Análisis caso ABB

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

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

require(ggplot2)

## Loading required package: ggplot2

require(dplyr)

## Loading required package: dplyr  
##   
## Attaching package: 'dplyr'  
##   
## The following objects are masked from 'package:stats':  
##   
## filter, lag  
##   
## The following objects are masked from 'package:base':  
##   
## intersect, setdiff, setequal, union

#la opción file.chose() en la función read.table nos permite escoger un fichero de datos guardado en el ordenador local)  
#leer el fichero de datos abb-R.txt, el cual contiene los datos de la elección de las empresas eléctricas y la descripción de su volumen de compras así cómo su distrito.  
abb<-read.table("abb-r.txt", header=T)  
#la función head() nos permite visualizar las primer seis líneas de un objeto de datos.  
#He traspuesto el resupado con la función t() con el objeto de facilitar la lectura. Así las líneas representan las variables y las columnas los valors para las 6 primeras observaciones.  
t(head(abb))

## 1 2 3 4 5 6   
## id "1" "1" "1" "1" "2" "2"   
## Alternatives "ABB" "GE" "Westinghouse" "Edison" "ABB" "GE"   
## choice "0" "1" "0" "0" "0" "0"   
## price "6" "6" "6" "5" "3" "3"   
## energy\_loss "6" "6" "5" "5" "4" "4"   
## maintenance "7" "6" "7" "6" "5" "5"   
## warranty "6" "7" "5" "7" "4" "4"   
## spare\_parts "6" "9" "3" "8" "4" "7"   
## ease\_install "5" "9" "4" "2" "5" "3"   
## problem\_solving "7" "7" "7" "6" "6" "5"   
## quality "5" "5" "6" "5" "4" "5"   
## DA "1" "0" "0" "0" "1" "0"   
## DB "0" "1" "0" "0" "0" "1"   
## DC "0" "0" "1" "0" "0" "0"   
## DD "0" "0" "0" "1" "0" "0"   
## volume "761" "761" "761" "761" "627" "627"  
## district "1" "1" "1" "1" "1" "1"

#la funcion names() muestra los nombres de las variables   
  
names(abb)

## [1] "id" "Alternatives" "choice"   
## [4] "price" "energy\_loss" "maintenance"   
## [7] "warranty" "spare\_parts" "ease\_install"   
## [10] "problem\_solving" "quality" "DA"   
## [13] "DB" "DC" "DD"   
## [16] "volume" "district"

#La función str() nos proporciona una descripción de la base de datos  
str(abb)

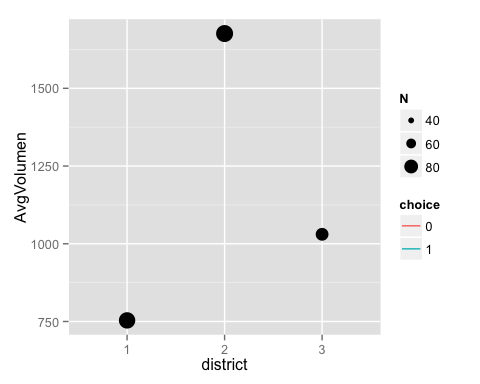
## 'data.frame': 352 obs. of 17 variables:  
## $ id : int 1 1 1 1 2 2 2 2 3 3 ...  
## $ Alternatives : Factor w/ 4 levels "ABB","Edison",..: 1 3 4 2 1 3 4 2 1 3 ...  
## $ choice : num 0 1 0 0 0 0 0 1 1 0 ...  
## $ price : num 6 6 6 5 3 3 4 4 6 5 ...  
## $ energy\_loss : num 6 6 5 5 4 4 5 5 6 6 ...  
## $ maintenance : num 7 6 7 6 5 5 5 6 7 7 ...  
## $ warranty : num 6 7 5 7 4 4 5 5 7 7 ...  
## $ spare\_parts : num 6 9 3 8 4 7 5 4 6 5 ...  
## $ ease\_install : num 5 9 4 2 5 3 7 5 7 6 ...  
## $ problem\_solving: num 7 7 7 6 6 5 6 5 7 8 ...  
## $ quality : num 5 5 6 5 4 5 4 6 6 6 ...  
## $ DA : num 1 0 0 0 1 0 0 0 1 0 ...  
## $ DB : num 0 1 0 0 0 1 0 0 0 1 ...  
## $ DC : num 0 0 1 0 0 0 1 0 0 0 ...  
## $ DD : int 0 0 0 1 0 0 0 1 0 0 ...  
## $ volume : int 761 761 761 761 627 627 627 627 643 643 ...  
## $ district : int 1 1 1 1 1 1 1 1 2 2 ...

#cambiar la clase de las variables según sea apropiado.  
#las variables choice y district deberían se factores.  
abb$district <- as.factor(abb$district)  
abb$choice <- as.factor(abb$choice)  
#Ahora con la ayuda de la función select() del packete dplyr y del operador tubería (pipeline) %>% calculamos el valor medio del precio y volumen  
A= select(abb, choice, volume, district, price) %>%  
 group\_by(district, choice) %>%  
 summarize(AvgPrice = mean(price), AvgVolumen = mean(volume), N = length(price))  
A

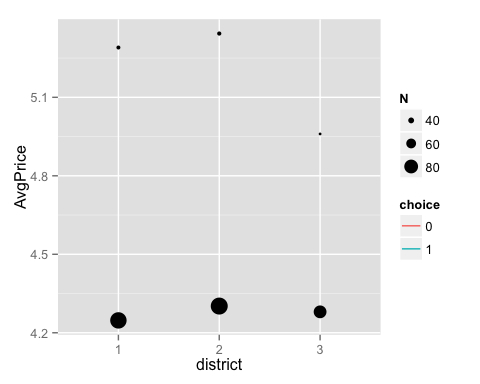
## Source: local data frame [6 x 5]  
## Groups: district  
##   
## district choice AvgPrice AvgVolumen N  
## 1 1 0 4.247 753.5 93  
## 2 1 1 5.290 753.5 31  
## 3 2 0 4.302 1676.2 96  
## 4 2 1 5.344 1676.2 32  
## 5 3 0 4.280 1030.4 75  
## 6 3 1 4.960 1030.4 25

You can also embed plots, for example:

## geom\_path: Each group consist of only one observation. Do you need to adjust the group aesthetic?



## geom\_path: Each group consist of only one observation. Do you need to adjust the group aesthetic?



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

## Loading required package: splines

## Call:  
## coxph(formula = Surv(rep(1, 352L), choice) ~ price + energy\_loss +   
## maintenance + warranty + spare\_parts + ease\_install + problem\_solving +   
## quality + DA + DB + DC + strata(id), data = abb, method = "exact")  
##   
## n= 352, number of events= 88   
##   
## coef exp(coef) se(coef) z Pr(>|z|)   
## price 2.181 8.851 0.587 3.72 0.00020 \*\*\*  
## energy\_loss 2.656 14.234 0.674 3.94 8.1e-05 \*\*\*  
## maintenance 0.594 1.811 0.437 1.36 0.17431   
## warranty 1.141 3.129 0.331 3.45 0.00057 \*\*\*  
## spare\_parts -0.133 0.876 0.218 -0.61 0.54216   
## ease\_install 0.520 1.682 0.173 3.01 0.00263 \*\*   
## problem\_solving 2.032 7.631 0.550 3.70 0.00022 \*\*\*  
## quality 2.639 14.005 0.688 3.84 0.00012 \*\*\*  
## DA -0.124 0.884 0.679 -0.18 0.85524   
## DB -0.671 0.511 0.719 -0.93 0.35081   
## DC -0.687 0.503 0.715 -0.96 0.33650   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## exp(coef) exp(-coef) lower .95 upper .95  
## price 8.851 0.1130 2.804 27.95  
## energy\_loss 14.234 0.0703 3.801 53.31  
## maintenance 1.811 0.5523 0.769 4.26  
## warranty 3.129 0.3196 1.636 5.99  
## spare\_parts 0.876 1.1418 0.572 1.34  
## ease\_install 1.682 0.5945 1.199 2.36  
## problem\_solving 7.631 0.1310 2.598 22.41  
## quality 14.005 0.0714 3.638 53.91  
## DA 0.884 1.1318 0.234 3.34  
## DB 0.511 1.9566 0.125 2.09  
## DC 0.503 1.9882 0.124 2.04  
##   
## Rsquare= 0.411 (max possible= 0.5 )  
## Likelihood ratio test= 186 on 11 df, p=0  
## Wald test = 23.7 on 11 df, p=0.0142  
## Score (logrank) test = 103 on 11 df, p=0

Ahora calculamos la utilidad de cada elección

u <- predict(abb.clogit)  
head(u)

## 1 2 3 4 5 6   
## 2.0459 3.7277 0.2034 -5.9770 -3.7209 -5.0991

Después obtenemos exp(u) y sumamos exp(u) para cada individuo

eu <- exp(u)  
sumaeu <- by(eu, abb$id, sum)  
head(sumaeu)

## abb$id  
## 1 2 3 4 5 6   
## 50.55 516.23 248.18 164.16 2069.30 153.61

Ahora calculamos la probabilidad de elección de cada marca. Para ello definimos una función que llamaremos prob()

prob<-function(suma, eutil, indiv){  
#suma, eutil, inviv son los argumentos de la función  
n<-0  
#Crea un vector con tantos elementos como el producto entre   
#lis individuos y las marcas  
p<-1:indiv\*4  
#Para cada individuo  
for (i in 1:indiv) {  
#para cada marca  
for (j in 1:4) {  
#construye un índice  
n<-n+1  
#calcula la probabilidad de que el individuo i compre la #marca j  
p[n]<-eutil[n]/suma[i]  
}  
}  
#Devuelve el vector de probabilidades  
return(p)  
}

Y después la utilizamos con los datos calculados previamente

pchoice <- prob(sumaeu, eu, 88)  
head(pchoice)

## [1] 1.530e-01 8.227e-01 2.425e-02 5.018e-05 4.690e-05 1.182e-05

abb$pchoice <- pchoice  
t(head(abb))

## 1 2 3 4   
## id "1" "1" "1" "1"   
## Alternatives "ABB" "GE" "Westinghouse" "Edison"   
## choice "1" "2" "1" "1"   
## price "6" "6" "6" "5"   
## energy\_loss "6" "6" "5" "5"   
## maintenance "7" "6" "7" "6"   
## warranty "6" "7" "5" "7"   
## spare\_parts "6" "9" "3" "8"   
## ease\_install "5" "9" "4" "2"   
## problem\_solving "7" "7" "7" "6"   
## quality "5" "5" "6" "5"   
## DA "1" "0" "0" "0"   
## DB "0" "1" "0" "0"   
## DC "0" "0" "1" "0"   
## DD "0" "0" "0" "1"   
## volume "761" "761" "761" "761"   
## district "1" "1" "1" "1"   
## pchoice "1.530e-01" "8.227e-01" "2.425e-02" "5.018e-05"  
## 5 6   
## id "2" "2"   
## Alternatives "ABB" "GE"   
## choice "1" "1"   
## price "3" "3"   
## energy\_loss "4" "4"   
## maintenance "5" "5"   
## warranty "4" "4"   
## spare\_parts "4" "7"   
## ease\_install "5" "3"   
## problem\_solving "6" "5"   
## quality "4" "5"   
## DA "1" "0"   
## DB "0" "1"   
## DC "0" "0"   
## DD "0" "0"   
## volume "627" "627"   
## district "1" "1"   
## pchoice "4.690e-05" "1.182e-05"

Ahora creamos una función para clasificar a los clientes en función de su probabilidad de compra

msegment<-function(p, indiv){  
# p es el vector de probabilidades  
# in es el número de individuos   
s<-1:indiv\*4  
j<-0  
for (i in 1:indiv) {  
#para cada individuo  
j=j+4  
#Leales  
if (p[j-3]>0.8) {s[j-3]<-"L"; s[j-2]<-"L"; s[j-1]<-"L"; s[j]<-"L"}  
#Competitivos  
if (p[j-3]<=0.8 & p[j-3]>0.5) {s[j-3]<-"C"; s[j-2]<-"C"; s[j-1]<-"C"; s[j]<-"C"}  
#Apropiables  
if (p[j-3]<=0.5 & p[j-3]>0.15) {s[j-3]<-"A"; s[j-2]<-"A"; s[j-1]<-"A"; s[j]<-"A"}  
#Perdidos  
if (p[j-3]<=0.15) {s[j-3]<-"P"; s[j-2]<-"P"; s[j-1]<-"P"; s[j]<-"P"}  
}  
#Devuelve el resultado de la función  
return(s)  
}

Ahora utilizamos la nueva función para clasificar la base de datos

seg <- msegment(pchoice, 88)  
abb$seg <- seg  
  
abb.select.ord <- select(abb, volume, pchoice, seg) %>%  
 arrange(-volume)  
head(abb.select.ord)

## volume pchoice seg  
## 1 14798 4.989e-04 P  
## 2 14798 6.260e-08 P  
## 3 14798 8.012e-07 P  
## 4 14798 9.995e-01 P  
## 5 12514 7.867e-03 P  
## 6 12514 3.195e-04 P

primero seleccionamos las variables que queremos ordenar, después