

## Logistic\_Regression.R

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# Pepe Pizza is a family-owned business that is considering offering a 30-minute delivery guarantee.
# To get information about current service, a sample of deliveries during one month was taken, totaling 240 deliveries in the sample (8 orders per day for 30 days).
# Variables:
# Order: Order of observations
# Distance: Driving miles, from store to delivery location
# TTime31: 1 if delivery time > 30; 0 otherwise
# Weekend 0 = Mon - Thu; 1 = Fri - Sun

#install readxl package first
library(readxl)
pizza <- read_excel("pizza.xlsx", na="NA", col_names = TRUE)
attach(pizza)

# fit the model
modelfit <- glm(TTime31 ~ Distance + Weekend, family = binomial)
summary(modelfit)

##
## Call:
## glm(formula = TTime31 ~ Distance + Weekend, family = binomial)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -0.7975  -0.5537  -0.3110  -0.2521   2.8777
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -4.5199     1.0224  -4.421 9.82e-06 ***
## Distance       0.3294     0.2203   1.495  0.1348
## Weekend       1.5941     0.5229   3.048  0.0023 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 156.04  on 239  degrees of freedom
## Residual deviance: 141.95  on 237  degrees of freedom
## AIC: 147.95
##
## Number of Fisher Scoring iterations: 6
```

```

#install pscl package first
library(pscl)

# McFadden R^2 index somewhat comparable to R^2 in multiple regression - model fit measure
pR2(modelfit)

##           llh           llhNull           G2           McFadden           r2ML
## -70.97546505 -78.01991361  14.08889712   0.09029039   0.05701390
##           r2CU
##    0.11926575

# prediction for delivery 5 miles away on a weekend
Xvalues <- data.frame(Distance = 5, Weekend = 1)
predict(modelfit, Xvalues, type = "response")

##           1
## 0.2177344

# prediction for delivery 2 miles away on a weekday
Xvalues <- data.frame(Distance = 2, Weekend = 0)
predict(modelfit, Xvalues, type = "response")

##           1
## 0.02061069

detach(pizza)

```