Logistic Regression

```
##   x freq
## 1 0  198
## 2 1  200
```

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.182  -1.182   1.173   1.173   1.173
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.01005    0.10025     0.1     0.92
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 551.74  on 397  degrees of freedom
## Residual deviance: 551.74  on 397  degrees of freedom
## AIC: 553.74
##
## 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
## -2.3961  -0.8798   0.1402   0.9358   2.0371
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  2.366867   1.706265   1.387  0.16539
## NASA         0.014522   0.023499   0.618  0.53658
## TA          -0.021379   0.020821  -1.027  0.30453
## EXT         -0.048910   0.057015  -0.858  0.39098
## AGR          0.030349   0.076305   0.398  0.69082
## CS          -0.074833   0.081404  -0.919  0.35795
## NT          -0.043157   0.080961  -0.533  0.59399
## OP          -0.026981   0.069150  -0.390  0.69640
## AV           0.021409   0.024575   0.871  0.38365
## EM           0.016871   0.031432   0.537  0.59144
## Task        -0.016805   0.034788  -0.483  0.62905
## H            0.014589   0.007944   1.837  0.06628 .
## RS2         -0.302606   0.248525  -1.218  0.22337
## WH2          0.088180   0.475293   0.186  0.85282
## TWR         -0.004884   0.008989  -0.543  0.58689
## BR2          0.017662   0.252568   0.070  0.94425
## NP2         -1.236414   0.280784  -4.403 1.07e-05 ***
## NP3         -1.832060   0.339111  -5.403 6.57e-08 ***
## FA2         -0.073509   0.320385  -0.229  0.81853
## FA3          0.415402   0.561867   0.739  0.45971
## FA4          2.938786   0.795456   3.694  0.00022 ***
## FA5          0.712069   0.716613   0.994  0.32039
## FA6          1.385634   0.529059   2.619  0.00882 **
## AP           0.157058   0.329222   0.477  0.63332
## AR          -0.111605   0.100983  -1.105  0.26908
## DWH2        -0.287237   0.428138  -0.671  0.50229
## DWR         -0.001253   0.007424  -0.169  0.86596
## T2           0.441328   0.253211   1.743  0.08135 .
## DS2         -0.360056   0.294380  -1.223  0.22129
## Rank1       -0.049535   0.339990  -0.146  0.88416
## Rank2        0.322880   0.355856   0.907  0.36423
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 551.74  on 397  degrees of freedom
## Residual deviance: 439.09  on 367  degrees of freedom
## AIC: 501.09
##
## 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                             367   439.0949 501.0949
## 2  - Rank  2 1.579507502       369   440.6744 498.6744
## 3    - BR  1 0.002648221       370   440.6771 496.6771
## 4   - DWR  1 0.013046553       371   440.6901 494.6901
## 5    - WH  1 0.050277091       372   440.7404 492.7404
## 6    - OP  1 0.166975716       373   440.9074 490.9074
## 7   - AGR  1 0.171537140       374   441.0789 489.0789
## 8    - EM  1 0.275108544       375   441.3540 487.3540
## 9  - Task  1 0.243225197       376   441.5973 485.5973
## 10   - NT  1 0.323290190       377   441.9205 483.9205
## 11 - NASA  1 0.369787703       378   442.2903 482.2903
## 12  - DWH  1 0.464769884       379   442.7551 480.7551
## 13   - AP  1 0.450354987       380   443.2055 479.2055
## 14  - TWR  1 0.573531216       381   443.7790 477.7790
## 15   - CS  1 0.671933921       382   444.4509 476.4509
## 16   - AV  1 0.693609143       383   445.1445 475.1445
## 17  - EXT  1 0.472857776       384   445.6174 473.6174
## 18   - AR  1 1.252470700       385   446.8699 472.8699
## 19   - DS  1 1.902255040       386   448.7721 472.7721
## 20   - RS  1 1.957813992       387   450.7299 472.7299
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + NP + FA + T, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4150  -0.9035   0.1565   0.8929   2.0564
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.865045   0.615759   1.405  0.16007
## TA          -0.022093   0.011672  -1.893  0.05838 .
## H            0.017392   0.006591   2.639  0.00832 **
## NP2         -1.237801   0.267768  -4.623 3.79e-06 ***
## NP3         -1.835045   0.303995  -6.036 1.58e-09 ***
## FA2         -0.085921   0.305520  -0.281  0.77854
## FA3          0.423543   0.535889   0.790  0.42932
## FA4          3.059662   0.781205   3.917 8.98e-05 ***
## FA5          0.606805   0.672389   0.902  0.36681
## FA6          1.487881   0.514751   2.890  0.00385 **
## T2           0.510101   0.234296   2.177  0.02947 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 551.74  on 397  degrees of freedom
## Residual deviance: 450.73  on 387  degrees of freedom
## AIC: 472.73
##
## 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       397     551.74
## 2       387     450.73 10  101.005   <2e-16 ***
## 3       367     439.09 20   11.635   0.9281
## ---
## 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                         397   551.7351 553.7351
## 2 + NP  2 48.583318       395   503.1518 509.1518
## 3 + FA  5 32.024276       390   471.1275 487.1275
## 4  + H  1 10.702331       389   460.4252 478.4252
## 5  + T  1  6.065482       388   454.3597 474.3597
## 6 + TA  1  3.629768       387   450.7299 472.7299
```

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
## -2.3637  -0.8637   0.1777   0.9475   2.0651
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.399782   0.671487   2.085 0.037106 *
## NP2         -1.235357   0.269914  -4.577 4.72e-06 ***
## NP3         -1.899929   0.311015  -6.109 1.00e-09 ***
## DS2         -0.473045   0.257033  -1.840 0.065709 .
## H            0.012647   0.007494   1.688 0.091486 .
## RS2         -0.301065   0.241627  -1.246 0.212767
## FA2         -0.041479   0.305213  -0.136 0.891898
## FA3          0.388561   0.546677   0.711 0.477227
## FA4          2.886269   0.780080   3.700 0.000216 ***
## FA5          0.709978   0.705005   1.007 0.313909
## FA6          1.505547   0.514333   2.927 0.003421 **
## TA          -0.016086   0.012260  -1.312 0.189499
## Rank1       -0.023110   0.327943  -0.070 0.943820
## Rank2        0.328143   0.344212   0.953 0.340431
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 551.74  on 397  degrees of freedom
## Residual deviance: 448.52  on 384  degrees of freedom
## AIC: 476.52
##
## 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       397     551.74
## 2       387     450.73 10  101.005   <2e-16 ***
## 3       384     448.52  3    2.214   0.5292
## 4       367     439.09 17    9.421   0.9261
## ---
## 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                         397   551.7351 553.7351
## 2 + NP  2 48.583318       395   503.1518 509.1518
## 3 + FA  5 32.024276       390   471.1275 487.1275
## 4  + H  1 10.702331       389   460.4252 478.4252
## 5  + T  1  6.065482       388   454.3597 474.3597
## 6 + TA  1  3.629768       387   450.7299 472.7299


##
## Call:
## glm(formula = SR ~ NP + FA + H + T + TA, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.4150  -0.9035   0.1565   0.8929   2.0564
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.865045   0.615759   1.405  0.16007
## NP2         -1.237801   0.267768  -4.623 3.79e-06 ***
## NP3         -1.835045   0.303995  -6.036 1.58e-09 ***
## FA2         -0.085921   0.305520  -0.281  0.77854
## FA3          0.423543   0.535889   0.790  0.42932
## FA4          3.059662   0.781205   3.917 8.98e-05 ***
## FA5          0.606805   0.672389   0.902  0.36681
## FA6          1.487881   0.514751   2.890  0.00385 **
## H            0.017392   0.006591   2.639  0.00832 **
## T2           0.510101   0.234296   2.177  0.02947 *
## TA          -0.022093   0.011672  -1.893  0.05838 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 551.74  on 397  degrees of freedom
## Residual deviance: 450.73  on 387  degrees of freedom
## AIC: 472.73
##
## 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       397     551.74
## 2       387     450.73 10  101.005   <2e-16 ***
## 3       384     448.52  3    2.214   0.5292
## 4       387     450.73 -3   -2.214   0.5292
## 5       367     439.09 20   11.635   0.9281
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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