Logistic Regression

Null Model

```
## 
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
## 
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.8516  -0.8516  -0.8516   1.5429   1.5429
## 
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.8277     0.1104  -7.501 6.35e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## (Dispersion parameter for binomial family taken to be 1)
## 
##     Null deviance: 476.71  on 387  degrees of freedom
## Residual deviance: 476.71  on 387  degrees of freedom
## AIC: 478.71
## 
## Number of Fisher Scoring iterations: 4
```

Logistic Regression: Full MOdel

```
##
## Call:
## glm(formula = SR ~ ., family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.0978  -0.7304  -0.4457   0.8003   2.4340
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept) -0.2737537  1.9939656  -0.137  0.89080
## NASA        -0.0317551  0.0264820  -1.199  0.23048
## TA          -0.0371628  0.0234796  -1.583  0.11347
## EXT         -0.0204652  0.0644321  -0.318  0.75077
## AGR         -0.0128791  0.0840772  -0.153  0.87825
## CS          -0.0453574  0.0887800  -0.511  0.60942
## NT           0.0087381  0.0940021   0.093  0.92594
## OP          -0.0146727  0.0759346  -0.193  0.84678
## AV           0.0182773  0.0271975   0.672  0.50157
## EM           0.0361146  0.0354656   1.018  0.30854
## Task         0.0144386  0.0398281   0.363  0.71696
## H            0.6269569  0.2731670   2.295  0.02173 *
## RS2         -0.5242301  0.2722834  -1.925  0.05419 .
## WH2          0.2675878  0.5307765   0.504  0.61416
## TWR          0.0116897  0.0097311   1.201  0.22965
## BR2          0.2333856  0.2843063   0.821  0.41171
## NP2         -1.1744496  0.2981411  -3.939 8.17e-05 ***
## NP3         -2.2943067  0.4118944  -5.570 2.55e-08 ***
## FA2         -0.3527988  0.3604407  -0.979  0.32768
## FA3         -0.3364634  0.6319042  -0.532  0.59441
## FA4          1.2249130  0.5502750   2.226  0.02601 *
## FA5          0.1620410  0.8474011   0.191  0.84835
## FA6          1.4695264  0.5349611   2.747  0.00601 **
## AP           0.1928126  0.3673455   0.525  0.59967
## AR          -0.0156178  0.1088782  -0.143  0.88594
## DWH2        -0.5008306  0.4236579  -1.182  0.23714
## DWR         -0.0007634  0.0081080  -0.094  0.92498
## T2           0.3002640  0.2834042   1.059  0.28938
## DS2         -0.5143580  0.3188082  -1.613  0.10666
## Rank1       -0.8919587  0.4181800  -2.133  0.03293 *
## Rank2       -0.5434950  0.4303068  -1.263  0.20657
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 476.71  on 387  degrees of freedom
## Residual deviance: 374.43  on 357  degrees of freedom
## AIC: 436.43
##
## Number of Fisher Scoring iterations: 5
```

Backward Elimination Model selection

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##
## Final Model:
## SR ~ TA + H + RS + NP + FA + DWH + DS + Rank
##
##
##        Step Df    Deviance Resid. Df Resid. Dev      AIC
## 1                              357    374.4338 436.4338
## 2    - NT  1 0.008642896       358    374.4424 434.4424
## 3   - DWR  1 0.009010796       359    374.4514 432.4514
## 4    - AR  1 0.020890001       360    374.4723 430.4723
## 5   - AGR  1 0.029273735       361    374.5016 428.5016
## 6    - OP  1 0.043962961       362    374.5455 426.5455
## 7  - Task  1 0.112484468       363    374.6580 424.6580
## 8   - EXT  1 0.118807459       364    374.7768 422.7768
## 9    - CS  1 0.252505723       365    375.0293 421.0293
## 10   - AP  1 0.278798175       366    375.3081 419.3081
## 11   - AV  1 0.347085932       367    375.6552 417.6552
## 12   - WH  1 0.319425797       368    375.9747 415.9747
## 13   - BR  1 0.848538724       369    376.8232 414.8232
## 14 - NASA  1 0.912795344       370    377.7360 413.7360
## 15   - EM  1 1.062606654       371    378.7986 412.7986
## 16    - T  1 1.168525184       372    379.9671 411.9671
## 17  - TWR  1 1.594296908       373    381.5614 411.5614
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + RS + NP + FA + DWH + DS + Rank, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min      1Q   Median      3Q      Max
## -1.8947  -0.7657  -0.4582   0.8289   2.4485
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.589671   1.017784    0.579  0.56234
## TA          -0.026163   0.013880   -1.885  0.05943 .
## H            0.642660   0.256490    2.506  0.01222 *
## RS2         -0.477283   0.263120   -1.814  0.06969 .
## NP2         -1.124507   0.286496   -3.925 8.67e-05 ***
## NP3         -2.257325   0.387949   -5.819 5.93e-09 ***
## FA2         -0.272194   0.347202   -0.784  0.43306
## FA3         -0.239969   0.608670   -0.394  0.69340
## FA4          1.155480   0.518646    2.228  0.02589 *
## FA5          0.007584   0.813514    0.009  0.99256
## FA6          1.492588   0.507076    2.944  0.00325 **
## DWH2        -0.564588   0.393016   -1.437  0.15085
## DS2         -0.577279   0.298436   -1.934  0.05307 .
## Rank1       -0.835675   0.406776   -2.054  0.03994 *
## Rank2       -0.589136   0.419825   -1.403  0.16053
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 476.71  on 387  degrees of freedom
## Residual deviance: 381.56  on 373  degrees of freedom
## AIC: 411.56
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DWH + DS + Rank
## Model 3: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1       387     476.71
## 2       373     381.56 14   95.149 4.005e-14 ***
## 3       357     374.43 16    7.128    0.9707
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Forward Selection

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ 1
##
## Final Model:
## SR ~ NP + DS + H + FA + TA + RS + Rank + DWH
##
##
##      Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                            387    476.7107 478.7107
## 2    + NP  2 48.351556       385    428.3592 434.3592
## 3    + DS  1 11.164701       384    417.1945 425.1945
## 4     + H  1  7.574792       383    409.6197 419.6197
## 5    + FA  5 14.171981       378    395.4477 415.4477
## 6    + TA  1  3.856122       377    391.5916 413.5916
## 7    + RS  1  3.345548       376    388.2460 412.2460
## 8 + Rank  2  4.617853       374    383.6282 411.6282
## 9   + DWH  1  2.066745       373    381.5614 411.5614
```

Forward Selection model

```
## 
## Call:
## glm(formula = SR ~ NP + DS + H + RS + FA + TA + Rank, family = "binomial",
##     data = lm_DF)
## 
## Deviance Residuals:
##     Min      1Q   Median      3Q     Max
## -1.9754  -0.7706  -0.4601   0.8239   2.4697
## 
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.22760    0.97566   0.233  0.81555
## NP2         -1.14359    0.28579  -4.002 6.29e-05 ***
## NP3         -2.33276    0.38534  -6.054 1.41e-09 ***
## DS2         -0.74056    0.27447  -2.698  0.00697 **
## H            0.64919    0.25546   2.541  0.01105 *
## RS2         -0.48350    0.26198  -1.846  0.06495 .
## FA2         -0.25935    0.34406  -0.754  0.45099
## FA3         -0.21190    0.59720  -0.355  0.72272
## FA4          1.16395    0.51882   2.243  0.02487 *
## FA5         -0.02495    0.82436  -0.030  0.97585
## FA6          1.57002    0.50116   3.133  0.00173 **
## TA          -0.02632    0.01380  -1.907  0.05651 .
## Rank1       -0.86735    0.40577  -2.138  0.03255 *
## Rank2       -0.60944    0.41900  -1.455  0.14580
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## (Dispersion parameter for binomial family taken to be 1)
## 
##     Null deviance: 476.71  on 387  degrees of freedom
## Residual deviance: 383.63  on 374  degrees of freedom
## AIC: 411.63
## 
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DWH + DS + Rank
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##     H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##     T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1       387     476.71
## 2       373     381.56 14   95.149 4.005e-14 ***
## 3       374     383.63 -1   -2.067    0.1505
## 4       357     374.43 17    9.194    0.9340
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Step_wise method

```
## Stepwise Model Path
## Analysis of Deviance Table
##
## Initial Model:
## SR ~ 1
##
## Final Model:
## SR ~ NP + DS + H + FA + TA + RS + Rank + DWH
##
##
##      Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                            387    476.7107 478.7107
## 2    + NP  2 48.351556       385    428.3592 434.3592
## 3    + DS  1 11.164701       384    417.1945 425.1945
## 4     + H  1  7.574792       383    409.6197 419.6197
## 5    + FA  5 14.171981       378    395.4477 415.4477
## 6    + TA  1  3.856122       377    391.5916 413.5916
## 7    + RS  1  3.345548       376    388.2460 412.2460
## 8 + Rank  2  4.617853       374    383.6282 411.6282
## 9   + DWH  1  2.066745       373    381.5614 411.5614


##
## Call:
## glm(formula = SR ~ NP + DS + H + FA + TA + RS + Rank + DWH, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8947  -0.7657  -0.4582   0.8289   2.4485
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.589671   1.017784   0.579  0.56234
## NP2         -1.124507   0.286496  -3.925 8.67e-05 ***
## NP3         -2.257325   0.387949  -5.819 5.93e-09 ***
## DS2         -0.577279   0.298436  -1.934  0.05307 .
## H            0.642660   0.256490   2.506  0.01222 *
## FA2         -0.272194   0.347202  -0.784  0.43306
## FA3         -0.239969   0.608670  -0.394  0.69340
## FA4          1.155480   0.518646   2.228  0.02589 *
## FA5          0.007584   0.813514   0.009  0.99256
## FA6          1.492588   0.507076   2.944  0.00325 **
## TA          -0.026163   0.013880  -1.885  0.05943 .
## RS2         -0.477283   0.263120  -1.814  0.06969 .
## Rank1       -0.835675   0.406776  -2.054  0.03994 *
## Rank2       -0.589136   0.419825  -1.403  0.16053
## DWH2        -0.564588   0.393016  -1.437  0.15085
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
```

```
##     Null deviance: 476.71  on 387  degrees of freedom
## Residual deviance: 381.56  on 373  degrees of freedom
## AIC: 411.56
##
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DWH + DS + Rank
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + DS + H + FA + TA + RS + Rank + DWH
## Model 5: SR ~ NASA + TA + EXT + AGR + CS + NT + OP + AV + EM + Task +
##      H + RS + WH + TWR + BR + NP + FA + AP + AR + DWH + DWR +
##      T + DS + Rank
##   Resid. Df Resid. Dev Df Deviance  Pr(>Chi)
## 1       387     476.71
## 2       373     381.56 14   95.149 4.005e-14 ***
## 3       374     383.63 -1   -2.067    0.1505
## 4       373     381.56  1    2.067    0.1505
## 5       357     374.43 16    7.128    0.9707
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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