Regressão Logística

Carregar Dados

```r
TEBA <- read_excel("TEBA.xlsx")
```

Separar em treino e teste

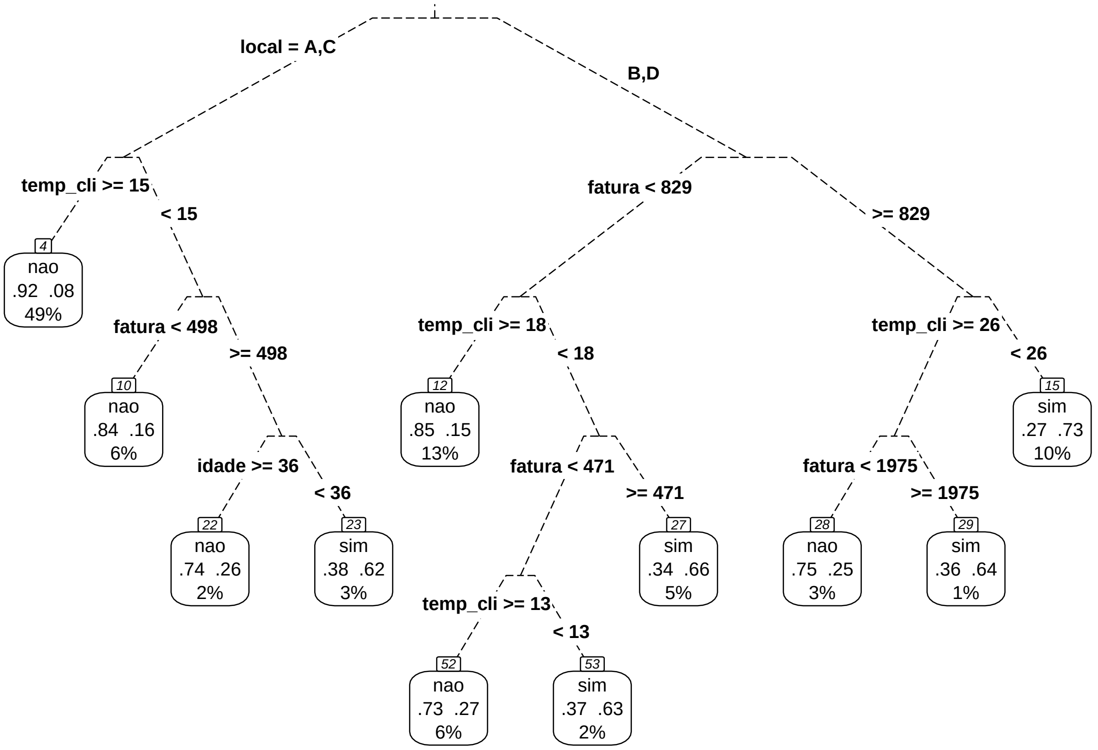
```r
set.seed(1234)
index=sample(1:2000,1200)

teba.learn=TEBA[index,]
teba.test=TEBA[-index,]
```

Criar arvore

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

set.seed(93)
ad1=rpart(data=teba.learn, cancel~idade+linhas+temp_cli+renda+fatura+temp_rsd+local+tvcabo+debaut, meth
prp(ad1, type=3, extra=104,nn=T, fallen.leaves = F, branch.lty = 5)
```

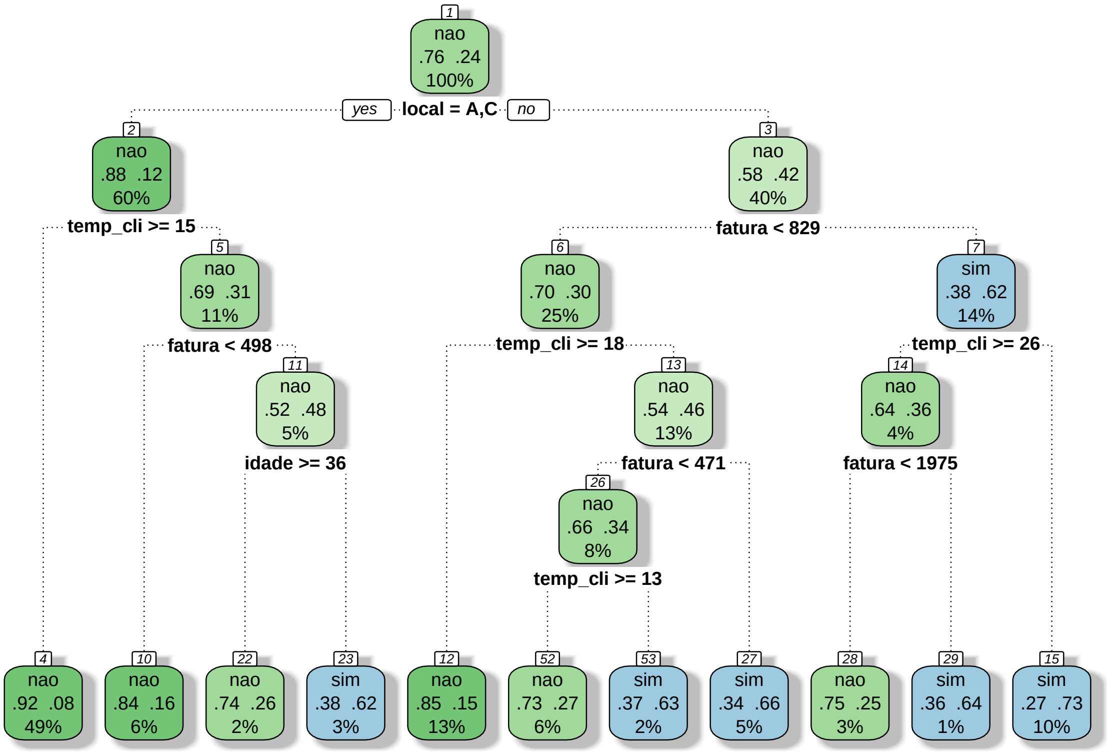


Visualizacao alternativa

```
library(RColorBrewer)
library(rattle)
```

```
## Rattle: A free graphical interface for data science with R.
## Version 5.2.0 Copyright (c) 2006-2018 Togaware Pty Ltd.
## Type 'rattle()' to shake, rattle, and roll your data.
```

```
fancyRpartPlot(ad1)
```



Rattle 2019−Oct−06 22:03:48 rstudio−user

Saida crua da arvare

```
ad1
```

```
## n= 1200
##
## node), split, n, loss, yval, (yprob)
##       * denotes terminal node
##
##  1) root 1200 288 nao (0.76000000 0.24000000)
##    2) local=A,C 726  89 nao (0.87741047 0.12258953)
##      4) temp_cli>=14.5 590  47 nao (0.92033898 0.07966102) *
##      5) temp_cli< 14.5 136  42 nao (0.69117647 0.30882353)
##       10) fatura< 497.5 74  12 nao (0.83783784 0.16216216) *
##       11) fatura>=497.5 62  30 nao (0.51612903 0.48387097)
##         22) idade>=35.5 23   6 nao (0.73913043 0.26086957) *
##         23) idade< 35.5 39  15 sim (0.38461538 0.61538462) *
##    3) local=B,D 474 199 nao (0.58016878 0.41983122)
##      6) fatura< 829 302  92 nao (0.69536424 0.30463576)
##       12) temp_cli>=17.5 151  22 nao (0.85430464 0.14569536) *
##       13) temp_cli< 17.5 151  70 nao (0.53642384 0.46357616)
##         26) fatura< 471 93  32 nao (0.65591398 0.34408602)
##           52) temp_cli>=12.5 74  20 nao (0.72972973 0.27027027) *
##           53) temp_cli< 12.5 19   7 sim (0.36842105 0.63157895) *
##         27) fatura>=471 58  20 sim (0.34482759 0.65517241) *
##      7) fatura>=829 172  65 sim (0.37790698 0.62209302)
##       14) temp_cli>=25.5 50  18 nao (0.64000000 0.36000000)
##         28) fatura< 1975 36   9 nao (0.75000000 0.25000000) *
##         29) fatura>=1975 14   5 sim (0.35714286 0.64285714) *
##       15) temp_cli< 25.5 122  33 sim (0.27049180 0.72950820) *
```

Classificar individuos da porcao de treino

```
teba.learn$pred.lrn.class=predict(ad1, newdata = teba.learn, type = "class")
table(teba.learn$cancel,teba.learn$pred.lrn.class)
```

```
##
##       nao sim
##   nao 832  80
##   sim 116 172
```

Analisar a necessidade de podar

É necessario podar quando há decrescimo no valor de xerror

```
printcp(ad1)
```

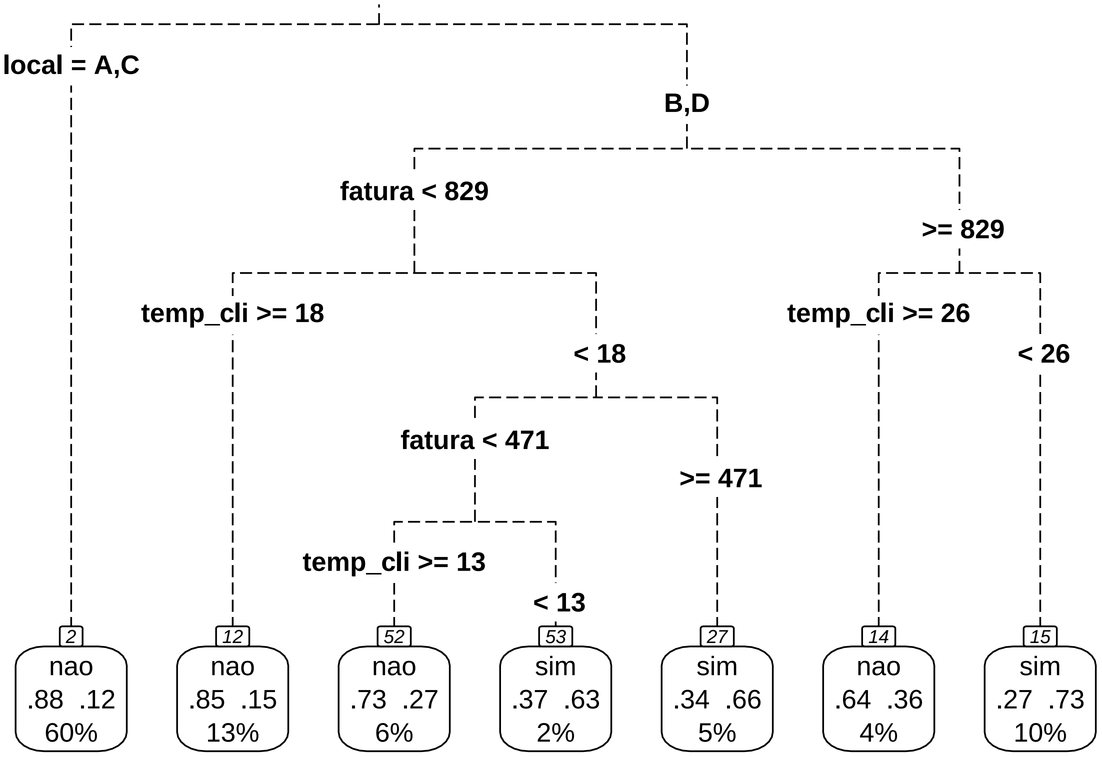
```
##
## Classification tree:
## rpart(formula = cancel ~ idade + linhas + temp_cli + renda +
##     fatura + temp_rsd + local + tvcabo + debaut, data = teba.learn,
##     method = "class")
##
## Variables actually used in tree construction:
## [1] fatura   idade    local    temp_cli
##
## Root node error: 288/1200 = 0.24
##
## n= 1200
##
##         CP nsplit rel error  xerror     xstd
## 1 0.072917      0   1.00000 1.00000 0.051370
## 2 0.048611      2   0.85417 0.89931 0.049484
## 3 0.031250      3   0.80556 0.89236 0.049345
## 4 0.017361      5   0.74306 0.89583 0.049414
## 5 0.013889      6   0.72569 0.88542 0.049204
## 6 0.010417      7   0.71181 0.89236 0.049345
## 7 0.010000     10   0.68056 0.91319 0.049758
```

Podar a arvore

```
ad2=prune(ad1,cp=0.015)
ad2
```

```
## n= 1200
##
## node), split, n, loss, yval, (yprob)
##       * denotes terminal node
##
##  1) root 1200 288 nao (0.7600000 0.2400000)
##    2) local=A,C 726  89 nao (0.8774105 0.1225895) *
##    3) local=B,D 474 199 nao (0.5801688 0.4198312)
##      6) fatura< 829 302  92 nao (0.6953642 0.3046358)
##       12) temp_cli>=17.5 151  22 nao (0.8543046 0.1456954) *
##       13) temp_cli< 17.5 151  70 nao (0.5364238 0.4635762)
##         26) fatura< 471 93  32 nao (0.6559140 0.3440860)
##           52) temp_cli>=12.5 74  20 nao (0.7297297 0.2702703) *
##           53) temp_cli< 12.5 19   7 sim (0.3684211 0.6315789) *
##         27) fatura>=471 58  20 sim (0.3448276 0.6551724) *
##      7) fatura>=829 172  65 sim (0.3779070 0.6220930)
##       14) temp_cli>=25.5 50  18 nao (0.6400000 0.3600000) *
##       15) temp_cli< 25.5 122  33 sim (0.2704918 0.7295082) *
```

```
prp(ad2, type=3, extra=104,nn=T, fallen.leaves = T, branch.lty = 5)
```

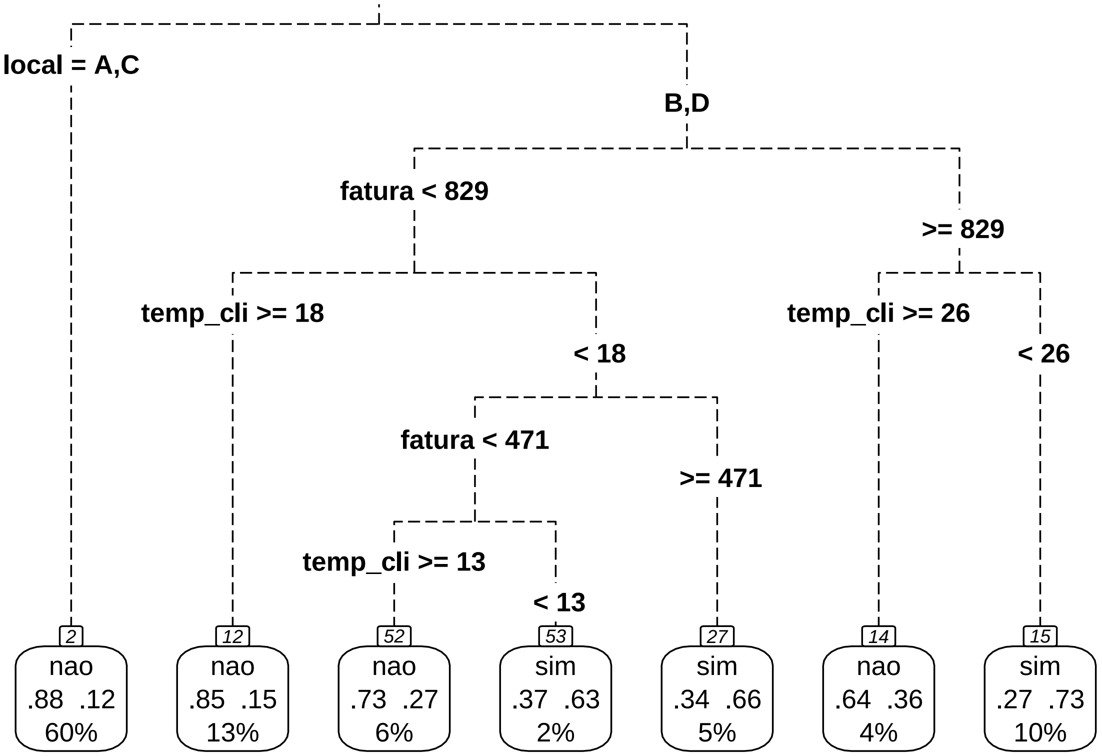


Analisar resultado na amostra teste

```
ad2=prune(ad1,cp=0.015)
ad2
```

```
## n= 1200
##
## node), split, n, loss, yval, (yprob)
##       * denotes terminal node
##
##  1) root 1200 288 nao (0.7600000 0.2400000)
##    2) local=A,C 726  89 nao (0.8774105 0.1225895) *
##    3) local=B,D 474 199 nao (0.5801688 0.4198312)
##      6) fatura< 829 302  92 nao (0.6953642 0.3046358)
##       12) temp_cli>=17.5 151  22 nao (0.8543046 0.1456954) *
##       13) temp_cli< 17.5 151  70 nao (0.5364238 0.4635762)
##         26) fatura< 471 93  32 nao (0.6559140 0.3440860)
##           52) temp_cli>=12.5 74  20 nao (0.7297297 0.2702703) *
##           53) temp_cli< 12.5 19   7 sim (0.3684211 0.6315789) *
##         27) fatura>=471 58  20 sim (0.3448276 0.6551724) *
##      7) fatura>=829 172  65 sim (0.3779070 0.6220930)
##       14) temp_cli>=25.5 50  18 nao (0.6400000 0.3600000) *
##       15) temp_cli< 25.5 122  33 sim (0.2704918 0.7295082) *
```

```
prp(ad2, type=3, extra=104,nn=T, fallen.leaves = T, branch.lty = 5)
```


local = A,C
B,D
fatura < 829
>= 829
temp_cli >= 18
< 18
temp_cli >= 26
< 26
fatura < 471
>= 471
temp_cli >= 13
< 13
2
nao
.88 .12
60%
12
nao
.85 .15
13%
52
nao
.73 .27
6%
53
sim
.37 .63
2%
27
sim
.34 .66
5%
14
nao
.64 .36
4%
15
sim
.27 .73
10%