Logistic Regression

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.8518  -0.8518  -0.8518   1.5427   1.5427
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.8272     0.1118    -7.4 1.37e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 464.49  on 377  degrees of freedom
## Residual deviance: 464.49  on 377  degrees of freedom
## AIC: 466.49
##
## 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
## -2.0579  -0.7465  -0.4563   0.8183   2.5398
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.915687   1.888963   0.485  0.62785
## NASA        -0.028166   0.026621  -1.058  0.29004
## TA          -0.037413   0.023570  -1.587  0.11244
## EXT         -0.011232   0.065260  -0.172  0.86335
## AGR         -0.005669   0.085549  -0.066  0.94716
## CS          -0.040235   0.089838  -0.448  0.65425
## NT           0.018313   0.095243   0.192  0.84753
## OP          -0.004392   0.076973  -0.057  0.95449
## AV           0.016552   0.027533   0.601  0.54772
## EM           0.027491   0.035782   0.768  0.44231
## Task         0.014878   0.039636   0.375  0.70738
## H            0.013658   0.007933   1.722  0.08513 .
## RS2         -0.548558   0.278024  -1.973  0.04849 *
## WH2          0.409802   0.523078   0.783  0.43337
## TWR          0.009801   0.009953   0.985  0.32473
## BR2          0.157108   0.289165   0.543  0.58691
## NP2         -1.176780   0.299401  -3.930 8.48e-05 ***
## NP3         -2.336155   0.426673  -5.475 4.37e-08 ***
## FA2         -0.285092   0.364738  -0.782  0.43443
## FA3         -0.214260   0.645692  -0.332  0.74002
## FA4          1.140387   0.565787   2.016  0.04384 *
## FA5          0.174028   0.850925   0.205  0.83795
## FA6          1.423296   0.538496   2.643  0.00822 **
## AP           0.207961   0.373404   0.557  0.57757
## AR          -0.055991   0.110970  -0.505  0.61386
## DWH2        -0.514843   0.427643  -1.204  0.22862
## DWR          0.003102   0.008509   0.365  0.71539
## T2           0.300860   0.285838   1.053  0.29255
## DS2         -0.492676   0.322204  -1.529  0.12624
## Rank1       -0.806870   0.404097  -1.997  0.04586 *
## Rank2       -0.383368   0.398680  -0.962  0.33625
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 464.49  on 377  degrees of freedom
## Residual deviance: 366.69  on 347  degrees of freedom
## AIC: 428.69
##
## 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 + DS
##
##
##      Step Df    Deviance Resid. Df Resid. Dev      AIC
## 1                              347   366.6903 428.6903
## 2    - OP  1 0.003255733       348   366.6936 426.6936
## 3   - AGR  1 0.004851067       349   366.6984 424.6984
## 4   - EXT  1 0.033662441       350   366.7321 422.7321
## 5    - NT  1 0.037003290       351   366.7691 420.7691
## 6   - DWR  1 0.129576688       352   366.8986 418.8986
## 7  - Task  1 0.168215987       353   367.0669 417.0669
## 8    - CS  1 0.153629538       354   367.2205 415.2205
## 9    - BR  1 0.248632797       355   367.4691 413.4691
## 10   - AR  1 0.257157602       356   367.7263 411.7263
## 11   - AP  1 0.243690291       357   367.9700 409.9700
## 12   - AV  1 0.306422233       358   368.2764 408.2764
## 13   - EM  1 0.932764208       359   369.2092 407.2092
## 14 - NASA  1 0.830530919       360   370.0397 406.0397
## 15   - WH  1 0.780168396       361   370.8199 404.8199
## 16    - T  1 1.222879314       362   372.0427 404.0427
## 17  - DWH  1 1.411439793       363   373.4542 403.4542
## 18 - Rank  2 3.999381664       365   377.4536 403.4536
## 19  - TWR  1 1.963728523       366   379.4173 403.4173
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + RS + NP + FA + DS, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8526  -0.7802  -0.4898   0.8338   2.6053
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.402070   0.659340   2.126 0.033464 *
## TA          -0.027475   0.013406  -2.049 0.040419 *
## H            0.012178   0.006399   1.903 0.057018 .
## RS2         -0.514356   0.260380  -1.975 0.048222 *
## NP2         -1.069405   0.279963  -3.820 0.000134 ***
## NP3         -2.252004   0.386247  -5.830 5.53e-09 ***
## FA2         -0.207575   0.342654  -0.606 0.544657
## FA3          0.031708   0.604876   0.052 0.958194
## FA4          1.101938   0.535941   2.056 0.039775 *
## FA5          0.094913   0.810976   0.117 0.906832
## FA6          1.403102   0.502658   2.791 0.005249 **
## DS2         -0.703372   0.273706  -2.570 0.010176 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 464.49  on 377  degrees of freedom
## Residual deviance: 379.42  on 366  degrees of freedom
## AIC: 403.42
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DS
## 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       377     464.49
## 2       366     379.42 11   85.075 1.528e-13 ***
## 3       347     366.69 19   12.727    0.8522
## ---
## 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 + TA + RS + FA + H
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         377   464.4926 466.4926
## 2 + NP  2 47.588825       375   416.9038 422.9038
## 3 + DS  1 11.803077       374   405.1007 413.1007
## 4 + TA  1  5.831603       373   399.2691 409.2691
## 5 + RS  1  4.209351       372   395.0597 407.0597
## 6 + FA  5 11.779725       367   383.2800 405.2800
## 7  + H  1  3.862735       366   379.4173 403.4173
```

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
## -1.8709  -0.7729  -0.4770   0.8202   2.5331
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.860725   0.760771   2.446   0.0145 *
## NP2         -1.135745   0.286182  -3.969 7.23e-05 ***
## NP3         -2.348685   0.395978  -5.931 3.00e-09 ***
## DS2         -0.707599   0.275652  -2.567   0.0103 *
## H            0.013704   0.007293   1.879   0.0602 .
## RS2         -0.516470   0.265741  -1.944   0.0520 .
## FA2         -0.215637   0.347401  -0.621   0.5348
## FA3         -0.105734   0.613277  -0.172   0.8631
## FA4          1.061733   0.537378   1.976   0.0482 *
## FA5          0.063448   0.824705   0.077   0.9387
## FA6          1.486279   0.505826   2.938   0.0033 **
## TA          -0.028622   0.014010  -2.043   0.0411 *
## Rank1       -0.766100   0.392181  -1.953   0.0508 .
## Rank2       -0.403071   0.384858  -1.047   0.2950
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 464.49  on 377  degrees of freedom
## Residual deviance: 375.50  on 364  degrees of freedom
## AIC: 403.5
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DS
## 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       377     464.49
## 2       366     379.42 11   85.075 1.528e-13 ***
## 3       364     375.50  2    3.916    0.1412
## 4       347     366.69 17    8.811    0.9460
## ---
## 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 + TA + RS + FA + H
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         377   464.4926 466.4926
## 2 + NP  2 47.588825       375   416.9038 422.9038
## 3 + DS  1 11.803077       374   405.1007 413.1007
## 4 + TA  1  5.831603       373   399.2691 409.2691
## 5 + RS  1  4.209351       372   395.0597 407.0597
## 6 + FA  5 11.779725       367   383.2800 405.2800
## 7  + H  1  3.862735       366   379.4173 403.4173

##
## Call:
## glm(formula = SR ~ NP + DS + TA + RS + FA + H, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8526  -0.7802  -0.4898   0.8338   2.6053
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.402070   0.659340   2.126 0.033464 *
## NP2         -1.069405   0.279963  -3.820 0.000134 ***
## NP3         -2.252004   0.386247  -5.830 5.53e-09 ***
## DS2         -0.703372   0.273706  -2.570 0.010176 *
## TA          -0.027475   0.013406  -2.049 0.040419 *
## RS2         -0.514356   0.260380  -1.975 0.048222 *
## FA2         -0.207575   0.342654  -0.606 0.544657
## FA3          0.031708   0.604876   0.052 0.958194
## FA4          1.101938   0.535941   2.056 0.039775 *
## FA5          0.094913   0.810976   0.117 0.906832
## FA6          1.403102   0.502658   2.791 0.005249 **
## H            0.012178   0.006399   1.903 0.057018 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 464.49  on 377  degrees of freedom
## Residual deviance: 379.42  on 366  degrees of freedom
## AIC: 403.42
##
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + DS
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + DS + TA + RS + FA + H
## 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       377     464.49
## 2       366     379.42 11   85.075 1.528e-13 ***
## 3       364     375.50  2    3.916    0.1412
## 4       366     379.42 -2   -3.916    0.1412
## 5       347     366.69 19   12.727    0.8522
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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