Examen 2. Métodos Estadísticos Avanzados

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2022-11-27

Objetivo

Reproducir los resultados del Ejemplo 1 (Modelo I y II) de la sección 3 del artículo **Fitzmaurice, G. M. and N. M. Laird (1993). A likelihood - based for analysingg longitudinal binary responses. Biometrika 80 (1), 141 - 151**, utilizando:

1) El método propuesto en el artículo.
2) El enfoque bayesiano con el método computacional de su preferencia.

Resultados

Preparación

```
data <- read.csv("Ohio.csv",header=T)
data$resp <- as.factor(data$resp)
data$smoke <- as.factor(data$smoke)
#data$id <- as.factor(data$id)
```

Modelo I: Independencia entre las observaciones en el tiempo

```
m1 <- glm(resp ~ age + smoke + age*smoke, family = binomial(link="logit"),
          data = data)
summary(m1)
```

```
##
## Call:
## glm(formula = resp ~ age + smoke + age * smoke, family = binomial(link = "logit"),
##     data = data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.6503  -0.6014  -0.5636  -0.4940   2.0804
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.90084    0.08874 -21.420   <2e-16 ***
## age         -0.14125    0.06951  -2.032   0.0422 *
## smoke1       0.31395    0.13944   2.252   0.0244 *
## age:smoke1   0.07084    0.11072   0.640   0.5223
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
```

```
##
##     Null deviance: 1829.1  on 2147  degrees of freedom
## Residual deviance: 1819.5  on 2144  degrees of freedom
## AIC: 1827.5
##
## Number of Fisher Scoring iterations: 4
```

Modelo II: Correlación intercambiable entre años sucesivos

```
library(gee)
m2 <- gee(resp ~ age + smoke + age*smoke, id = id,
          data=data, family=binomial, corstr = "exchangeable")
```

```
## Beginning Cgee S-function, @(#) geeformula.q 4.13 98/01/27
```

```
## running glm to get initial regression estimate
```

```
## (Intercept)         age      smoke1  age:smoke1
##  -1.9008426  -0.1412531   0.3139540   0.0708441
```

```
summary(m2)
```

```
##
##  GEE:  GENERALIZED LINEAR MODELS FOR DEPENDENT DATA
##  gee S-function, version 4.13 modified 98/01/27 (1998)
##
## Model:
##  Link:                      Logit
##  Variance to Mean Relation: Binomial
##  Correlation Structure:     Exchangeable
##
## Call:
## gee(formula = resp ~ age + smoke + age * smoke, id = id, data = data,
##     family = binomial, corstr = "exchangeable")
##
## Summary of Residuals:
##        Min         1Q     Median         3Q        Max
## -0.1906393 -0.1654776 -0.1468831 -0.1148906  0.8851094
##
##
## Coefficients:
##                Estimate Naive S.E.     Naive z Robust S.E.    Robust z
## (Intercept) -1.90049539 0.11871090 -16.0094430  0.11908696 -15.9588874
## age         -0.14123592 0.05608034  -2.5184570  0.05820089  -2.4266968
## smoke1       0.31382583 0.18719721   1.6764450  0.18784180   1.6706922
## age:smoke1   0.07083185 0.08917757   0.7942788  0.08827886   0.8023647
##
## Estimated Scale Parameter:  1.001273
## Number of Iterations:  1
##
## Working Correlation
##           [,1]      [,2]      [,3]      [,4]
## [1,] 1.0000000 0.3543843 0.3543843 0.3543843
## [2,] 0.3543843 1.0000000 0.3543843 0.3543843
## [3,] 0.3543843 0.3543843 1.0000000 0.3543843
## [4,] 0.3543843 0.3543843 0.3543843 1.0000000
```