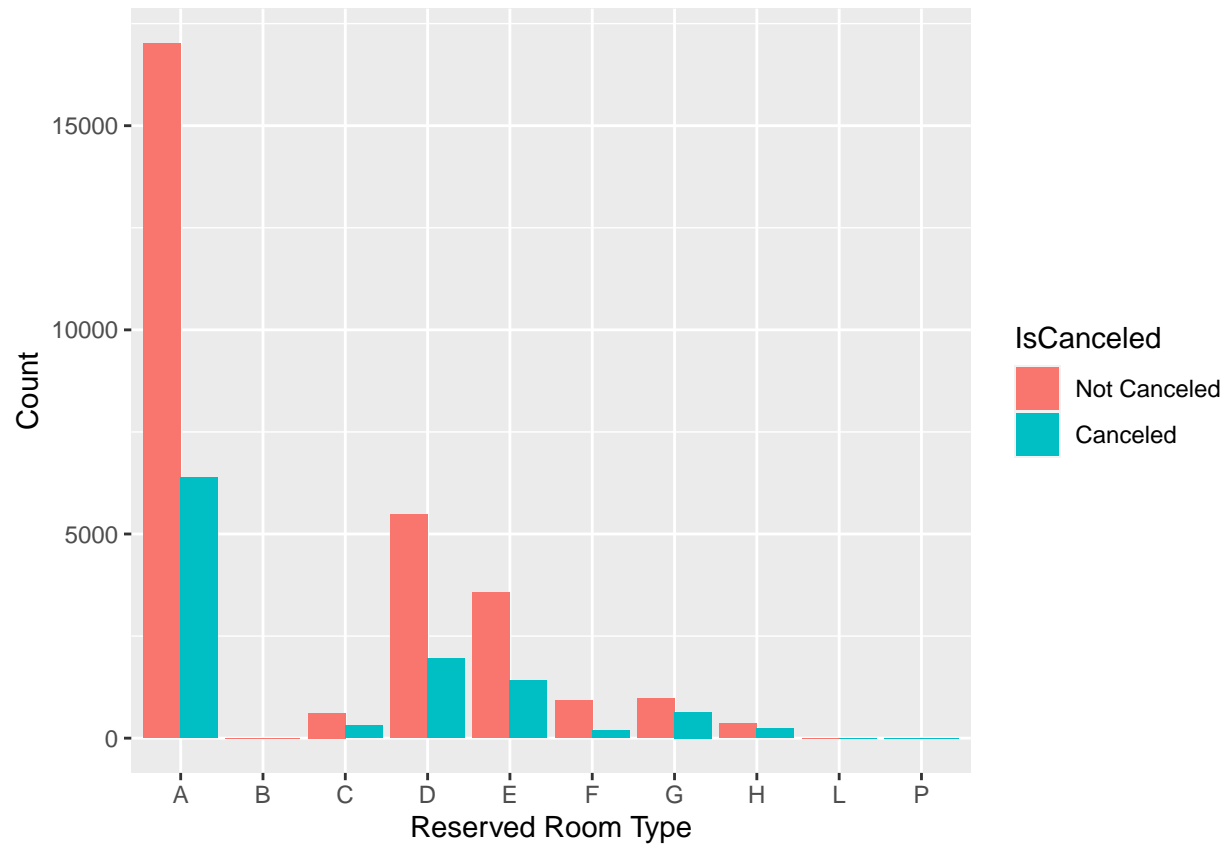
```
# plotting Stacked bar graph 'IsRepeatedGuest' Vs 'IsCanceled'
ggplot(hotelData, aes(x=factor(IsRepeatedGuest), fill=factor(IsCanceled)))+geom_bar(position="dodge")+1
```



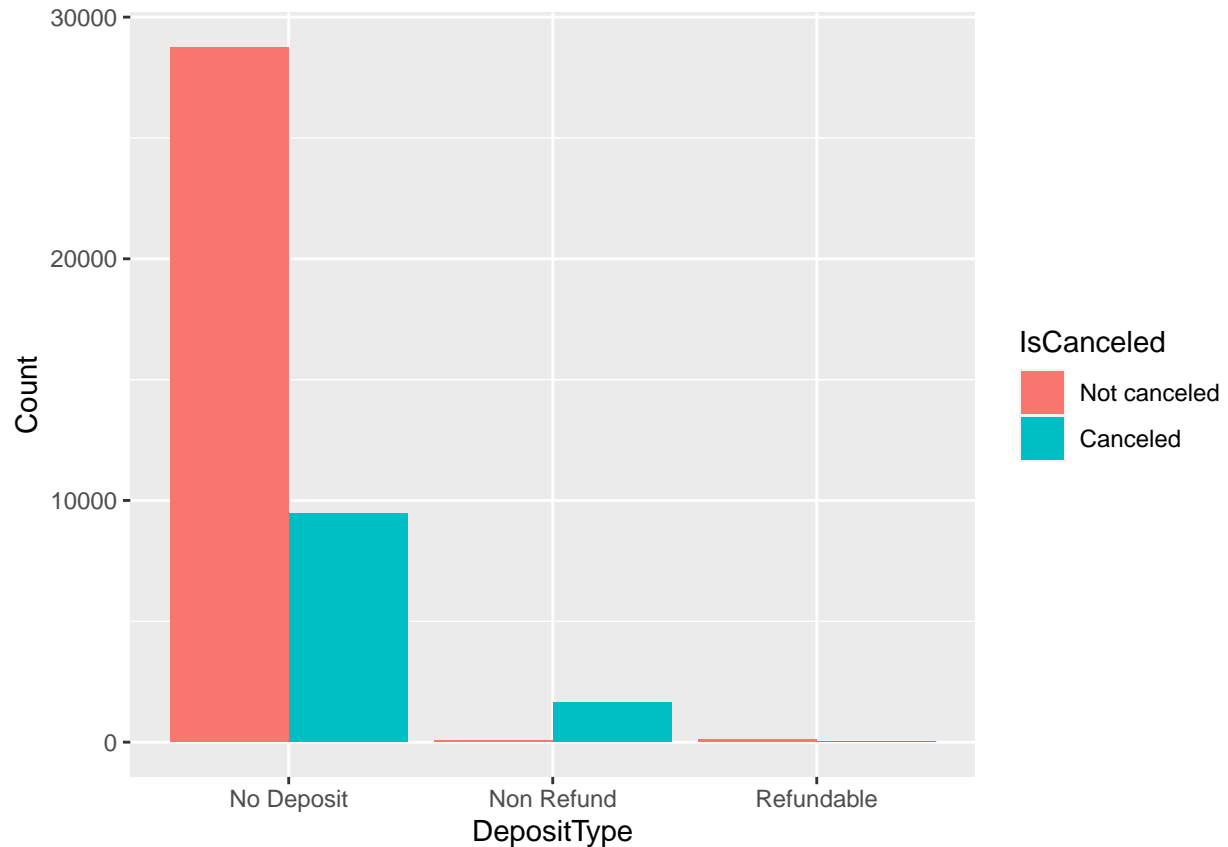
```
# plotting Stacked bar graph 'Assigned Room Type' Vs 'IsCanceled'
ggplot(hotelData, aes(x=factor(AssignedRoomType), fill=factor(IsCanceled)))+
  geom_bar(position="dodge")+labs(x="Assigned Room Type", y="Count")+
  scale_fill_discrete(name="IsCanceled", labels=c("Not Canceled", "Canceled"))
```



```
# plotting Stacked bar graph 'Reserved Room Type' Vs 'IsCanceled'
ggplot(hotelData, aes(x=factor(ReservedRoomType), fill=factor(IsCanceled)))+
  geom_bar(position="dodge")+labs(x="Reserved Room Type", y="Count")+
  scale_fill_discrete(name="IsCanceled", labels=c("Not Canceled", "Canceled"))
```



```
# plotting Stacked bar graph 'DepositType' Vs 'IsCanceled'
ggplot(hotelData, aes(x=factor(DepositType), fill=factor(IsCanceled))) +
  geom_bar(position="dodge") +labs(x="DepositType",y="Count")+
  scale_fill_discrete(name="IsCanceled", labels=c("Not canceled", "Canceled"))
```



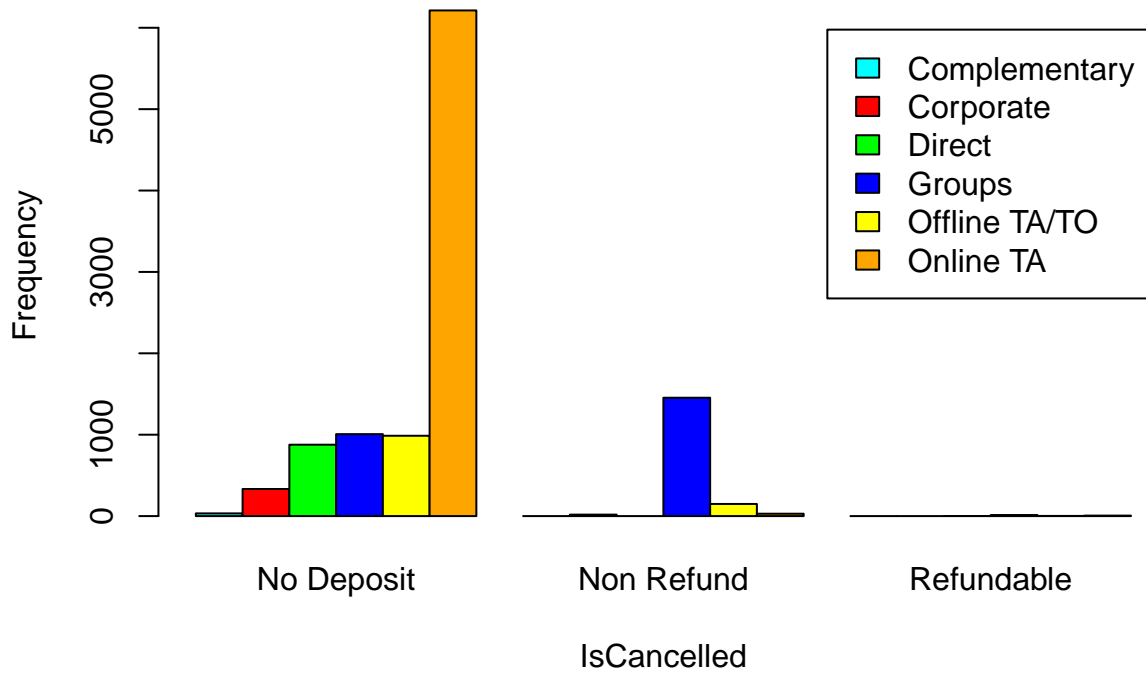
```
# creating separate data frames for cancelled bookings and not cancelled bookings
sample1 <- hotelData %>% filter(hotelData$IsCanceled == 1)
sample2 <- hotelData %>% filter(hotelData$IsCanceled == 0)

# finding count of "Market Segment" for each "DepositType"
other_table <- table(sample1$MarketSegment, sample1$DepositType)

# finding count of "AssignedRoomType" for each "MarketSegment"
other_table1 <- table(sample1$AssignedRoomType, sample1$MarketSegment)

# plotting cancelled bookings for each deposit type and market segments
barplot(other_table,
  main = "MarketSegment for Deposit Type when there are cancelations",
  xlab = "IsCancelled", ylab = "Frequency",
  col = c("cyan", "red", "green", "blue", "yellow", "orange"),
  legend.text = rownames(other_table),
  beside = TRUE)
```

MarketSegment for Deposit Type when there are cancelations



```
# plotting cancelled bookings for each market segments and assigned room types
```

```
barplot(other_table1,
```

```
main = "MarketSegment for Assigned room type",
```

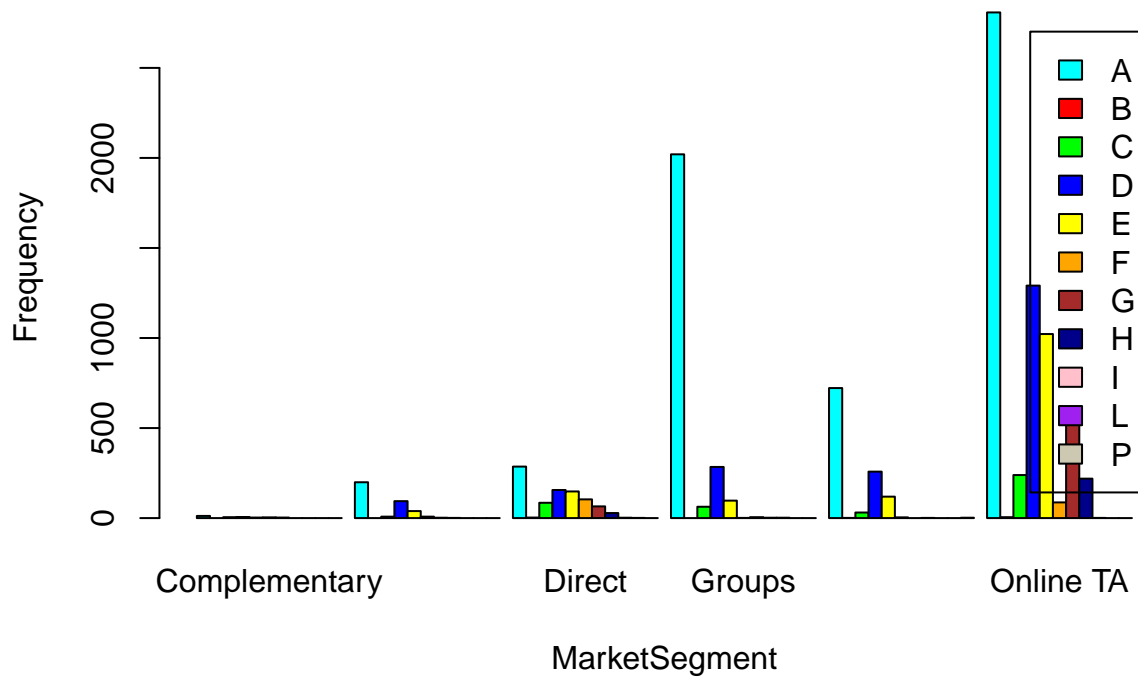
```
xlab = "MarketSegment", ylab = "Frequency",
```

```
col = c("cyan", "red", "green", "blue", "yellow", "orange", "brown", "darkblue", "pink", "purple", "c
```

```
legend.text = rownames(other_table1),
```

```
beside = TRUE) # Grouped bars
```


MarketSegment for Assigned room type



```
#creating new data frame with top 10 countries who are cancelling the most
hotelData_country <- hotelData
hotelData_country$LeadTime <- hotelData$LeadTime
hotelData_country$IsCanceled <- hotelData$IsCanceled
hotelData_country$MarketSegment <- hotelData$MarketSegment
hotelData_country$RequiredCarParkingSpaces <- hotelData$RequiredCarParkingSpaces
hotelData_country$DepositType <- hotelData$DepositType
hotelData_country$CustomerType <- hotelData$CustomerType
hotelData_country$StaysInWeekendNights <- hotelData$StaysInWeekendNights
hotelData_country$StaysInWeekNight <- hotelData$StaysInWeekNights
hotelData_country$Adults <- hotelData$Adults
hotelData_country$Children <- hotelData$Children
hotelData_country$Babies <- hotelData$Babies
hotelData_country$Country <- hotelData$Country

# unique home countries of customers
hotelData_country %>% unique()
```

```
## # A tibble: 31,834 x 22
##   IsCanceled LeadTime StaysInWeekendNi~ StaysInWeekNigh~ Adults Children Babies
##   <fct>      <dbl>          <dbl>          <dbl>    <dbl>    <dbl>    <dbl>
## 1 0          342            0            0        2        0        0
## 2 0          737            0            0        2        0        0
## 3 0           7            0            1        1        0        0
## 4 0          13            0            1        1        0        0
## 5 0          14            0            2        2        0        0
```

```
## 6 0          0          0          2      2      0      0
## 7 0          9          0          2      2      0      0
## 8 1         85          0          3      2      0      0
## 9 1         75          0          3      2      0      0
## 10 1         23          0          4      2      0      0
## # ... with 31,824 more rows, and 15 more variables: Meal <chr>, Country <chr>,
## #   MarketSegment <chr>, IsRepeatedGuest <dbl>, PreviousCancellations <dbl>,
## #   PreviousBookingsNotCanceled <dbl>, ReservedRoomType <chr>,
## #   AssignedRoomType <chr>, BookingChanges <dbl>, DepositType <chr>,
## #   CustomerType <chr>, RequiredCarParkingSpaces <dbl>,
## #   TotalOfSpecialRequests <dbl>, StaysInWeekNight <dbl>, Country <chr>
```

```
#factorizing "RequiredCarParkingSpaces" categorical variable
```

```
hotelData_country$RequiredCarParkingSpaces<-as.factor(hotelData_country$RequiredCarParkingSpaces)
```

```
# creating new data frame for top countries
```

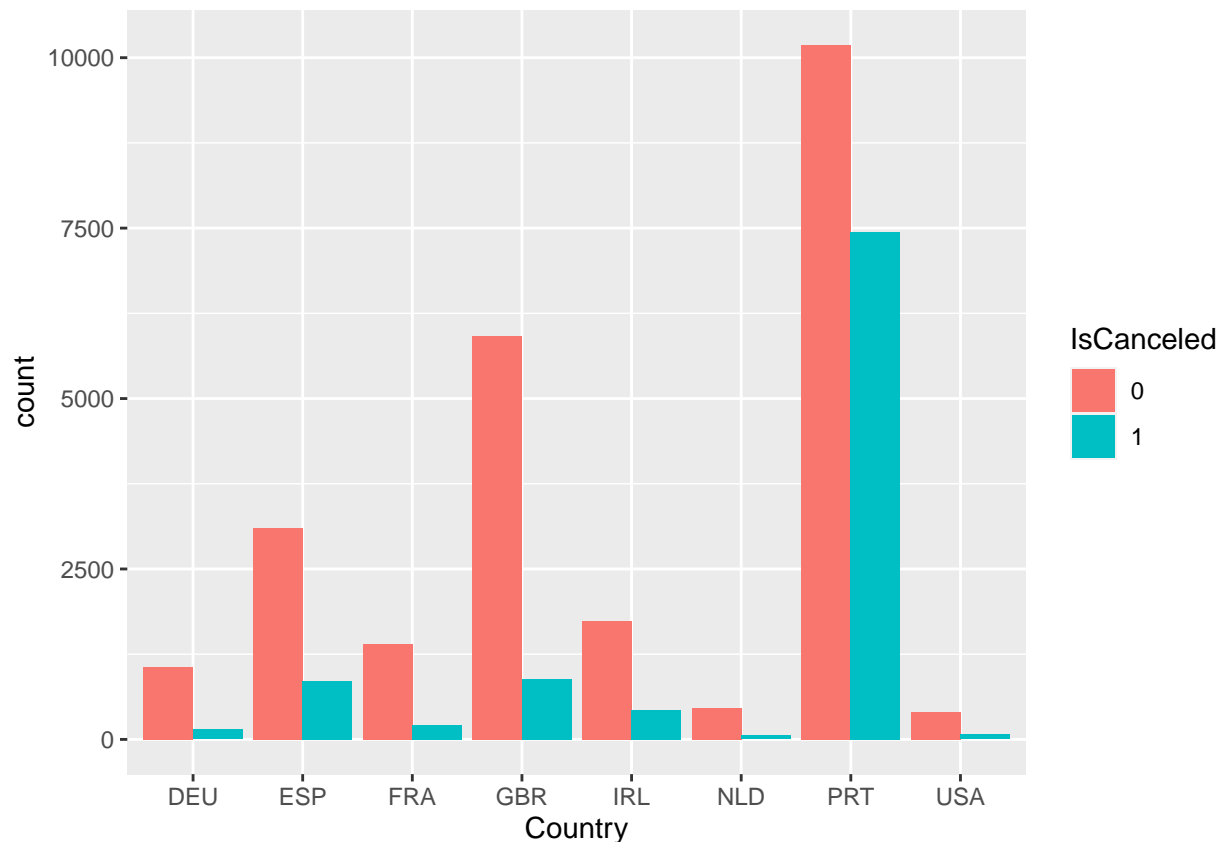
```
hotelData_top10countries<- hotelData_country %>% filter(Country == 'PRT' | Country == 'GBR' | Country ==
  Country == 'NLD' | Country == 'USA' )
```

```
# factorizing IsCanceled categorical variable
```

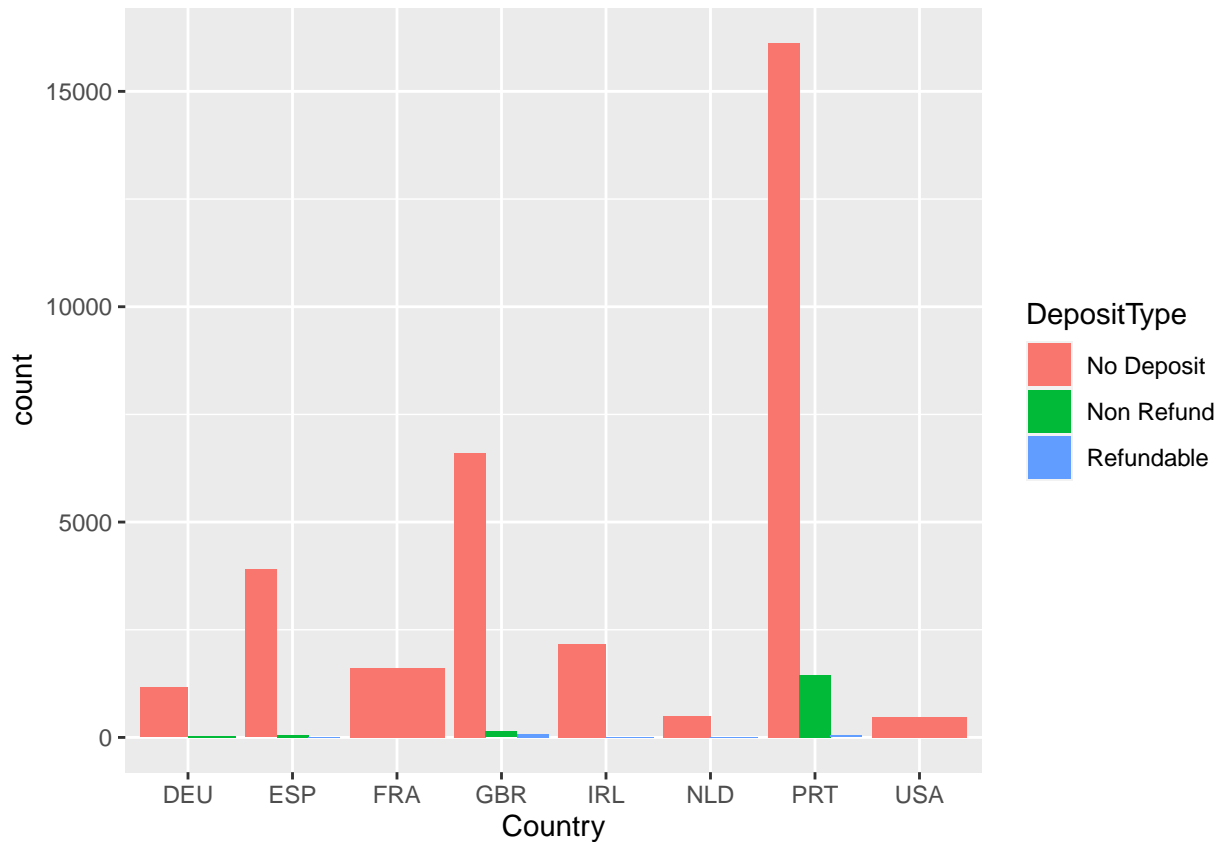
```
hotelData_top10countries$IsCanceled = as.factor(hotelData_top10countries$IsCanceled)
```

```
#plotting bar graphs of top 10 countries and their booking cancellation
```

```
ggplot(data = hotelData_top10countries, aes(x = Country, fill = IsCanceled)) +
  geom_bar(position = "dodge")
```



```
#plotting bar graphs of top 10 countries and their deposit types
ggplot(data = hotelData_top10countries, aes(x = Country, fill = DepositType)) +
  geom_bar(position = "dodge")
```



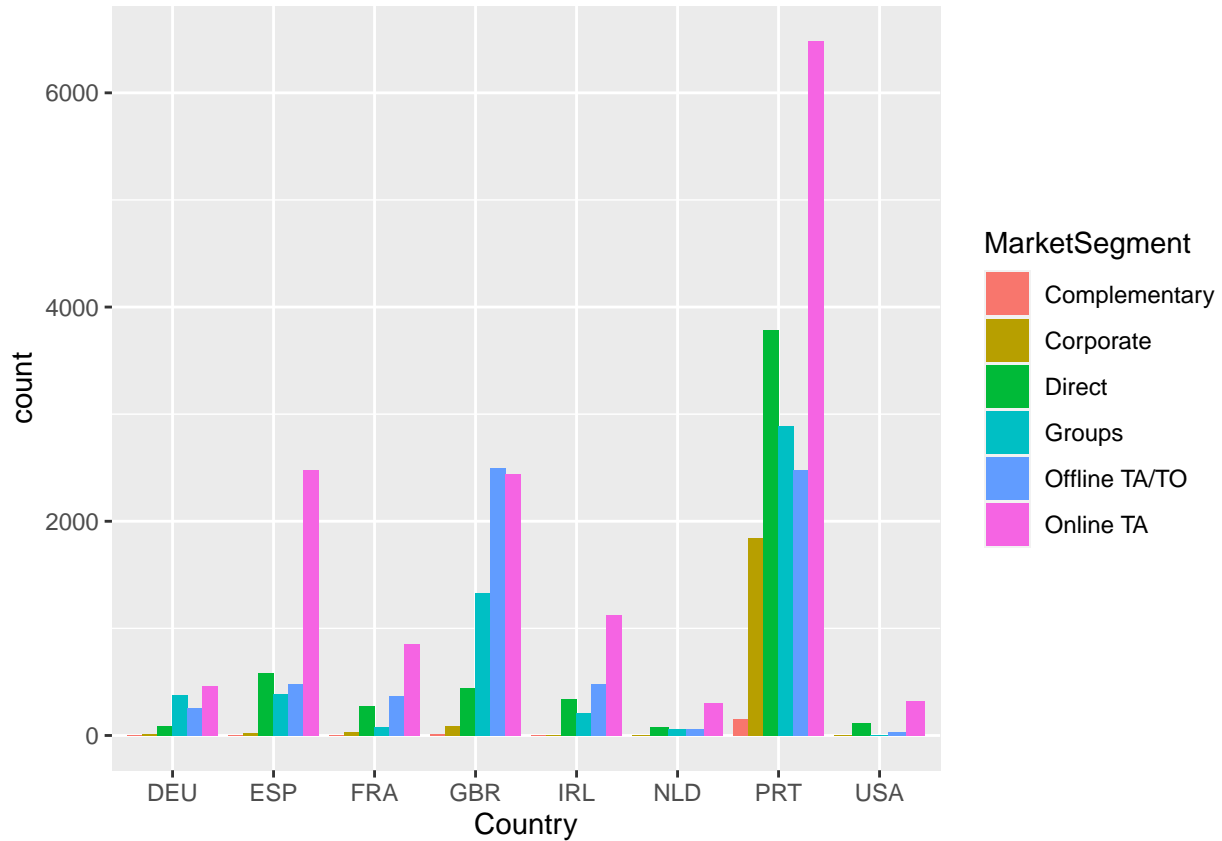
```
newhoteldata_top10countries<-hotelData_top10countries
#observations in top 10 countries having no deposit
newhoteldata_top10countries%>% filter(hotelData_top10countries$DepositType=='No Deposit')
```

```
## # A tibble: 32,554 x 22
##   IsCanceled LeadTime StaysInWeekendNi~ StaysInWeekNigh~ Adults Children Babies
##   <fct>      <dbl>          <dbl>          <dbl>    <dbl>    <dbl>    <dbl>
## 1 0          342            0            0         2         0         0
## 2 0          737            0            0         2         0         0
## 3 0           7            0            1         1         0         0
## 4 0          13            0            1         1         0         0
## 5 0          14            0            2         2         0         0
## 6 0          14            0            2         2         0         0
## 7 0           0            0            2         2         0         0
## 8 0           9            0            2         2         0         0
## 9 1          85            0            3         2         0         0
## 10 1          75            0            3         2         0         0
## # ... with 32,544 more rows, and 15 more variables: Meal <chr>, Country <chr>,
## #   MarketSegment <chr>, IsRepeatedGuest <dbl>, PreviousCancellations <dbl>,
## #   PreviousBookingsNotCanceled <dbl>, ReservedRoomType <chr>,
## #   AssignedRoomType <chr>, BookingChanges <dbl>, DepositType <chr>,
```

```
## # CustomerType <chr>, RequiredCarParkingSpaces <fct>,
## # TotalOfSpecialRequests <dbl>, StaysInWeekNight <dbl>, Country <chr>
```

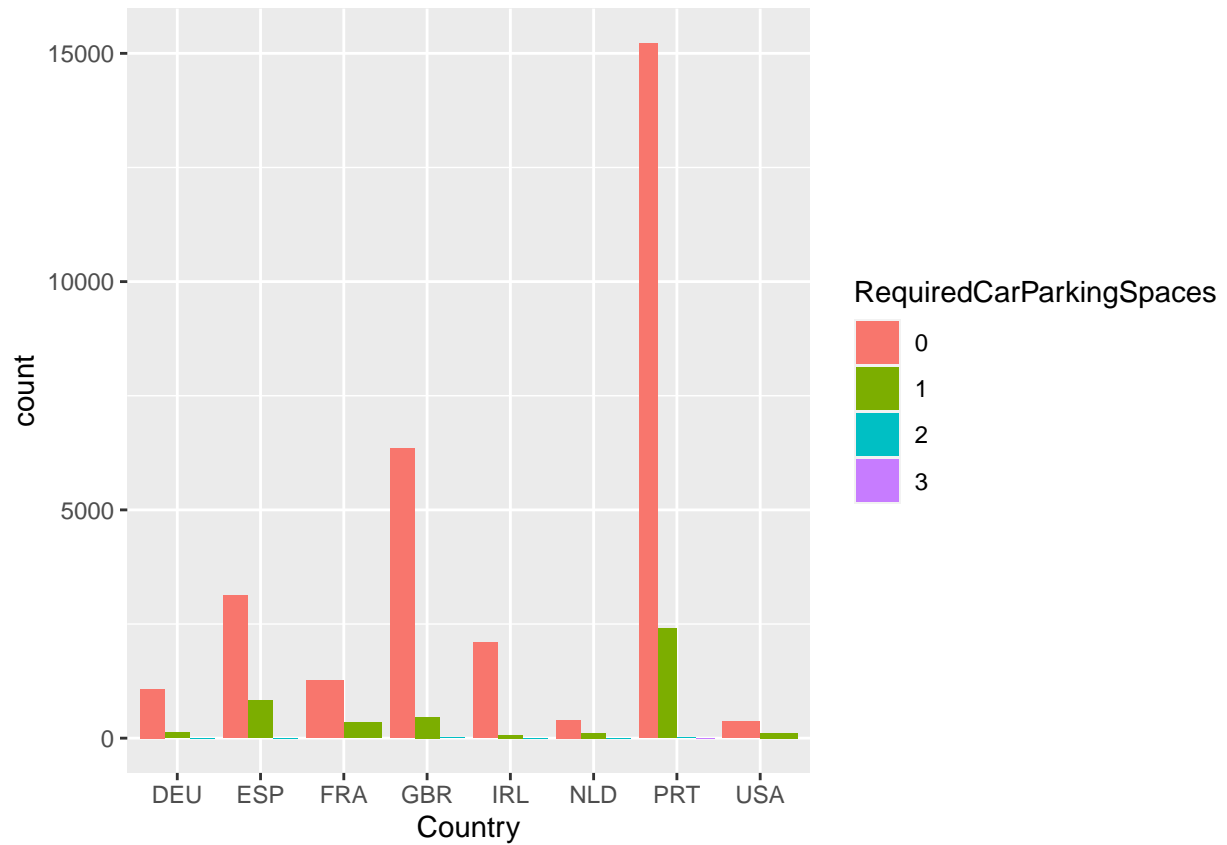
#plotting bar graphs of top 10 countries and their Market Segments

```
ggplot(data = hotelData_top10countries, aes(x = Country, fill = MarketSegment)) +
  geom_bar(position = "dodge")
```

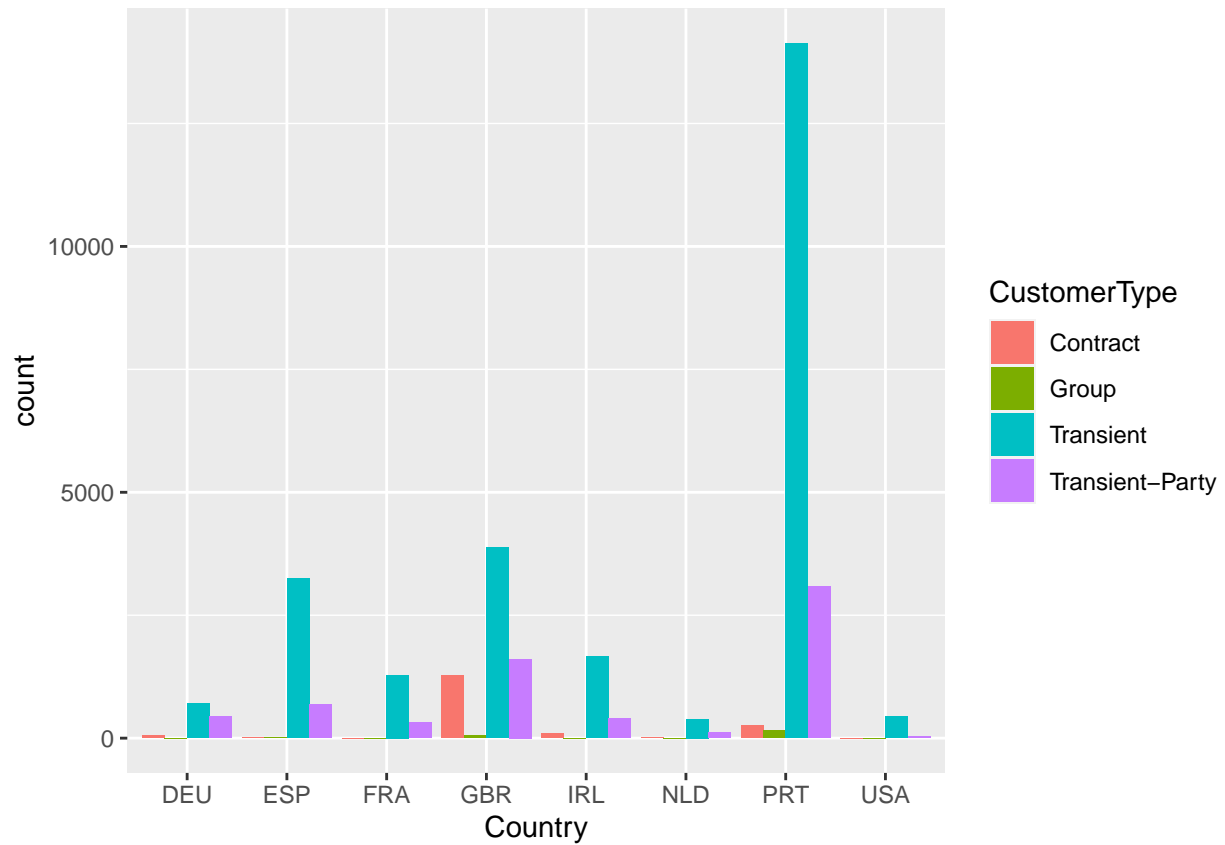


#plotting bar graphs of top 10 countries and their required car parking spaces

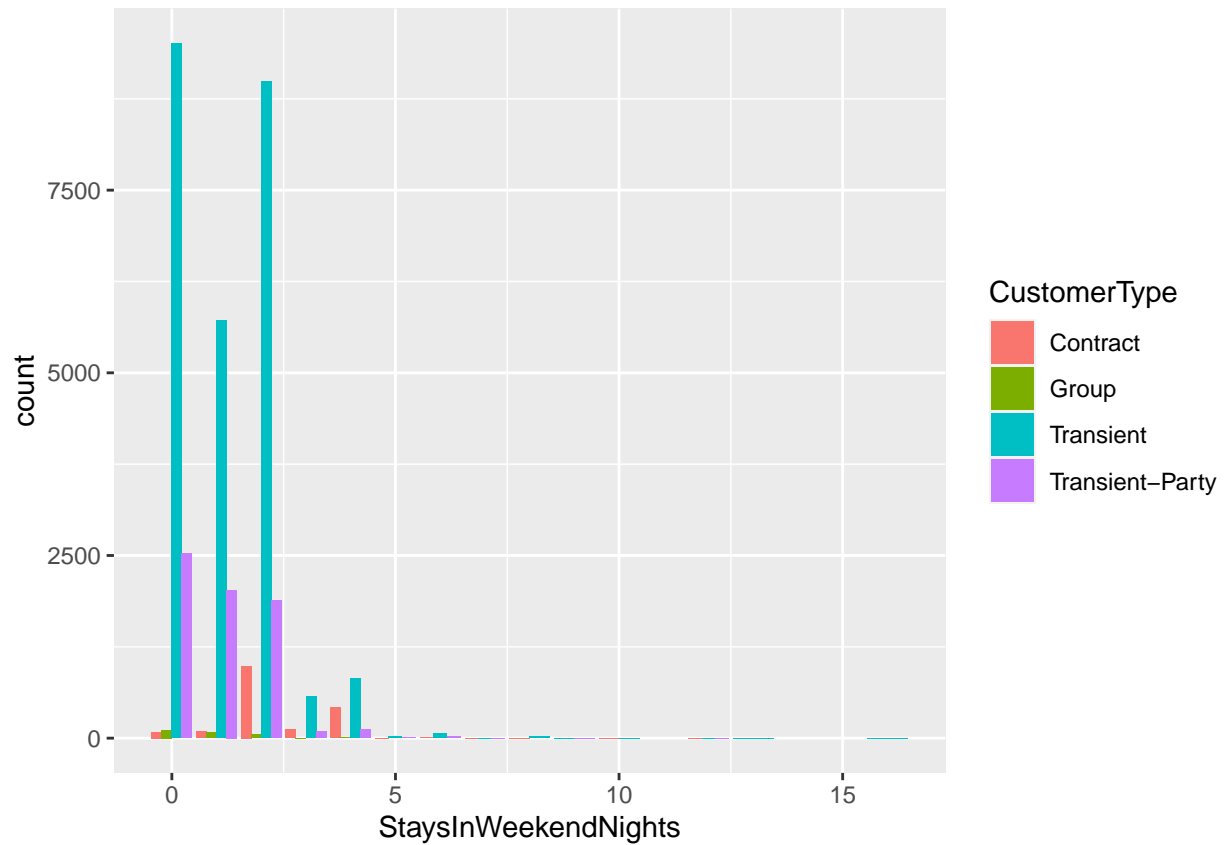
```
ggplot(data = hotelData_top10countries, aes(x = Country, fill = RequiredCarParkingSpaces)) +
  geom_bar(position = "dodge")
```



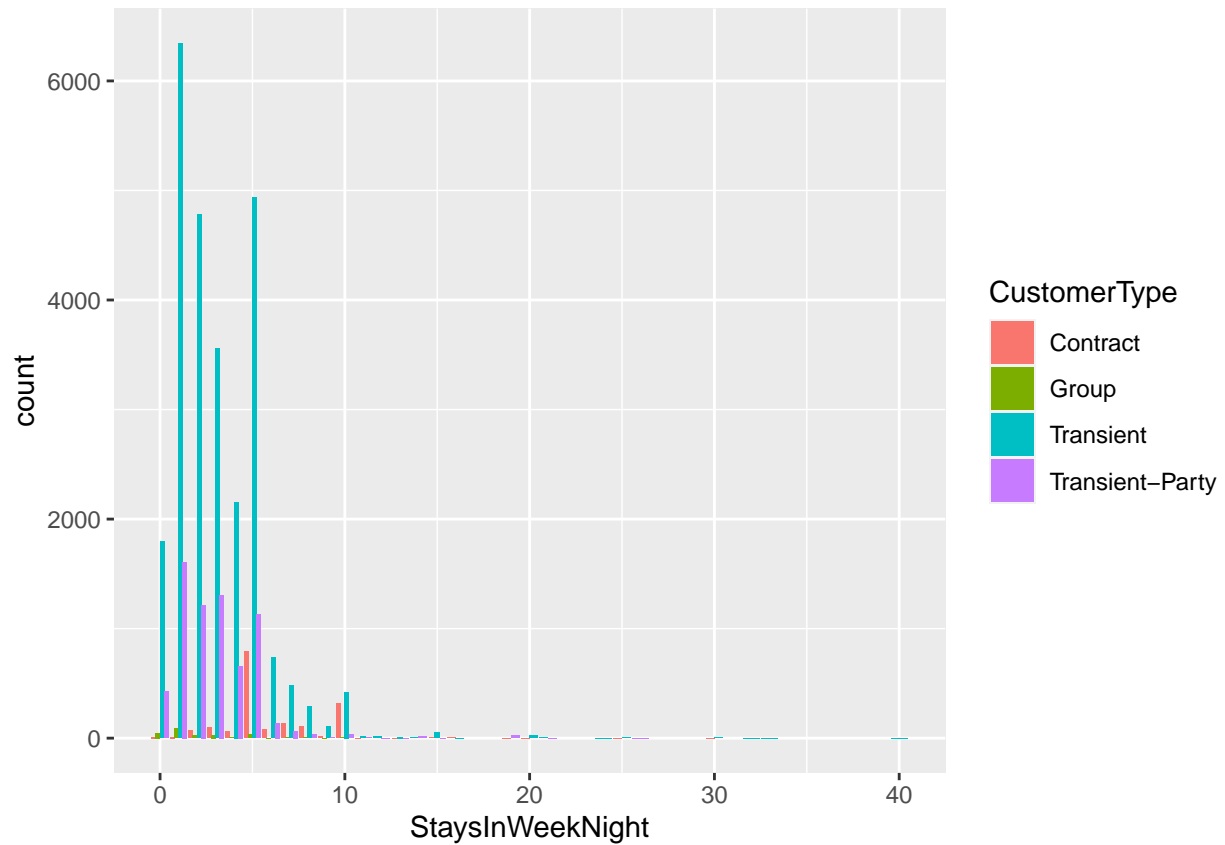
```
#plotting bar graphs of top 10 countries and the customer types  
ggplot(data = hotelData_top10countries, aes(x = Country, fill = CustomerType)) +  
  geom_bar(position = "dodge")
```



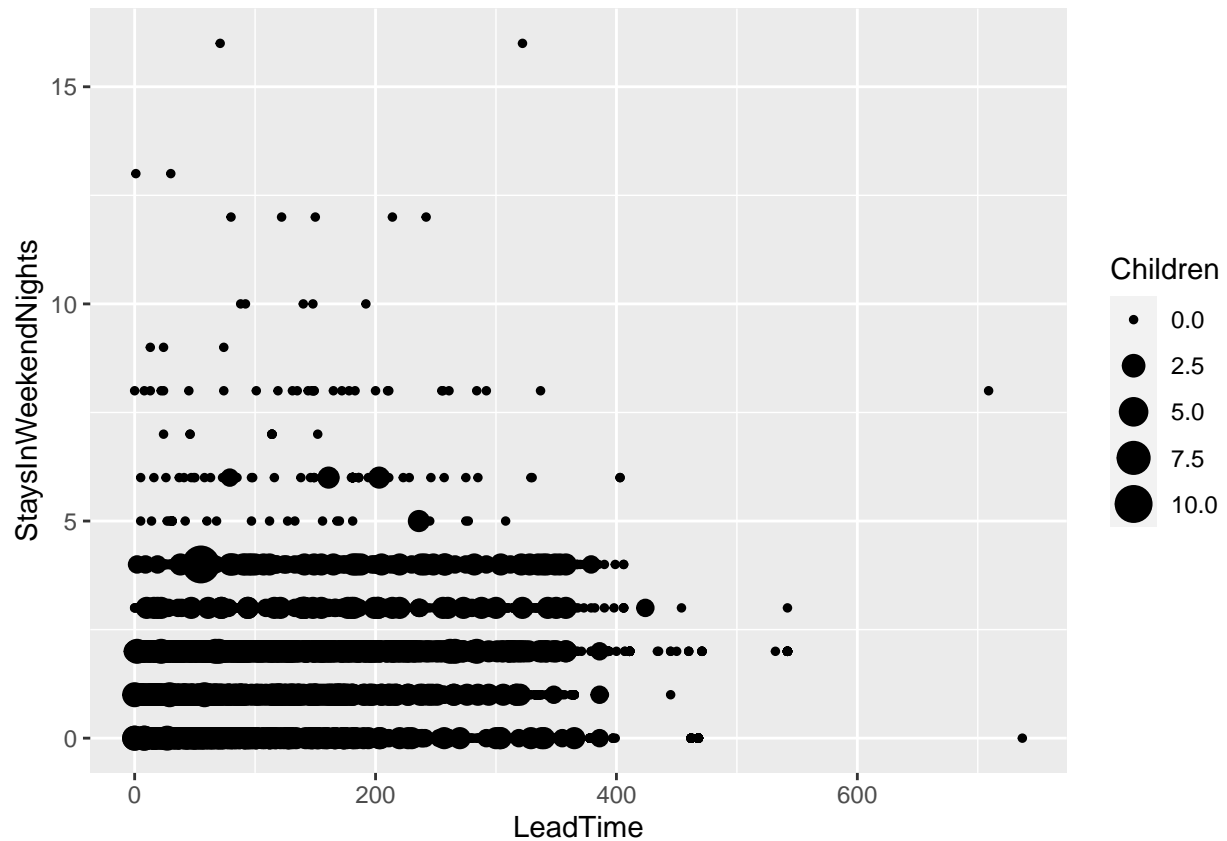
```
#plotting bar graphs of top 10 countries number of customers of each type
# staying for number of Weekend nights
ggplot(data = hotelData_top10countries, aes(x = StaysInWeekendNights, fill = CustomerType)) +
  geom_bar(position = "dodge")
```



```
#plotting bar graphs of top 10 countries number of customers of each type
# staying for number of week nights
ggplot(data = hotelData_top10countries, aes(x = StaysInWeekNight, fill = CustomerType)) +
  geom_bar(position = "dodge")
```

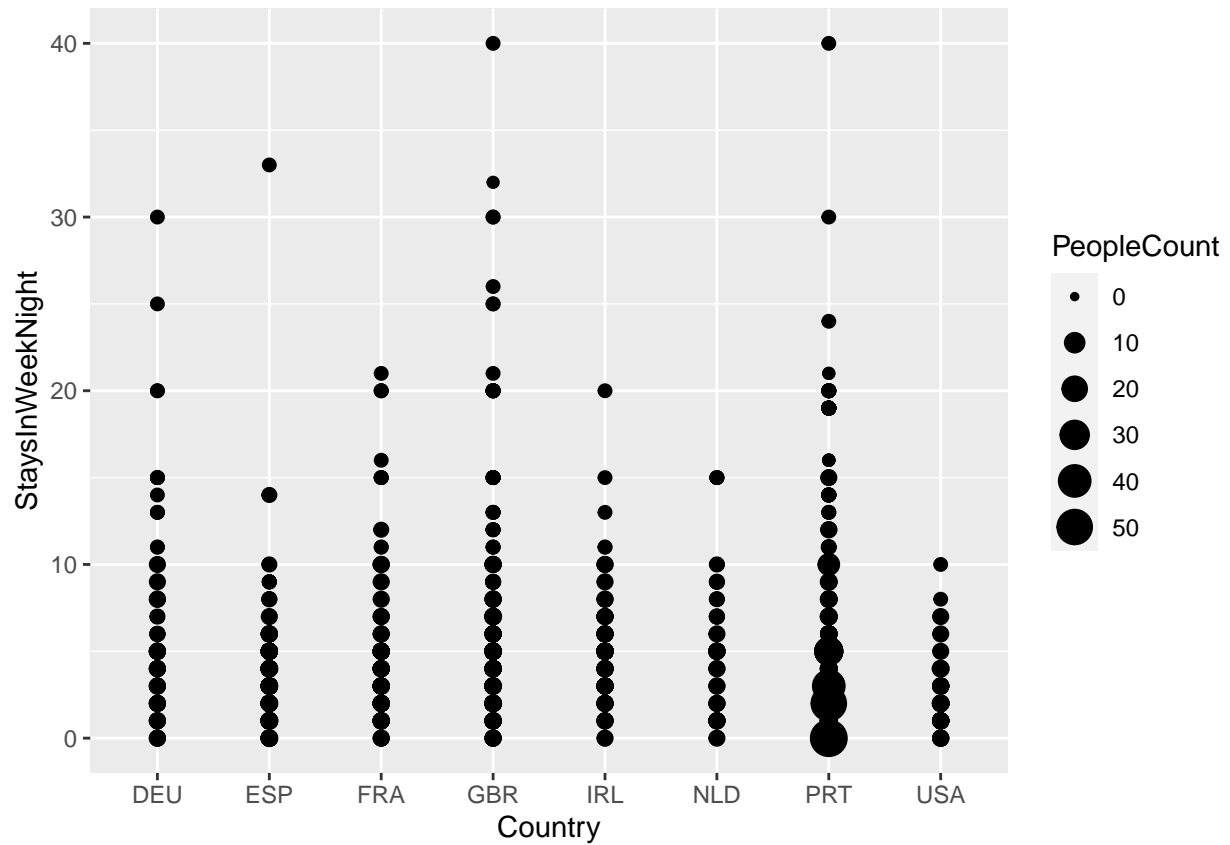


```
#plotting bar graphs of top 10 countries
# LeadTime Vs StaysInWeekendNights
ggplot(data = hotelData_top10countries, aes(x = LeadTime,y=StaysInWeekendNights,size = Children)) +
  geom_point()
```

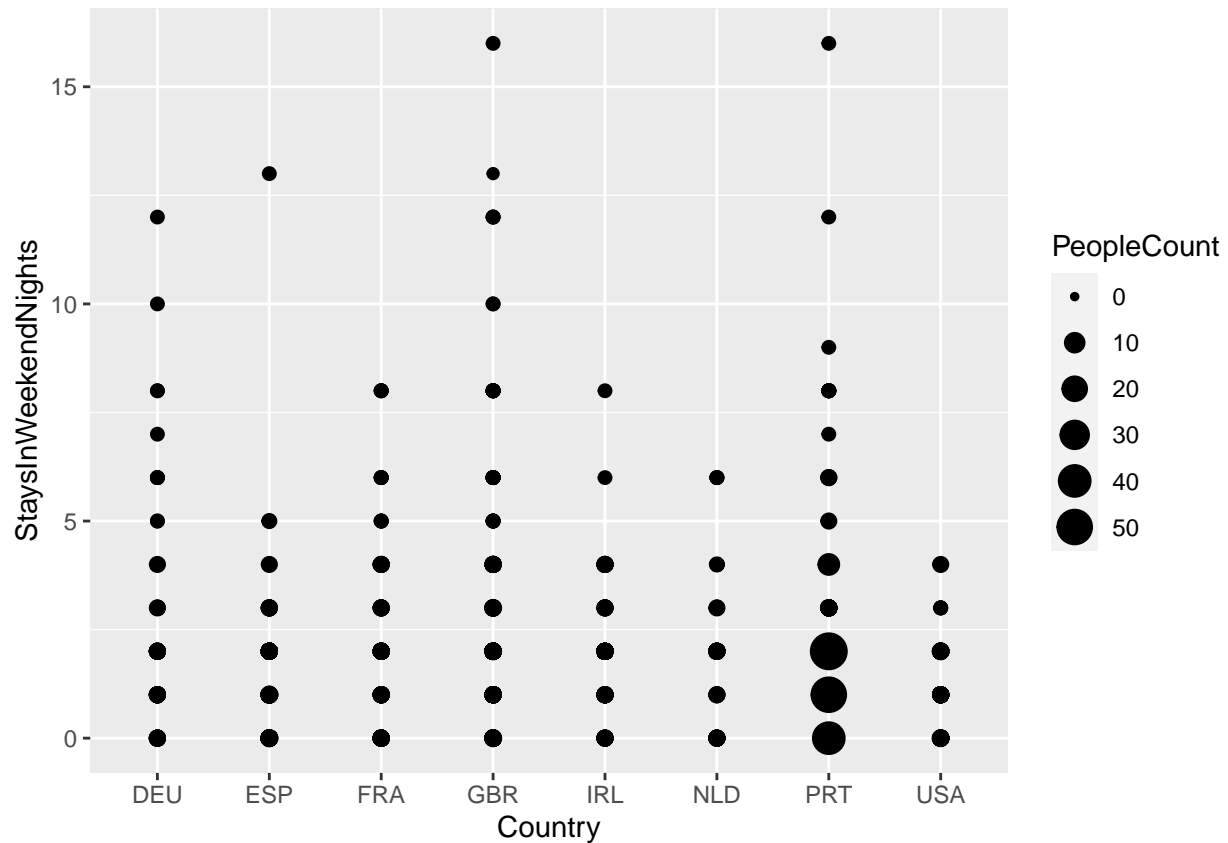



```
# total numbr of people for each booking
hotelData_top10countries$PeopleCount <- hotelData_top10countries$Adults+
                                         hotelData_top10countries$Children+
                                         hotelData_top10countries$Babies

# plotting total number of people who are staying in week nights for each country
ggplot(data = hotelData_top10countries, aes(x = Country, y=StaysInWeekNight, size = PeopleCount)) +
  geom_point()
```



```
# plotting total number of people who are staying in week nights for each country
ggplot(data = hotelData_top10countries, aes(x = Country, y=StaysInWeekendNights, size = PeopleCount)) +
  geom_point()
```

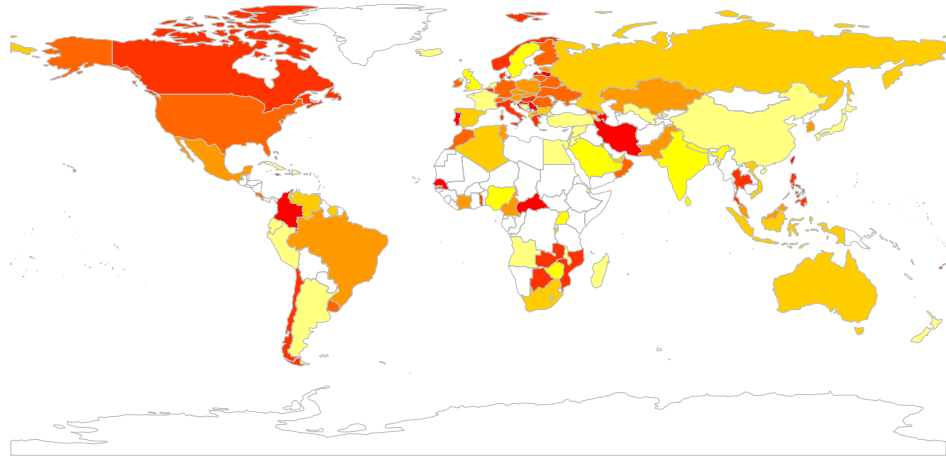


```
# Joining country codes to an internal map
joinData <- joinCountryData2Map( hotelData,
                                joinCode = "ISO3",
                                nameJoinColumn = "Country")

## 39583 codes from your data successfully matched countries in the map
## 477 codes from your data failed to match with a country code in the map
## 119 codes from the map weren't represented in your data

#world map of Lead time for countries
theMap <- mapCountryData( joinData, nameColumnToPlot="LeadTime", addLegend=FALSE)
do.call( addMapLegend, c(theMap, legendWidth=1, legendMar = 2))
```

LeadTime



```
#converting data frame to factors
hotelData$IsCanceled <- as.factor(hotelData$IsCanceled)
hotelData$Meal <- as.factor(hotelData$Meal)
hotelData$Country <- as.factor(hotelData$Country)
hotelData$MarketSegment <- as.factor(hotelData$MarketSegment)
hotelData$IsRepeatedGuest <- as.factor(hotelData$IsRepeatedGuest)
hotelData$ReservedRoomType <- as.factor(hotelData$ReservedRoomType)
hotelData$AssignedRoomType <- as.factor(hotelData$AssignedRoomType)
hotelData$DepositType <- as.factor(hotelData$DepositType)
hotelData$CustomerType <- as.factor(hotelData$CustomerType)
```

Association rule mining

```
#converting to transactions
hotelDataTransactions <- as(hotelData, 'transactions')
```

```
## Warning: Column(s) 2, 3, 4, 5, 6, 7, 12, 13, 16, 19, 20 not logical or factor.
## Applying default discretization (see '? discretizeDF').
```

```
## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, : The calculated breaks are
## Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.
```

```
## Warning in discretize(x = c(2, 2, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, : The calculated breaks are
## Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.
```

```
## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

## Warning in discretize(x = c(3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

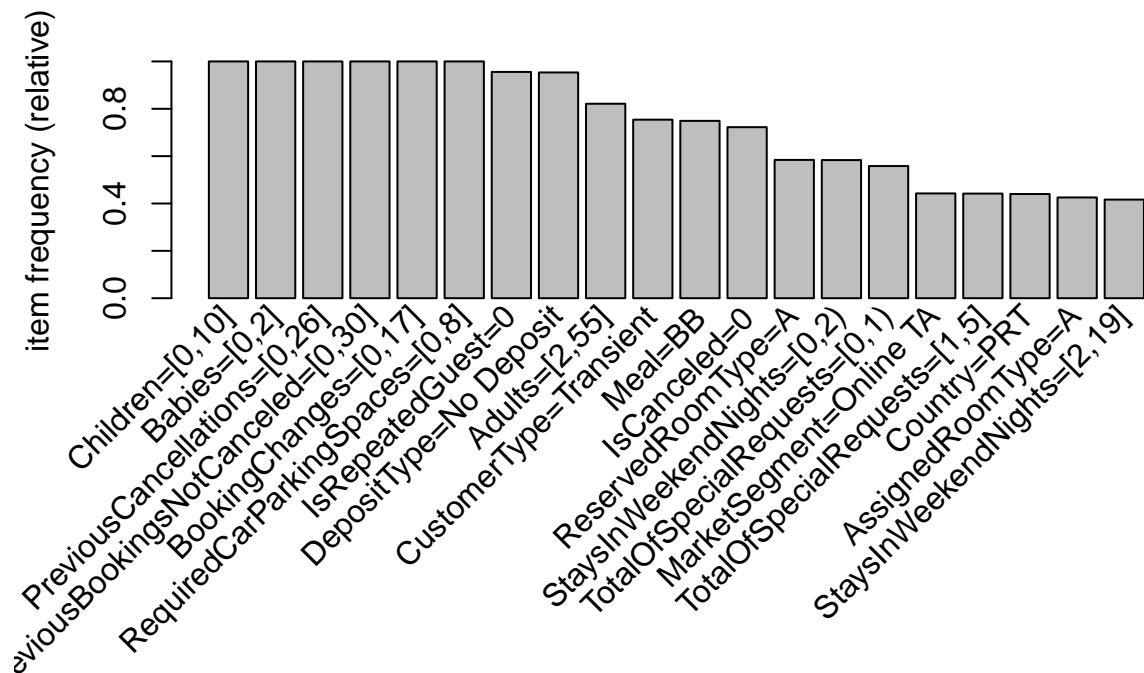
## Warning in discretize(x = c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.

## Warning in discretize(x = c(0, 0, 0, 0, 1, 1, 0, 1, 1, 0, 0, 0, 3, 1, 0, : The calculated breaks are
##   Only unique breaks are used reducing the number of intervals. Look at ? discretize for details.
```

```
hotelDataTransactions
```

```
## transactions in sparse format with
## 40060 transactions (rows) and
## 186 items (columns)
```

```
# creating item frequency bar plot for top 20 items
itemFrequencyPlot(hotelDataTransactions, topN=20)
```



```
# creating association rules to find pattern for cancelled booking
#support=0.1 and confidence 0.55
rules1 <- apriori(hotelDataTransactions,
                  parameter=list(supp=0.1, conf=0.55),
                  control=list(verbose=F),
                  appearance=list(default="lhs", rhs=("IsCanceled=1")))

inspect(rules1)
```

	lhs	rhs	support	confidence	coverage	lift
## [1]	{Country=PRT, IsRepeatedGuest=0, AssignedRoomType=A}	=> {IsCanceled=1}	0.1093360	0.5680934	0.1924613	2.04619
## [2]	{Adults=[2,55], Country=PRT, TotalOfSpecialRequests=[0,1)}	=> {IsCanceled=1}	0.1087619	0.5838135	0.1862956	2.10282
## [3]	{Country=PRT, IsRepeatedGuest=0, ReservedRoomType=A, AssignedRoomType=A}	=> {IsCanceled=1}	0.1093110	0.5687752	0.1921867	2.04865
## [4]	{Children=[0,10], Country=PRT, IsRepeatedGuest=0, AssignedRoomType=A}	=> {IsCanceled=1}	0.1093360	0.5680934	0.1924613	2.04619
## [5]	{Babies=[0,2], Country=PRT,					

##	IsRepeatedGuest=0,				
##	AssignedRoomType=A}	=>	{IsCanceled=1}	0.1093360	0.5680934 0.1924613 2.04619
## [6]	{Country=PRT,				
##	IsRepeatedGuest=0,				
##	PreviousCancellations=[0,26],				
##	AssignedRoomType=A}	=>	{IsCanceled=1}	0.1093360	0.5680934 0.1924613 2.04619
## [7]	{Country=PRT,				
##	IsRepeatedGuest=0,				
##	PreviousBookingsNotCanceled=[0,30],				
##	AssignedRoomType=A}	=>	{IsCanceled=1}	0.1093360	0.5680934 0.1924613 2.04619
## [8]	{Country=PRT,				
##	IsRepeatedGuest=0,				
##	AssignedRoomType=A,				
##	RequiredCarParkingSpaces=[0,8]}	=>	{IsCanceled=1}	0.1093360	0.5680934 0.1924613 2.04619
## [9]	{Country=PRT,				
##	IsRepeatedGuest=0,				
##	AssignedRoomType=A,				
##	BookingChanges=[0,17]}	=>	{IsCanceled=1}	0.1093360	0.5680934 0.1924613 2.04619
## [10]	{Adults=[2,55],				
##	Country=PRT,				
##	IsRepeatedGuest=0,				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1075387	0.5966759 0.1802297 2.14914
## [11]	{Adults=[2,55],				
##	Children=[0,10],				
##	Country=PRT,				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [12]	{Adults=[2,55],				
##	Babies=[0,2],				
##	Country=PRT,				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [13]	{Adults=[2,55],				
##	Country=PRT,				
##	PreviousCancellations=[0,26],				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [14]	{Adults=[2,55],				
##	Country=PRT,				
##	PreviousBookingsNotCanceled=[0,30],				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [15]	{Adults=[2,55],				
##	Country=PRT,				
##	RequiredCarParkingSpaces=[0,8],				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [16]	{Adults=[2,55],				
##	Country=PRT,				
##	BookingChanges=[0,17],				
##	TotalOfSpecialRequests=[0,1]}	=>	{IsCanceled=1}	0.1087619	0.5838135 0.1862956 2.10282
## [17]	{Children=[0,10],				
##	Country=PRT,				
##	IsRepeatedGuest=0,				
##	ReservedRoomType=A,				
##	AssignedRoomType=A}	=>	{IsCanceled=1}	0.1093110	0.5687752 0.1921867 2.04865
## [18]	{Babies=[0,2],				
##	Country=PRT,				
##	IsRepeatedGuest=0,				

```

##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [19] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [20] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [21] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [22] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [23] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [24] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [25] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [26] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [27] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [28] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [29] {Babies=[0,2],
##      Country=PRT,

```



```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [30] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [31] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [32] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [33] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [34] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [35] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [36] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [37] {Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [38] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [39] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [40] {Adults=[2,55],

```

```

##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [41] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [42] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [43] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [44] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [45] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [46] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [47] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [48] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [49] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [50] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282

```

```

## [51] {Adults=[2,55],
##       Babies=[0,2],
##       Country=PRT,
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [52] {Adults=[2,55],
##       Babies=[0,2],
##       Country=PRT,
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [53] {Adults=[2,55],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [54] {Adults=[2,55],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [55] {Adults=[2,55],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [56] {Adults=[2,55],
##       Country=PRT,
##       PreviousBookingsNotCanceled=[0,30],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [57] {Adults=[2,55],
##       Country=PRT,
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [58] {Adults=[2,55],
##       Country=PRT,
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [59] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       ReservedRoomType=A,
##       AssignedRoomType=A}                => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [60] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       ReservedRoomType=A,
##       AssignedRoomType=A}                => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [61] {Children=[0,10],
##       Country=PRT,

```

```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [62] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [63] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [64] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [65] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [66] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [67] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [68] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [69] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [70] {Country=PRT,
##      IsRepeatedGuest=0,

```

```

##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [71] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [72] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [73] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [74] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [75] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [76] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [77] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [78] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [79] {Children=[0,10],
##      Country=PRT,

```

```

##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [80] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [81] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [82] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [83] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [84] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [85] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [86] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [87] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [88] {Babies=[0,2],
##      Country=PRT,

```

```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [89] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [90] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [91] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [92] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [93] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [94] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [95] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [96] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [97] {Adults=[2,55],
##      Children=[0,10],

```

```

##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [98] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [99] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [100] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [101] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [102] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [103] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [104] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [105] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [106] {Adults=[2,55],
##      Country=PRT,

```



```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [107] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [108] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [109] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [110] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [111] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [112] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [113] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [114] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [115] {Adults=[2,55],
##      Children=[0,10],

```

```

##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [116] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [117] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [118] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [119] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [120] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [121] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [122] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [123] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [124] {Adults=[2,55],
##      Babies=[0,2],

```

```

##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [125] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [126] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [127] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [128] {Adults=[2,55],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [129] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}              => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [130] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}              => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [131] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}  => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [132] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,

```

```

##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [133] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [134] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [135] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [136] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [137] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [138] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [139] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [140] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,

```

```

##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [141] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [142] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [143] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [144] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [145] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [146] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [147] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [148] {Country=PRT,

```

```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [149] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [150] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [151] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [152] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [153] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [154] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360  0.5680934 0.1924613 2.04619
## [155] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,

```

```

##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [156] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [157] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [158] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [159] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [160] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [161] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [162] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [163] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],

```

```

##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [164] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [165] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [166] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [167] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [168] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [169] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [170] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [171] {Adults=[2,55],
##      Children=[0,10],

```



```

##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [172] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [173] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [174] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [175] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [176] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [177] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [178] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914

```

```

## [179] {Adults=[2,55],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [180] {Adults=[2,55],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [181] {Adults=[2,55],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [182] {Adults=[2,55],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [183] {Adults=[2,55],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [184] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [185] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [186] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousCancellations=[0,26],

```

```

##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [187] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [188] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [189] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [190] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [191] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [192] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [193] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [194] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,

```

```

##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [195] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [196] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [197] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [198] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282

```

```
#sorting rules in descending order by lift
```

```
top10Lift <- sort(rules1, decreasing = TRUE, na.last = NA, by = "lift")
```

```
inspect(top10Lift)
```

```

##      lhs                                rhs      support confidence  coverage  lift
## [1]  {Adults=[2,55],                      {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1)}
## [2]  {Adults=[2,55],                      {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1)}
## [3]  {Adults=[2,55],                      {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1)}

```

```

## [4] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [5] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [6] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [7] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [8] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [9] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [10] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [11] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [12] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]} => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [13] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,

```

```

##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [14] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [15] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [16] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [17] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [18] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [19] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [20] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [21] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [22] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],

```

```

##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [23] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [24] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [25] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [26] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [27] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [28] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [29] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387  0.5966759 0.1802297 2.14914
## [30] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,

```

```

##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [31] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [32] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [33] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [34] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [35] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [36] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [37] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [38] {Adults=[2,55],

```



```

##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [39] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [40] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [41] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [42] {Adults=[2,55],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1075387 0.5966759 0.1802297 2.14914
## [43] {Adults=[2,55],
##      Country=PRT,
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [44] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [45] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [46] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [47] {Adults=[2,55],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [48] {Adults=[2,55],

```

```

##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [49] {Adults=[2,55],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [50] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [51] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [52] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [53] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [54] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [55] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [56] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [57] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [58] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [59] {Adults=[2,55],
##      Country=PRT,

```

```

##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [60] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [61] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [62] {Adults=[2,55],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [63] {Adults=[2,55],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [64] {Adults=[2,55],
##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [65] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [66] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [67] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [68] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [69] {Adults=[2,55],
##      Children=[0,10],

```

```

##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [70] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [71] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [72] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [73] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [74] {Adults=[2,55],
##      Children=[0,10],
##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [75] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [76] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [77] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}    => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [78] {Adults=[2,55],
##      Babies=[0,2],

```

```

##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [79] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [80] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [81] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [82] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [83] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [84] {Adults=[2,55],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [85] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [86] {Adults=[2,55],
##      Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282

```

```

## [87] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [88] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousBookingsNotCanceled=[0,30],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [89] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [90] {Adults=[2,55],
##       Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [91] {Adults=[2,55],
##       Children=[0,10],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [92] {Adults=[2,55],
##       Children=[0,10],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [93] {Adults=[2,55],
##       Children=[0,10],
##       Country=PRT,
##       PreviousCancellations=[0,26],
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8],
##       TotalOfSpecialRequests=[0,1]}      => {IsCanceled=1} 0.1087619 0.5838135 0.1862956 2.10282
## [94] {Adults=[2,55],
##       Children=[0,10],
##       Country=PRT,
##       PreviousBookingsNotCanceled=[0,30],
##       BookingChanges=[0,17],

```

```

##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [95] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [96] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [97] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [98] {Adults=[2,55],
##      Babies=[0,2],
##      Country=PRT,
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [99] {Adults=[2,55],
##      Country=PRT,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8],
##      TotalOfSpecialRequests=[0,1)}      => {IsCanceled=1} 0.1087619  0.5838135 0.1862956 2.10282
## [100] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A}                => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [101] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A}                => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [102] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A}                => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [103] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],

```

```

##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [104] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [105] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [106] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [107] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [108] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [109] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [110] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [111] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [112] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [113] {Babies=[0,2],

```



```

##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [114] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [115] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [116] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [117] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [118] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [119] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [120] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [121] {Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.04865
## [122] {Children=[0,10],

```

```

##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [123] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [124] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [125] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [126] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}          => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [127] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [128] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}        => {IsCanceled=1} 0.1093110  0.5687752 0.1921867 2.048654
## [129] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,

```

```

##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [130] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [131] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [132] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [133] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [134] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [135] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [136] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [137] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      ReservedRoomType=A,

```

```

##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [138] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [139] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [140] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [141] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      ReservedRoomType=A,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093110 0.5687752 0.1921867 2.04865
## [142] {Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [143] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [144] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [145] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [146] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [147] {Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619

```

```

## [148] {Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [149] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [150] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [151] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [152] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [153] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [154] {Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [155] {Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [156] {Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       RequiredCarParkingSpaces=[0,8]} => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [157] {Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [158] {Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A}          => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619

```

```

## [159] {Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       AssignedRoomType=A,
##       RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [160] {Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [161] {Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A,
##       RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [162] {Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [163] {Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       BookingChanges=[0,17],
##       RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [164] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [165] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousBookingsNotCanceled=[0,30],
##       AssignedRoomType=A}                  => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [166] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [167] {Children=[0,10],
##       Babies=[0,2],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       AssignedRoomType=A,
##       BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [168] {Children=[0,10],
##       Country=PRT,
##       IsRepeatedGuest=0,
##       PreviousCancellations=[0,26],
##       PreviousBookingsNotCanceled=[0,30],

```

```

##      AssignedRoomType=A}                               => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [169] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}                     => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [170] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}                             => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [171] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}                     => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [172] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}                             => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [173] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}                     => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [174] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}                               => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [175] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}                     => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [176] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}                             => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [177] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,

```

```

##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [178] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [179] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [180] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [181] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [182] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [183] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [184] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [185] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [186] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,

```



```

##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [187] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [188] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [189] {Children=[0,10],
##      Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [190] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [191] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [192] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [193] {Children=[0,10],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [194] {Babies=[0,2],

```

```

##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [195] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17]}              => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [196] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [197] {Babies=[0,2],
##      Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619
## [198] {Country=PRT,
##      IsRepeatedGuest=0,
##      PreviousCancellations=[0,26],
##      PreviousBookingsNotCanceled=[0,30],
##      AssignedRoomType=A,
##      BookingChanges=[0,17],
##      RequiredCarParkingSpaces=[0,8]}      => {IsCanceled=1} 0.1093360 0.5680934 0.1924613 2.04619

```

```

# creating association rules to find pattern for cancelled booking
#support=0.09 and confidence=0.5
rules2 <- apriori(hotelDataTransactions,
                  parameter=list(supp=0.09, conf=0.50),
                  control=list(verbose=F),
                  appearance=list(default="lhs",rhs=("IsCanceled=1")))
rules2

```

```
## set of 997 rules
```

```

top10Lift2 <- sort(rules2, decreasing = TRUE, na.last = NA, by = "lift")
#inspect(top10Lift2)

```

Model 1

```

set.seed(1)
#creating a training data set of only the "IsCanceled" column with partition at 66%
trainList <- createDataPartition(y=hotelData$IsCanceled, p=0.66, list=FALSE)

```

```
#str(trainList)
#creating a training data set
trainSet <- hotelData[trainList,]
#creating a testing data set
testSet <- hotelData[-trainList,]
```

```
dim(trainSet)
```

```
## [1] 26441    20
```

```
dim(testSet)
```

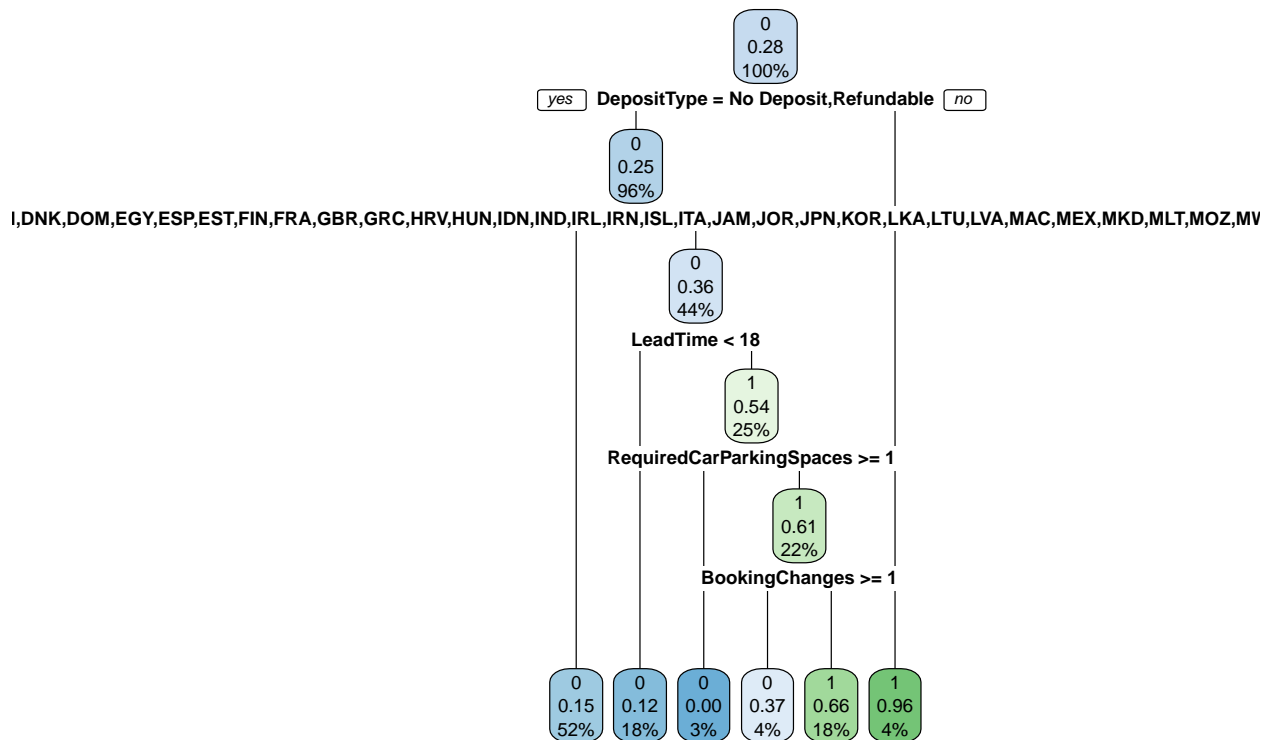
```
## [1] 13619    20
```

```
# creating decision tree
cartTree1 <- rpart(IsCanceled ~ ., data = trainSet)
```

```
library(rpart.plot)
```

```
## Warning: package 'rpart.plot' was built under R version 4.1.3
```

```
# plotting the decision tree
rpart.plot(cartTree1)
```



```
#predicting cancellation from test data set
rpartPred1 <- predict(cartTree1, newdata=testSet, type="class")
```

```
# calculating accuracy of the prediction
confusionMatrix(rpartPred1, testSet$IsCanceled)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction    0    1
##           0 8988 1583
##           1  850 2198
##
##           Accuracy : 0.8214
##           95% CI : (0.8148, 0.8278)
##       No Information Rate : 0.7224
##       P-Value [Acc > NIR] : < 2.2e-16
##
##           Kappa : 0.5263
##
##  McNemar's Test P-Value : < 2.2e-16
##
##           Sensitivity : 0.9136
##           Specificity : 0.5813
##           Pos Pred Value : 0.8503
##           Neg Pred Value : 0.7211
##           Prevalence : 0.7224
##           Detection Rate : 0.6600
##       Detection Prevalence : 0.7762
##           Balanced Accuracy : 0.7475
##
##           'Positive' Class : 0
##
```

```
# calculating variable importance to find top features impacting cancellation
varImp <- varImp(cartTree1)
```

```
#sorting to find top 5 impacting features
arrange(varImp, desc(Overall))
```

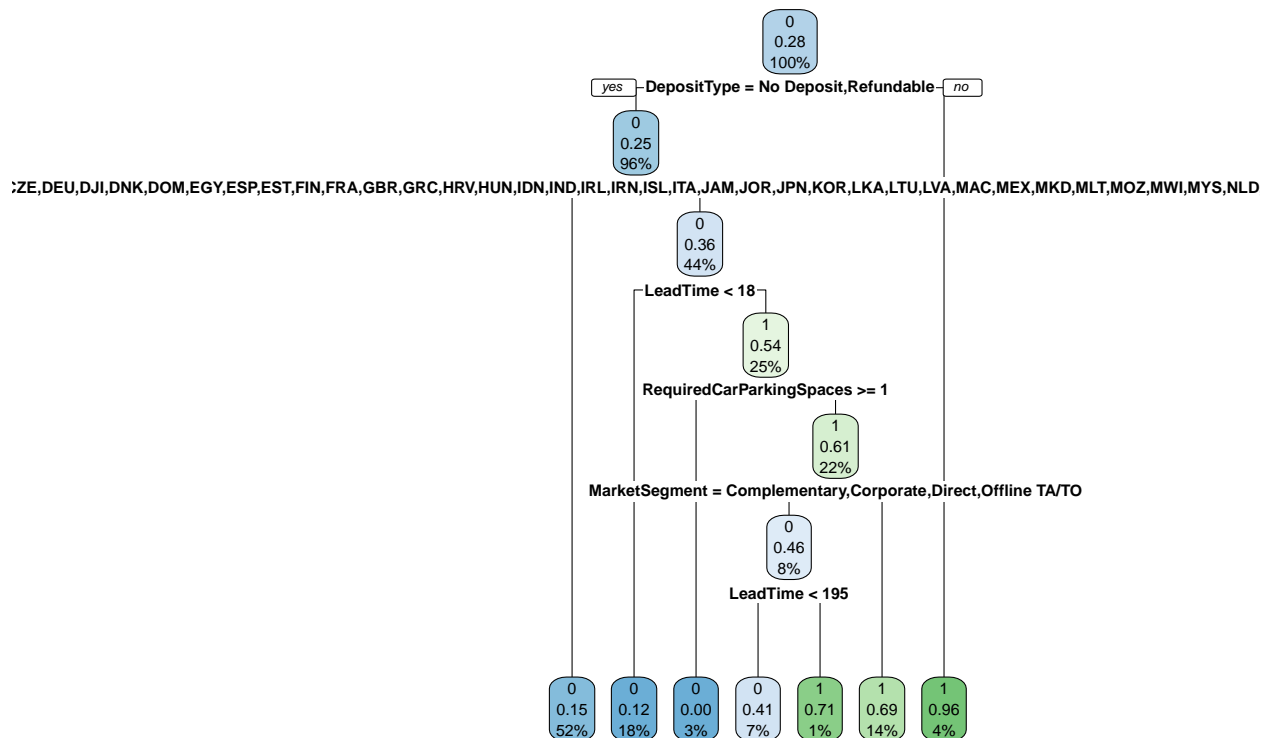
```
##           Overall
## LeadTime      2501.70553
## RequiredCarParkingSpaces 2181.73038
## MarketSegment 2007.04026
## Country       1482.71160
## DepositType   1082.85924
## StaysInWeekendNights 394.21041
## StaysInWeekNights 367.38978
## BookingChanges 345.72524
## PreviousCancellations 243.89002
## AssignedRoomType 154.26788
## Meal          90.41333
## Adults        0.00000
```

```
## Children          0.00000
## Babies            0.00000
## IsRepeatedGuest   0.00000
## PreviousBookingsNotCanceled 0.00000
## ReservedRoomType  0.00000
## CustomerType      0.00000
## TotalOfSpecialRequests 0.00000
```

Model 2

```
# prediction of cancellation using top features found in the previous step
cartTree2 <- rpart(IsCanceled ~ LeadTime+RequiredCarParkingSpaces+Country+
  DepositType+MarketSegment, data = trainSet)
```

```
# plotting the decision tree of the new model
rpart.plot(cartTree2)
```



```
#predicting cancellation from test data set
rpartPred2 <- predict(cartTree2, newdata=testSet, type="class")

# calculating accuracy of the prediction
confusionMatrix(rpartPred2, testSet$IsCanceled)
```

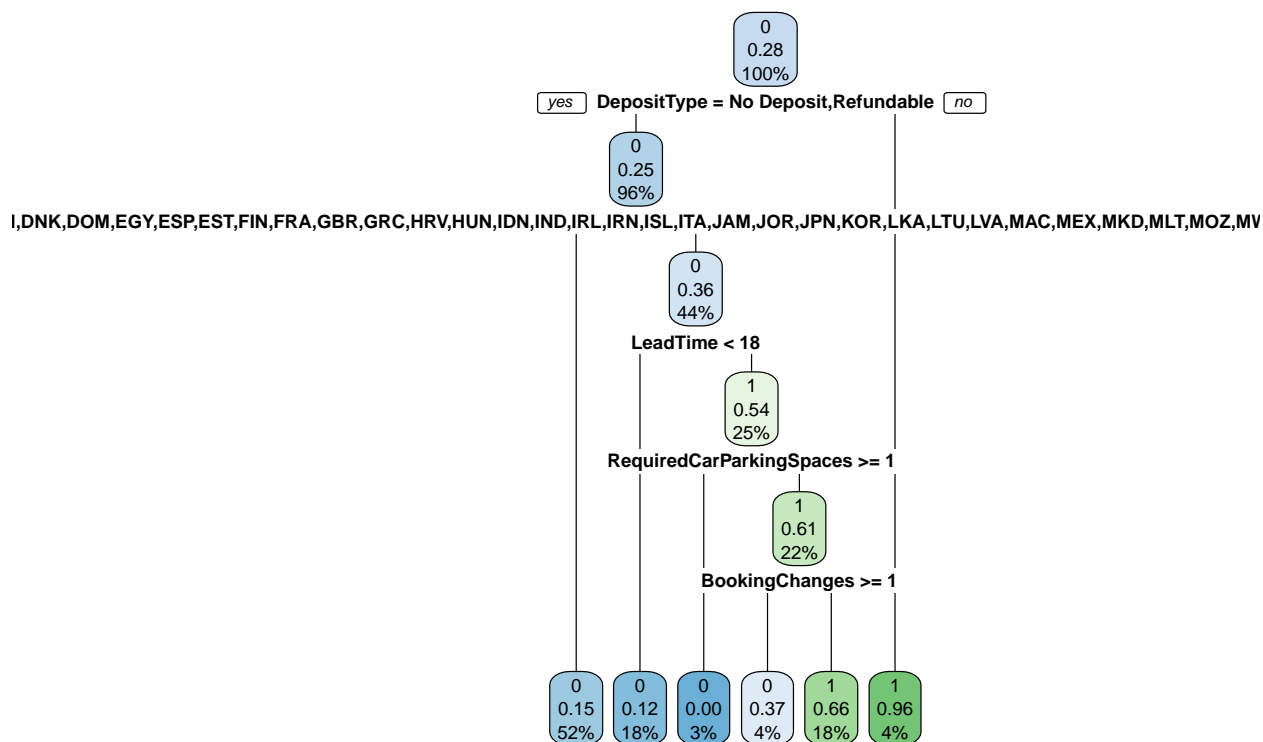
```
## Confusion Matrix and Statistics
```

```
##
##           Reference
## Prediction    0    1
##           0 9179 1754
##           1  659 2027
##
##           Accuracy : 0.8228
##           95% CI : (0.8163, 0.8292)
##           No Information Rate : 0.7224
##           P-Value [Acc > NIR] : < 2.2e-16
##
##           Kappa : 0.515
##
## Mcnemar's Test P-Value : < 2.2e-16
##
##           Sensitivity : 0.9330
##           Specificity : 0.5361
##           Pos Pred Value : 0.8396
##           Neg Pred Value : 0.7547
##           Prevalence : 0.7224
##           Detection Rate : 0.6740
##           Detection Prevalence : 0.8028
##           Balanced Accuracy : 0.7346
##
##           'Positive' Class : 0
##
```

Model 3

```
# prediction of cancellation by including different set of top features
cartTree3 <- rpart(IsCanceled ~ LeadTime+RequiredCarParkingSpaces+Country+DepositType+
  +StaysInWeekendNights+StaysInWeekNights+
  BookingChanges+PreviousCancellations+AssignedRoomType+Meal,
  data = trainSet)
```

```
rpart.plot(cartTree3)
```



```
rpartPred3 <- predict(cartTree3, newdata=testSet, type="class")
confusionMatrix(rpartPred3, testSet$IsCanceled)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction    0    1
##           0 8995 1585
##           1  843 2196
##
##           Accuracy : 0.8217
##           95% CI : (0.8152, 0.8281)
##           No Information Rate : 0.7224
##           P-Value [Acc > NIR] : < 2.2e-16
##
##           Kappa : 0.5269
##
##           McNemar's Test P-Value : < 2.2e-16
##
##           Sensitivity : 0.9143
##           Specificity : 0.5808
##           Pos Pred Value : 0.8502
##           Neg Pred Value : 0.7226
##           Prevalence : 0.7224
```

```
##          Detection Rate : 0.6605
## Detection Prevalence : 0.7769
##    Balanced Accuracy : 0.7476
##
##    'Positive' Class : 0
##
```