Logistic Regression

```
##   x freq
## 1 0  199
## 2 1  200
```

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.180  -1.180   1.175   1.175   1.175
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.005013   0.100126    0.05     0.96
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 553.13  on 398  degrees of freedom
## Residual deviance: 553.13  on 398  degrees of freedom
## AIC: 555.13
##
## 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
## -2.3986  -0.8797   0.1285   0.9339   2.0423
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.349894   1.706667   1.377 0.168546
## NASA         0.014477   0.023516   0.616 0.538135
## TA          -0.021154   0.020836  -1.015 0.309971
## EXT         -0.048838   0.057059  -0.856 0.392040
## AGR          0.029654   0.076353   0.388 0.697735
## CS          -0.076570   0.081366  -0.941 0.346678
## NT          -0.043839   0.081005  -0.541 0.588382
## OP          -0.025136   0.069051  -0.364 0.715843
## AV           0.021286   0.024587   0.866 0.386643
## EM           0.016363   0.031432   0.521 0.602650
## Task        -0.017182   0.034802  -0.494 0.621510
## H            0.014615   0.007950   1.838 0.066010 .
## RS2         -0.297712   0.248436  -1.198 0.230783
## WH2          0.086835   0.475858   0.182 0.855205
## TWR         -0.004844   0.008995  -0.539 0.590222
## BR2          0.013564   0.252564   0.054 0.957170
## NP2         -1.234498   0.280807  -4.396 1.10e-05 ***
## NP3         -1.836746   0.339224  -5.415 6.14e-08 ***
## FA2         -0.072730   0.320576  -0.227 0.820523
## FA3          0.421857   0.562229   0.750 0.453057
## FA4          2.950070   0.795530   3.708 0.000209 ***
## FA5          0.720676   0.716958   1.005 0.314808
## FA6          1.392862   0.529168   2.632 0.008484 **
## AP           0.168345   0.328588   0.512 0.608421
## AR          -0.110109   0.100983  -1.090 0.275546
## DWH2        -0.286373   0.428426  -0.668 0.503858
## DWR         -0.001248   0.007427  -0.168 0.866549
## T2           0.444975   0.253266   1.757 0.078926 .
## DS2         -0.360455   0.294650  -1.223 0.221205
## Rank1       -0.040800   0.339646  -0.120 0.904384
## Rank2        0.331352   0.355659   0.932 0.351515
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 553.13  on 398  degrees of freedom
## Residual deviance: 439.43  on 368  degrees of freedom
## AIC: 501.43
##
## 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 + NP + FA + T
##
##
##      Step Df   Deviance Resid. Df Resid. Dev      AIC
## 1                           368   439.4279 501.4279
## 2  - Rank  2 1.59636367       370   441.0243 499.0243
## 3    - BR  1 0.00123080       371   441.0255 497.0255
## 4   - DWR  1 0.01305328       372   441.0386 495.0386
## 5    - WH  1 0.04762197       373   441.0862 493.0862
## 6    - OP  1 0.14512465       374   441.2313 491.2313
## 7   - AGR  1 0.16288932       375   441.3942 489.3942
## 8    - EM  1 0.26214326       376   441.6563 487.6563
## 9  - Task  1 0.25111289       377   441.9074 485.9074
## 10   - NT  1 0.33296124       378   442.2404 484.2404
## 11 - NASA  1 0.36031270       379   442.6007 482.6007
## 12  - DWH  1 0.46404338       380   443.0648 481.0648
## 13   - AP  1 0.49877627       381   443.5635 479.5635
## 14  - TWR  1 0.56712269       382   444.1307 478.1307
## 15  - EXT  1 0.67080366       383   444.8015 476.8015
## 16   - AV  1 0.40877353       384   445.2102 475.2102
## 17   - CS  1 0.79872965       385   446.0090 474.0090
## 18   - AR  1 1.21480101       386   447.2238 473.2238
## 19   - RS  1 1.89781257       387   449.1216 473.1216
## 20   - DS  1 1.92261918       388   451.0442 473.0442
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + NP + FA + T, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4171  -0.9014   0.1545   0.8918   2.0620
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.862680   0.616207   1.400  0.16152
## TA          -0.022158   0.011681  -1.897  0.05783 .
## H            0.017469   0.006596   2.648  0.00809 **
## NP2         -1.237823   0.267862  -4.621 3.82e-06 ***
## NP3         -1.842975   0.303778  -6.067 1.30e-09 ***
## FA2         -0.084823   0.305690  -0.277  0.78141
## FA3          0.427184   0.536153   0.797  0.42559
## FA4          3.065929   0.781367   3.924 8.72e-05 ***
## FA5          0.609859   0.672827   0.906  0.36472
## FA6          1.492718   0.515039   2.898  0.00375 **
## T2           0.513964   0.234287   2.194  0.02825 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 553.13  on 398  degrees of freedom
## Residual deviance: 451.04  on 388  degrees of freedom
## AIC: 473.04
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + 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       398     553.13
## 2       388     451.04 10  102.085   <2e-16 ***
## 3       368     439.43 20   11.616   0.9287
## ---
## 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 + H + T + TA
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         398   553.1289 555.1289
## 2 + NP  2 49.243765       396   503.8852 509.8852
## 3 + FA  5 32.225520       391   471.6597 487.6597
## 4  + H  1 10.811038       390   460.8486 478.8486
## 5  + T  1  6.158559       389   454.6901 474.6901
## 6 + TA  1  3.645861       388   451.0442 473.0442
```

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
## -2.3672  -0.8635   0.1636   0.9446   2.0681
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.390170   0.671669   2.070  0.03848 *
## NP2         -1.234340   0.269956  -4.572 4.82e-06 ***
## NP3         -1.907467   0.310970  -6.134 8.57e-10 ***
## DS2         -0.476301   0.257142  -1.852  0.06398 .
## H            0.012656   0.007501   1.687  0.09155 .
## RS2         -0.295157   0.241456  -1.222  0.22156
## FA2         -0.038754   0.305321  -0.127  0.89900
## FA3          0.395281   0.546859   0.723  0.46979
## FA4          2.892137   0.780206   3.707  0.00021 ***
## FA5          0.713618   0.705677   1.011  0.31189
## FA6          1.510841   0.514614   2.936  0.00333 **
## TA          -0.016118   0.012269  -1.314  0.18897
## Rank1       -0.014020   0.327688  -0.043  0.96587
## Rank2        0.337660   0.343963   0.982  0.32626
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 553.13  on 398  degrees of freedom
## Residual deviance: 448.90  on 385  degrees of freedom
## AIC: 476.9
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + 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       398     553.13
## 2       388     451.04 10  102.085   <2e-16 ***
## 3       385     448.90  3    2.148   0.5423
## 4       368     439.43 17    9.468   0.9244
## ---
## 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 + H + T + TA
##
##
##   Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                         398   553.1289 555.1289
## 2 + NP  2 49.243765       396   503.8852 509.8852
## 3 + FA  5 32.225520       391   471.6597 487.6597
## 4  + H  1 10.811038       390   460.8486 478.8486
## 5  + T  1  6.158559       389   454.6901 474.6901
## 6 + TA  1  3.645861       388   451.0442 473.0442


##
## Call:
## glm(formula = SR ~ NP + FA + H + T + TA, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4171  -0.9014   0.1545   0.8918   2.0620
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.862680   0.616207   1.400  0.16152
## NP2         -1.237823   0.267862  -4.621 3.82e-06 ***
## NP3         -1.842975   0.303778  -6.067 1.30e-09 ***
## FA2         -0.084823   0.305690  -0.277  0.78141
## FA3          0.427184   0.536153   0.797  0.42559
## FA4          3.065929   0.781367   3.924 8.72e-05 ***
## FA5          0.609859   0.672827   0.906  0.36472
## FA6          1.492718   0.515039   2.898  0.00375 **
## H            0.017469   0.006596   2.648  0.00809 **
## T2           0.513964   0.234287   2.194  0.02825 *
## TA          -0.022158   0.011681  -1.897  0.05783 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 553.13  on 398  degrees of freedom
## Residual deviance: 451.04  on 388  degrees of freedom
## AIC: 473.04
##
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + NP + FA + T
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + FA + H + T + TA
## 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       398     553.13
## 2       388     451.04 10  102.085   <2e-16 ***
## 3       385     448.90  3    2.148   0.5423
## 4       388     451.04 -3   -2.148   0.5423
## 5       368     439.43 20   11.616   0.9287
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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