Periandri_Anthony_Assignment 3

Anthony Periandri

2025-06-12

R Markdown

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

```
library(caret)
```

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

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

```
library(e1071)
data <- read.csv("UniversalBank.csv")
set.seed(768)
trainset <- createDataPartition(data$Personal.Loan, p = 0.6, list = FALSE)
training <- data[trainset, ]
validation <- data[-trainset, ]
pivottable <- table(training$CreditCard, training$Online, training$Personal.Loan)
FinalTable <- as.data.frame(pivottable)
colnames(FinalTable) <- c("CreditCard", "Online", "Loan", "Count")
print(FinalTable)
```

```
##   CreditCard Online Loan Count
## 1          0      0    0   774
## 2          1      0    0   318
## 3          0      1    0  1157
## 4          1      1    0   456
## 5          0      0    1    81
## 6          1      0    1    39
## 7          0      1    1   122
## 8          1      1    1    53
```

```
A <- pivottable["1", "1", "1"]
B <- pivottable["1", "1", "0"] + pivottable["1", "1", "1"]
probability <- A / B
print(probability)
```

```
## [1] 0.1041257
```

```r
onlinevpl <- table(training$Personal.Loan, training$Online)
print(onlinevpl)
```

```
##
##        0    1
##   0 1092 1613
##   1  120  175
```

```r
ccvpl <- table(training$Personal.Loan, training$CreditCard)
print(ccvpl)
```

```
##
##        0    1
##   0 1931  774
##   1  203   92
```

```r
loan_1 <- mean(training$Personal.Loan)
loan_0 <- 1-loan_1
cc_1_loan_1 <- mean(training$CreditCard[training$Personal.Loan ==1])
online_1_loan_1 <- mean(training$Online[training$Personal.Loan == 1])
cc_1_loan_0 <- mean(training$CreditCard[training$Personal.Loan == 0])
online_1_loan_0 <- mean(training$Online[training$Personal.Loan == 0])
num <- cc_1_loan_1 * online_1_loan_1 * loan_1
denom <- num + (cc_1_loan_0 * online_1_loan_0 * loan_0)
naive_bayes <- num/denom
print(naive_bayes)
```

```
## [1] 0.1057444
```

```r
cat("Probability", probability, "\n")
```

```
## Probability 0.1041257
```

```r
cat("Naive Bayes", naive_bayes, "\n")
```

```
## Naive Bayes 0.1057444
```

```r
new_model <- naiveBayes(as.factor(Personal.Loan) ~ CreditCard + Online, data = training)
new_data <- data.frame(CreditCard = 1, Online = 1)
pred_prob <- predict(new_model,new_data, type = "raw")
print(pred_prob)
```

```
##              0         1
## [1,] 0.8909715 0.1090285
```

```r
cat("Normal Probability (Loan=1 | CC=1, Online=1):", round(probability, 4), "\n")
```

```
## Normal Probability (Loan=1 | CC=1, Online=1): 0.1041
```

```r
cat("Manual Naive Bayes Estimate:", round(naive_bayes, 4), "\n")
```

```
## Manual Naive Bayes Estimate: 0.1057
```

```r
cat("NaiveBayes Model Prediction:", round(pred_prob[2], 4), "\n")
```

```
## NaiveBayes Model Prediction: 0.109
```