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ASSIGNMENT 5

Question 12.23

PerformabinarylogisticregressionanalysisusingtheParentalHIVdatato model the probability of having been absent from school without a reason (variable HOOKEY). Find the variables that best predict whether an adolescent had been absent withouta reason or not. Assess goodness-of-fitfor the finalmodel(overallandinfluenceofpatterns).

The variables that best predict the results are:

AGE -age

HOWREL -religious or spiritual

BSI53 – others not giving proper credit for achievements

BSI37 – Feeling weak in parts of your body

BSI40 – Having urges to beat, injure or harm someone

BSI14 – Feeling lonely even when with people

BSI10 – Feeling that most people cannot be trusted

AGEMAR- age first had marijuana

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Call:
glm(formula = HOOKEY ~ AGE + HOWREL + BSI53 + BSI37 + BSI40 +
    BSI14 + BSI10 + AGEMAR, family = binomial(link = "logit"),
    data = clean_data)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-3.2457  -0.4446   0.0940   0.5377   2.8257

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -13.78637    2.28028  -6.046 1.49e-09 ***
AGE           0.85455    0.14515   5.887 3.92e-09 ***
HOWREL1      -2.39312    0.82704  -2.894 0.003809 **
HOWREL2      -0.44201    0.61610  -0.717 0.473106
HOWREL3       1.34804    0.77406   1.742 0.081594 .
BSI531       -0.59024    0.61786  -0.955 0.339425
BSI532       -0.19773    1.33149  -0.148 0.881949
BSI533       -2.19155    1.33096  -1.647 0.099640 .
BSI534       -9.24212    2.44098  -3.786 0.000153 ***
BSI371        1.61431    0.55604   2.903 0.003693 **
BSI372       -0.24851    0.96578  -0.257 0.796935
```

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BSI373        0.94570    1.04289   0.907 0.364509
BSI374        2.76632    1.35897   2.036 0.041790 *
BSI401        2.10338    0.65602   3.206 0.001345 **
BSI402        1.58631    1.27914   1.240 0.214924
BSI403        4.29877    1.62679   2.642 0.008230 **
BSI404        1.46638    1.79125   0.819 0.412995
BSI141        1.40181    0.56092   2.499 0.012450 *
BSI142        0.89101    1.16901   0.762 0.445947
BSI143       -1.75713    0.84543  -2.078 0.037674 *
BSI144        2.09455    1.11581   1.877 0.060495 .
BSI101        0.33334    0.48974   0.681 0.496091
BSI102       -0.04353    0.84142  -0.052 0.958738
BSI103        2.42578    0.82807   2.929 0.003396 **
BSI104        0.60849    1.00888   0.603 0.546420
AGEMAR        0.14861    0.03708   4.008 6.12e-05 ***
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Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 340.90  on 251  degrees of freedom
Residual deviance: 172.81  on 226  degrees of freedom
AIC: 224.81

Number of Fisher Scoring iterations: 6
```

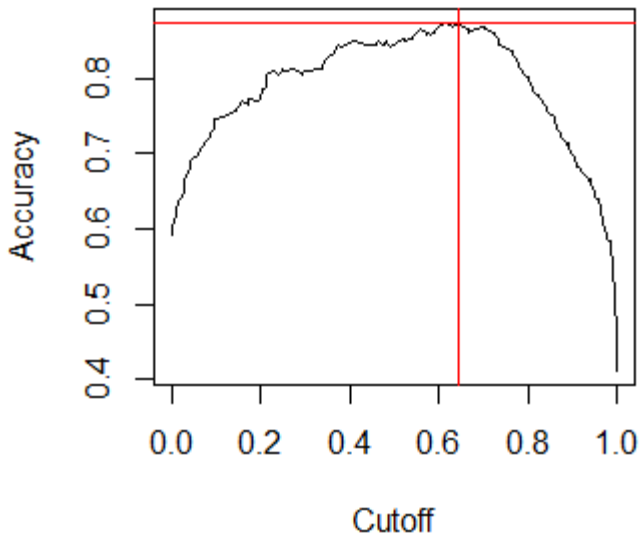
All the variables are significant with p values<0.05

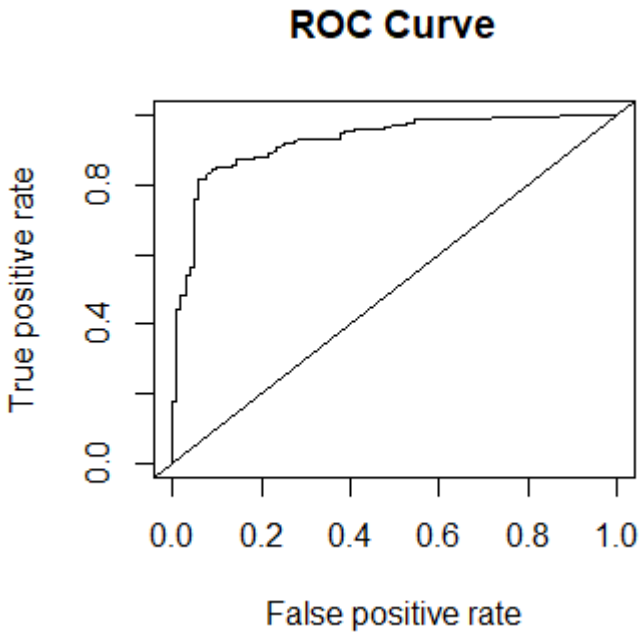
Pseudo R^2 value: 0.4931

If the value is close to 0, then the model has weak predictive power. In this case, the model has strong predictive power.

Question 12.24

For the model in 12.23 find an appropriate cutoff point to discriminate between adolescents who were absent without a reason and those who were not. Assess how well the model predicts the outcome using sensitivity, specificity, and the ROCcurve.


Accuracy
0.4
0.5
0.6
0.7
0.8
0.0
0.2
0.4
0.6
0.8
1.0
Cutoff


ROC Curve
True positive rate
0.0
0.4
0.8
0.0
0.2
0.4
0.6
0.8
1.0
False positive rate

Confusion Matrix

predicted_values	0	1
0	94	24
1	9	125

The appropriate cut off point is at 0.645

Sensitivity at this point: 0.9126

Specificity at this point: 0.8389

Area Under Curve(AUC): 0.9262