Instituto Tecnológico de Tijuana
Ingeniería en Informática

Subject Name:

Data Mining

Exercise:

Evaluative Practice 3 - Unit 3

Teacher:

Romero Hernandez Jose Christian

Students:

Castillo Ramirez Guadalupe 17213043

Ramos Rivera Manuel Isai 17212931

```
getwd()
[1] "F:/Data mining U1/Unidad3/Practica 3/Practice3"
> setwd("F:/Data mining U1/Unidad3/Practica 3/Practice3")
> getwd()
[1] "F:/Data mining U1/Unidad3/Practica 3/Practice3"
> dataset <- read.csv('Social_Network_Ads.csv')
> dataset <- dataset[, 3:5]
> install.packages('caTools')
```

package ‘caTools’ successfully unpacked and MD5 sums checked

The downloaded binary packages are in
C:\Users\Cylon\AppData\Local\Temp\RtmpGQkMIP\downloaded_packages

```
> library(caTools)
Warning message:
package ‘caTools’ was built under R version 3.6.3
> set.seed(123)
> split <- sample.split(dataset$Purchased, SplitRatio = 0.75)
> training_set <- subset(dataset, split == TRUE)
> test_set <- subset(dataset, split == FALSE)
> training_set[, 1:2] <- scale(training_set[, 1:2])
> test_set[, 1:2] <- scale(test_set[, 1:2])
> classifier = glm(formula = Purchased ~ .,
+                  family = binomial,
+                  data = training_set)
> prob_pred = predict(classifier, type = 'response', newdata = test_set[-3])
> prob_pred
```

```
          2           4           5           9          12          18          19          20          22
0.0162395375 0.0117148379 0.0037846461 0.0024527456 0.0073339436 0.2061576580
0.2669935073 0.3851475689 0.5448578778
         29          32          34          35          38          45          46          48          52
0.0103005636 0.2994922143 0.0084168787 0.0494471952 0.0171641479 0.0485051303
0.0008343060 0.0102561619 0.0007055347
         66          69          74          75          82          84          85          86          87
0.0058448457 0.0044534947 0.3933468488 0.0071065671 0.1068589185 0.2580084947
0.0303248927 0.3303649169 0.0051132916
         89         103         104         107         108         109         117         124         126
```

```
0.0263861849 0.1310148056 0.7649772313 0.0034367786 0.0473827096 0.0327965105
0.1626049288 0.0675494054 0.2189658514
      127        131        134        139        148        154        156        159        162
0.4142562486 0.0324337750 0.0043457839 0.0163538708 0.1030590600 0.0751093248
0.0048556976 0.0027487256 0.0306647902
      163        170        175        176        193        199        200        208        213
0.0463555716 0.0122981409 0.1169016711 0.0011936610 0.0103005636 0.0252589417
0.0177353905 0.9870859806 0.9453359968
      224        226        228        229        230        234        236        237        239
0.9969454446 0.1064430571 0.9979393884 0.3705093415 0.5807527959 0.9117762840
0.7817273411 0.2310672929 0.8037996043
      241        255        264        265        266        273        274        281        286
0.9682706714 0.6686007827 0.1451169281 0.9060311409 0.8293112410 0.9568520348
0.6781064291 0.9926955397 0.4170486388
      292        299        302        305        307        310        316        324        326
0.9220096987 0.7363498859 0.8247736816 0.2558136823 0.9932007105 0.1178058928
0.3442845494 0.3958138650 0.3059412440
      332        339        341        343        347        353        363        364        367
0.9725035550 0.1431602303 0.9842795480 0.2073273008 0.9371909698 0.6843940060
0.5559479117 0.5698028861 0.9440512240
      368        369        372        373        380        383        389        392        395
0.8427877409 0.2549836305 0.9928717092 0.3243409327 0.8519685008 0.9697473704
0.3793408625 0.2718336775 0.2040229226
      400
0.5236436275
```

```
> y_pred = ifelse(prob_pred > 0.5, 1, 0)
> y_pred
```

```
  2   4   5   9  12  18  19  20  22  29  32  34  35  38  45  46  48  52  66  69  74  75  82  84  85
86  87  89 103 104
  0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
1
107 108 109 117 124 126 127 131 134 139 148 154 156 159 162 163 170 175 176 193 199
200 208 213 224 226 228 229 230 234
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1   1   1   0   1   0   1
1
236 237 239 241 255 264 265 266 273 274 281 286 292 299 302 305 307 310 316 324 326
332 339 341 343 347 353 363 364 367
  1   0   1   1   1   0   1   1   1   1   1   0   1   1   1   0   1   0   0   0   0   1   0   1   0   1   1   1   1
1
368 369 372 373 380 383 389 392 395 400
  1   0   1   0   1   1   0   0   0   1
```

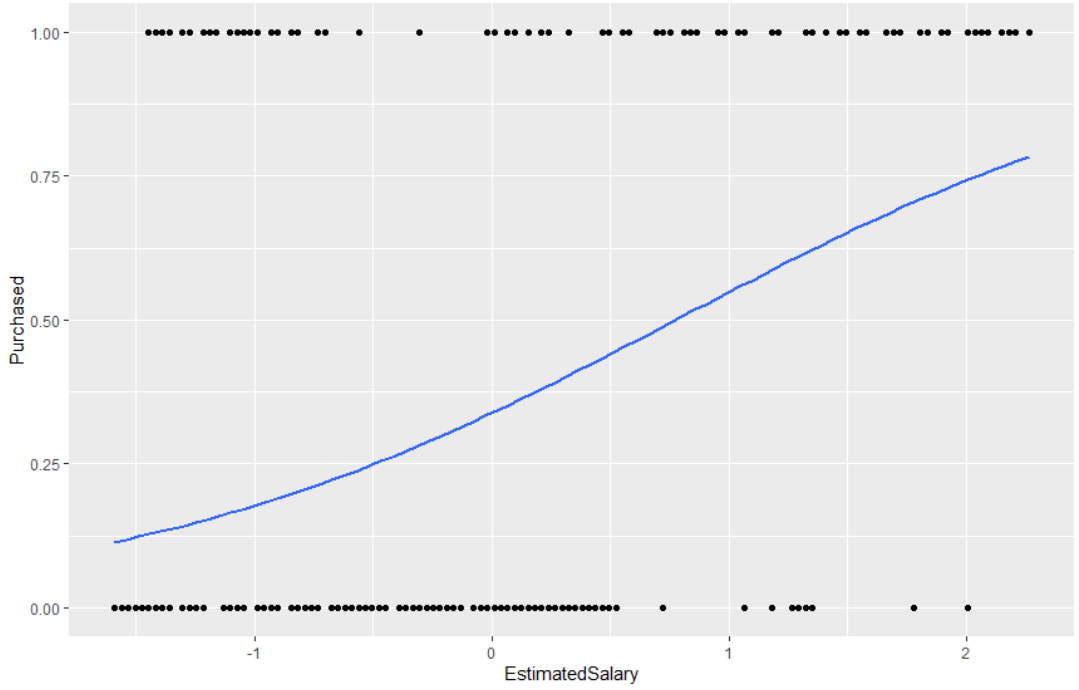
```
> cm = table(test_set[, 3], y_pred)
```

```
> cm
```

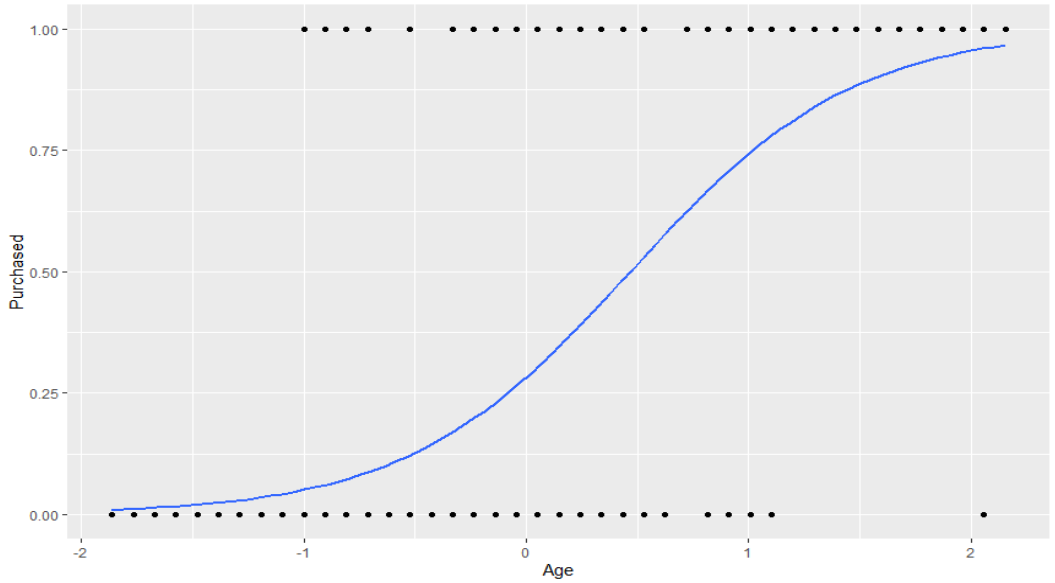
```
  y_pred
    0  1
0 57  7
1 10 26
```

```
> library(ggplot2)
> ggplot(training_set, aes(x=EstimatedSalary, y=Purchased)) + geom_point() +
+   stat_smooth(method="glm", method.args=list(family="binomial"), se=FALSE)
```

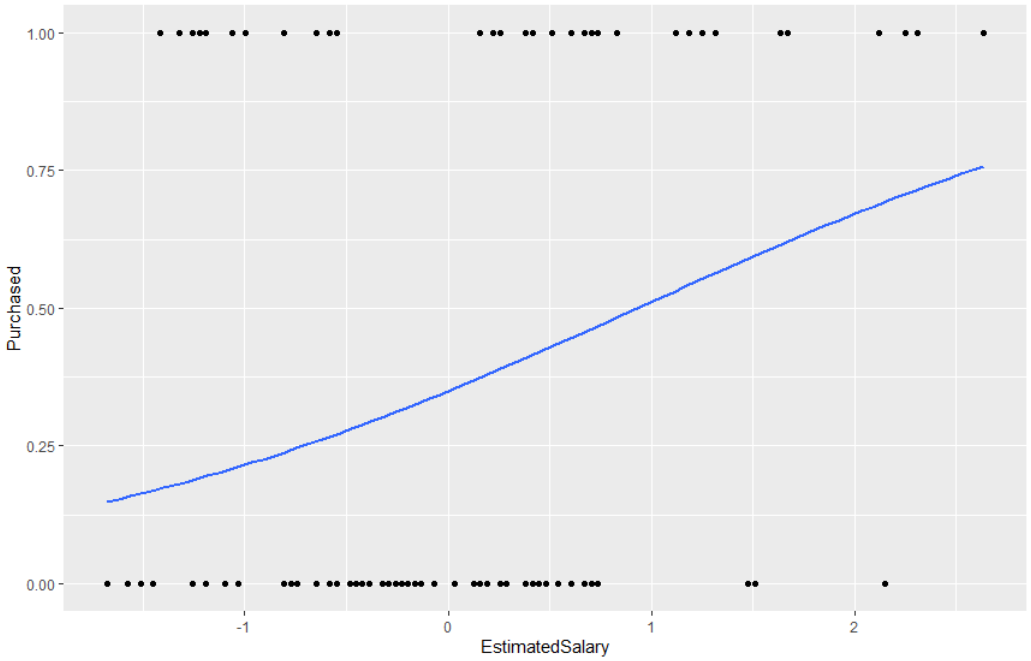
`geom_smooth()` using formula 'y ~ x'



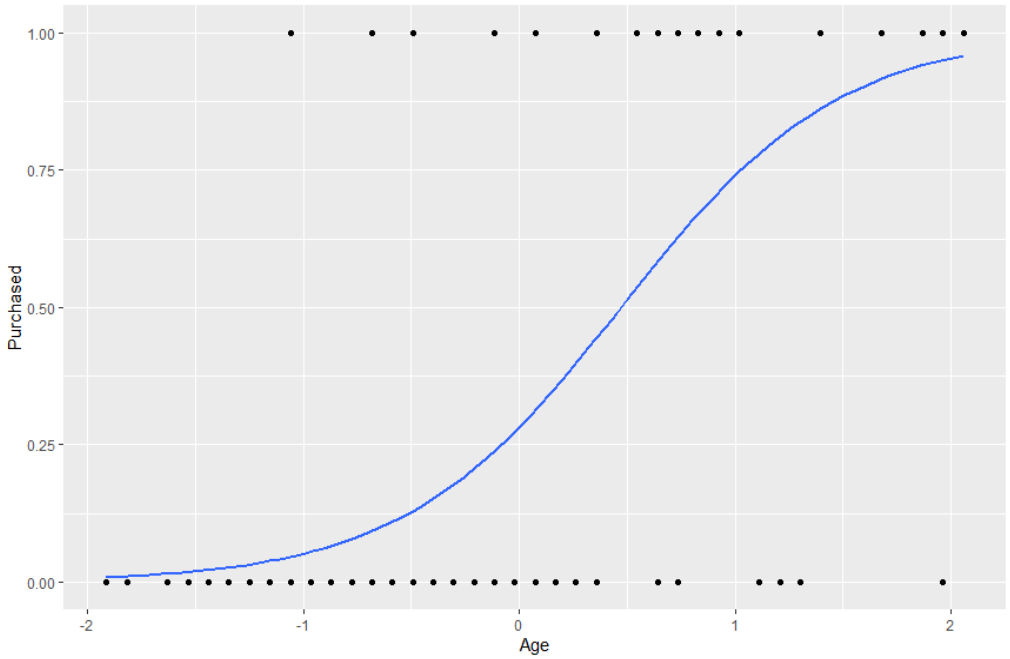

```
> ggplot(training_set, aes(x=Age, y=Purchased)) + geom_point() +
+   stat_smooth(method="glm", method.args=list(family="binomial"), se=FALSE)
`geom_smooth()` using formula 'y ~ x'
```




```
> ggplot(test_set, aes(x=EstimatedSalary, y=Purchased)) + geom_point() +
+   stat_smooth(method="glm", method.args=list(family="binomial"), se=FALSE)
`geom_smooth()` using formula 'y ~ x'
```



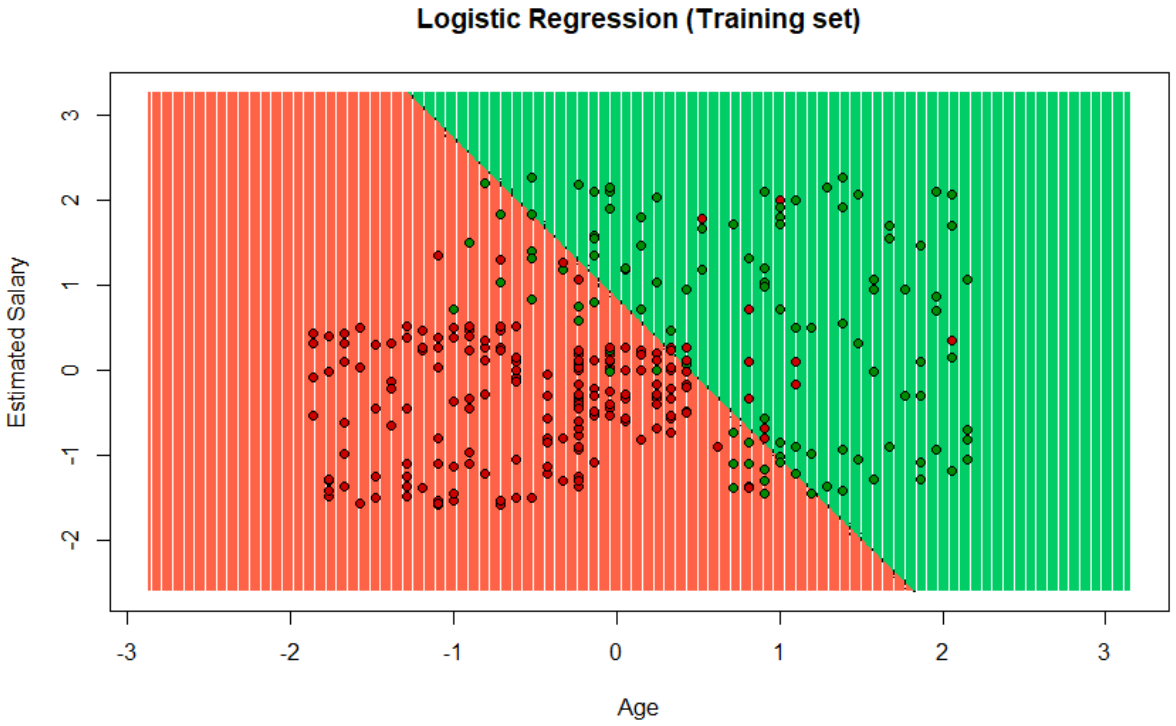

```
> ggplot(test_set, aes(x=Age, y=Purchased)) + geom_point() +
+   stat_smooth(method="glm", method.args=list(family="binomial"), se=FALSE)
`geom_smooth()` using formula 'y ~ x'
```




```
install.packages('ElemStatLearn')
library(ElemStatLearn)
set = training_set
X1 = seq(min(set[, 1]) - 1, max(set[, 1]) + 1, by = 0.01)
X2 = seq(min(set[, 2]) - 1, max(set[, 2]) + 1, by = 0.01)
grid_set = expand.grid(X1, X2)
colnames(grid_set) = c('Age', 'EstimatedSalary')
prob_set = predict(classifier, type = 'response', newdata = grid_set)
y_grid = ifelse(prob_set > 0.5, 1, 0)
plot(set[, -3],
     main = 'Logistic Regression (Training set)',
     xlab = 'Age', ylab = 'Estimated Salary',
     xlim = range(X1), ylim = range(X2))
contour(X1, X2, matrix(as.numeric(y_grid), length(X1), length(X2)), add = TRUE)
points(grid_set, pch = '.', col = ifelse(y_grid == 1, 'springgreen3', 'tomato'))
points(set, pch = 21, bg = ifelse(set[, 3] == 1, 'green4', 'red3'))
```

Visualising the Test set results

```
library(ElemStatLearn)
set = test_set
X1 = seq(min(set[, 1]) - 1, max(set[, 1]) + 1, by = 0.01)
X2 = seq(min(set[, 2]) - 1, max(set[, 2]) + 1, by = 0.01)
grid_set = expand.grid(X1, X2)
colnames(grid_set) = c('Age', 'EstimatedSalary')
prob_set = predict(classifier, type = 'response', newdata = grid_set)
y_grid = ifelse(prob_set > 0.5, 1, 0)
plot(set[, -3],
     main = 'Logistic Regression (Test set)',
     xlab = 'Age', ylab = 'Estimated Salary',
     xlim = range(X1), ylim = range(X2))
contour(X1, X2, matrix(as.numeric(y_grid), length(X1), length(X2)), add = TRUE)
points(grid_set, pch = '.', col = ifelse(y_grid == 1, 'springgreen3', 'tomato'))
points(set, pch = 21, bg = ifelse(set[, 3] == 1, 'green4', 'red3'))
```


Logistic Regression (Training set)
Estimated Salary
Age
-3
-2
-1
0
1
2
3