Logistic Regression

```
##   x freq
## 1 0  181
## 2 1  188
```

Null Model

```
## 
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
## 
## Deviance Residuals:
##     Min      1Q  Median      3Q     Max
## -1.194  -1.194   1.161   1.161   1.161
## 
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.03794    0.10413   0.364    0.716
## 
## (Dispersion parameter for binomial family taken to be 1)
## 
##     Null deviance: 511.41  on 368  degrees of freedom
## Residual deviance: 511.41  on 368  degrees of freedom
## AIC: 513.41
## 
## Number of Fisher Scoring iterations: 3
```

Logistic Regression: Full MOdel

```
##
## Call:
## glm(formula = SR ~ ., family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.2428  -0.8742   0.1810   0.9215   2.0029
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)   2.107186   1.827649   1.153  0.24893
## NASA          0.018207   0.024655   0.738  0.46022
## TA           -0.030034   0.021970  -1.367  0.17162
## EXT          -0.035337   0.059767  -0.591  0.55436
## AGR           0.064108   0.080838   0.793  0.42775
## CS           -0.117282   0.085836  -1.366  0.17183
## NT            0.002587   0.087026   0.030  0.97629
## OP            0.001117   0.072299   0.015  0.98767
## AV            0.012042   0.025887   0.465  0.64181
## EM            0.018859   0.032910   0.573  0.56662
## Task         -0.005050   0.036338  -0.139  0.88946
## H             0.012077   0.008057   1.499  0.13387
## RS2          -0.384743   0.262168  -1.468  0.14223
## WH2          -0.093397   0.509791  -0.183  0.85464
## TWR          -0.007500   0.009498  -0.790  0.42971
## BR2           0.137099   0.264490   0.518  0.60421
## NP2          -1.279100   0.294144  -4.349 1.37e-05 ***
## NP3          -1.907490   0.355561  -5.365 8.11e-08 ***
## FA2          -0.014686   0.336587  -0.044  0.96520
## FA3           0.303400   0.578725   0.524  0.60010
## FA4           3.360159   1.079240   3.113  0.00185 **
## FA5           0.664988   0.726800   0.915  0.36022
## FA6           1.662861   0.564122   2.948  0.00320 **
## AP            0.164443   0.339404   0.485  0.62803
## AR           -0.112773   0.106149  -1.062  0.28805
## DWH2         -0.249386   0.442325  -0.564  0.57289
## DWR           0.002545   0.007791   0.327  0.74396
## T2            0.446078   0.265912   1.678  0.09344 .
## DS2          -0.264991   0.307415  -0.862  0.38869
## Rank1        -0.232572   0.353064  -0.659  0.51007
## Rank2         0.328647   0.363912   0.903  0.36648
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 511.41  on 368  degrees of freedom
## Residual deviance: 401.45  on 338  degrees of freedom
## AIC: 463.45
##
## 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 + T
##
##
##        Step Df     Deviance Resid. Df Resid. Dev      AIC
## 1                                338    401.4491 463.4491
## 2     - OP  1 0.0002386772       339    401.4493 461.4493
## 3     - NT  1 0.0009430974       340    401.4502 459.4502
## 4   - Task  1 0.0201953758       341    401.4704 457.4704
## 5     - WH  1 0.0429247754       342    401.5134 455.5134
## 6    - DWR  1 0.1025733901       343    401.6159 453.6159
## 7     - AP  1 0.1966339913       344    401.8126 451.8126
## 8     - AV  1 0.2458426825       345    402.0584 450.0584
## 9     - BR  1 0.1977599683       346    402.2562 448.2562
## 10   - DWH  1 0.2473778468       347    402.5036 446.5036
## 11   - EXT  1 0.2942035418       348    402.7978 444.7978
## 12    - EM  1 0.4636104192       349    403.2614 443.2614
## 13   - TWR  1 0.4702474266       350    403.7316 441.7316
## 14  - NASA  1 0.6864359494       351    404.4181 440.4181
## 15    - DS  1 0.8260745969       352    405.2441 439.2441
## 16   - AGR  1 0.8568582404       353    406.1010 438.1010
## 17    - AR  1 0.8577579365       354    406.9587 436.9587
## 18  - Rank  2 2.9887228754       356    409.9475 435.9475
## 19    - CS  1 1.5962971346       357    411.5438 435.5438
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + RS + NP + FA + T, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.5232  -0.8785   0.1668   0.9111   1.9587
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.391136   0.676468   2.056  0.03974 *
## TA          -0.024124   0.012415  -1.943  0.05200 .
## H            0.014597   0.006723   2.171  0.02992 *
## RS2         -0.429243   0.251857  -1.704  0.08832 .
## NP2         -1.304220   0.280909  -4.643 3.44e-06 ***
## NP3         -1.979749   0.324476  -6.101 1.05e-09 ***
## FA2         -0.056198   0.320304  -0.175  0.86072
## FA3          0.227374   0.554508   0.410  0.68177
## FA4          3.482917   1.066966   3.264  0.00110 **
## FA5          0.684706   0.686253   0.998  0.31840
## FA6          1.721708   0.550780   3.126  0.00177 **
## T2           0.501253   0.244991   2.046  0.04076 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 511.41  on 368  degrees of freedom
## Residual deviance: 411.54  on 357  degrees of freedom
## AIC: 435.54
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + T
## 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       368     511.41
## 2       357     411.54 11   99.866   <2e-16 ***
## 3       338     401.45 19   10.095   0.9506
## ---
## 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 + FA + Rank + T + TA + RS + H
##
##
##      Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                            368    511.4098 513.4098
## 2    + NP  2 47.957313       366    463.4525 469.4525
## 3    + FA  5 31.003225       361    432.4493 448.4493
## 4 + Rank  2 11.453157       359    420.9961 440.9961
## 5     + T  1  4.851889       358    416.1442 438.1442
## 6    + TA  1  3.007861       357    413.1364 437.1364
## 7    + RS  1  2.130159       356    411.0062 437.0062
## 8     + H  1  2.071311       355    408.9349 436.9349
```

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
## -2.5634  -0.8574   0.1744   0.9668   2.0331
## 
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.730386   0.714232   2.423  0.01540 *
## NP2         -1.299821   0.282712  -4.598 4.27e-06 ***
## NP3         -2.015880   0.328551  -6.136 8.48e-10 ***
## DS2         -0.351316   0.267876  -1.311  0.18969
## H            0.009854   0.007527   1.309  0.19052
## RS2         -0.386409   0.253499  -1.524  0.12743
## FA2          0.023042   0.319580   0.072  0.94252
## FA3          0.233778   0.565460   0.413  0.67929
## FA4          3.328724   1.069585   3.112  0.00186 **
## FA5          0.762430   0.709486   1.075  0.28254
## FA6          1.729688   0.544067   3.179  0.00148 **
## TA          -0.019735   0.012937  -1.525  0.12714
## Rank1       -0.198263   0.340007  -0.583  0.55982
## Rank2        0.315105   0.352130   0.895  0.37087
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## (Dispersion parameter for binomial family taken to be 1)
## 
##     Null deviance: 511.41  on 368  degrees of freedom
## Residual deviance: 411.18  on 355  degrees of freedom
## AIC: 439.18
## 
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + T
## 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       368     511.41
## 2       357     411.54 11   99.866   <2e-16 ***
## 3       355     411.18  2    0.360   0.8351
## 4       338     401.45 17    9.734   0.9144
## ---
## 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 + FA + T + TA + RS + H
##
##
##       Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                            368    511.4098 513.4098
## 2    + NP  2 47.957313       366    463.4525 469.4525
## 3    + FA  5 31.003225       361    432.4493 448.4493
## 4 + Rank  2 11.453157        359    420.9961 440.9961
## 5     + T  1  4.851889       358    416.1442 438.1442
## 6    + TA  1  3.007861       357    413.1364 437.1364
## 7    + RS  1  2.130159       356    411.0062 437.0062
## 8     + H  1  2.071311       355    408.9349 436.9349
## 9 - Rank  2  2.608859        357    411.5438 435.5438


##
## Call:
## glm(formula = SR ~ NP + FA + T + TA + RS + H, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.5232  -0.8785   0.1668   0.9111   1.9587
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.391136   0.676468   2.056  0.03974 *
## NP2         -1.304220   0.280909  -4.643 3.44e-06 ***
## NP3         -1.979749   0.324476  -6.101 1.05e-09 ***
## FA2         -0.056198   0.320304  -0.175  0.86072
## FA3          0.227374   0.554508   0.410  0.68177
## FA4          3.482917   1.066966   3.264  0.00110 **
## FA5          0.684706   0.686253   0.998  0.31840
## FA6          1.721708   0.550780   3.126  0.00177 **
## T2           0.501253   0.244991   2.046  0.04076 *
## TA          -0.024124   0.012415  -1.943  0.05200 .
## RS2         -0.429243   0.251857  -1.704  0.08832 .
## H            0.014597   0.006723   2.171  0.02992 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 511.41  on 368  degrees of freedom
## Residual deviance: 411.54  on 357  degrees of freedom
## AIC: 435.54
```

```
## 
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + NP + FA + T
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + FA + T + TA + RS + 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       368     511.41
## 2       357     411.54 11   99.866   <2e-16 ***
## 3       355     411.18  2    0.360   0.8351
## 4       357     411.54 -2   -0.360   0.8351
## 5       338     401.45 19   10.095   0.9506
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

-> -> -> ->

-> -> -> -> ->

-> -> -> -> -> -> -> ->

-> -> -> -> ->