

Logistic Regression

```
##    x freq
## 1 0  277
## 2 1  122
```

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -0.8543  -0.8543  -0.8543   1.5394   1.5394
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.8200      0.1087  -7.546 4.47e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 491.3  on 398  degrees of freedom
## Residual deviance: 491.3  on 398  degrees of freedom
## AIC: 493.3
##
## 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
## -2.0793  -0.7297  -0.4517   0.7737   2.5316
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.1652075  1.8529899   0.629  0.52946
## NASA        -0.0309298  0.0258528  -1.196  0.23155
## TA          -0.0387311  0.0230915  -1.677  0.09349 .
## EXT         -0.0337913  0.0639312  -0.529  0.59711
## AGR         -0.0294630  0.0825261  -0.357  0.72108
## CS          -0.0232577  0.0873060  -0.266  0.78994
## NT          -0.0144675  0.0914776  -0.158  0.87434
## OP          -0.0304939  0.0751653  -0.406  0.68497
## AV           0.0270208  0.0267343   1.011  0.31215
## EM           0.0365547  0.0349825   1.045  0.29605
## Task         0.0063714  0.0385785   0.165  0.86882
## H            0.0142858  0.0077960   1.832  0.06688 .
## RS2         -0.4465736  0.2700274  -1.654  0.09817 .
## WH2          0.4084523  0.5084471   0.803  0.42178
## TWR          0.0114935  0.0096424   1.192  0.23327
## BR2          0.1933257  0.2812895   0.687  0.49190
## NP2         -1.1703711  0.2934793  -3.988 6.67e-05 ***
## NP3         -2.2774921  0.4095374  -5.561 2.68e-08 ***
## FA2         -0.3303314  0.3549904  -0.931  0.35209
## FA3         -0.2913836  0.6382580  -0.457  0.64801
## FA4          1.2798159  0.5377410   2.380  0.01731 *
## FA5          0.2720260  0.8361225   0.325  0.74492
## FA6          1.4076964  0.5314824   2.649  0.00808 **
## AP           0.2159622  0.3695655   0.584  0.55897
## AR          -0.0149990  0.1084380  -0.138  0.88999
## DWH2        -0.5582349  0.4177435  -1.336  0.18145
## DWR          0.0007356  0.0081010   0.091  0.92765
## T2           0.3812160  0.2793795   1.365  0.17241
## DS2         -0.4763713  0.3126907  -1.523  0.12764
## Rank1       -0.6883500  0.3975073  -1.732  0.08333 .
## Rank2       -0.2752568  0.3934465  -0.700  0.48417
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 491.30  on 398  degrees of freedom
## Residual deviance: 384.27  on 368  degrees of freedom
## AIC: 446.27
##
## 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 + TWR + NP + FA + DWH + T
##
##
```

	Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
##	1			368	384.2742	446.2742
##	2	- DWR	1 0.008259556	369	384.2824	444.2824
##	3	- AR	1 0.019675191	370	384.3021	442.3021
##	4	- NT	1 0.023831679	371	384.3259	440.3259
##	5	- Task	1 0.033405907	372	384.3593	438.3593
##	6	- CS	1 0.058544282	373	384.4179	436.4179
##	7	- AGR	1 0.111723035	374	384.5296	434.5296
##	8	- OP	1 0.202667636	375	384.7323	432.7323
##	9	- AP	1 0.313316327	376	385.0456	431.0456
##	10	- BR	1 0.472653310	377	385.5182	429.5182
##	11	- EXT	1 0.466684377	378	385.9849	427.9849
##	12	- AV	1 0.597598827	379	386.5825	426.5825
##	13	- Rank	2 2.971531802	381	389.5541	425.5541
##	14	- EM	1 0.852306328	382	390.4064	424.4064
##	15	- WH	1 0.963277504	383	391.3696	423.3696
##	16	- NASA	1 0.789072559	384	392.1587	422.1587
##	17	- DS	1 1.829358650	385	393.9881	421.9881

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + RS + TWR + NP + FA + DWH + T, family = "binomial",
##      data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.8856  -0.7507  -0.4785   0.8491   2.4413
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.848769   0.809769   1.048  0.29456
## TA          -0.030740   0.012996  -2.365  0.01802 *
## H             0.012951   0.006352   2.039  0.04145 *
## RS2          -0.425702   0.256805  -1.658  0.09738 .
## TWR           0.012263   0.008276   1.482  0.13841
## NP2          -1.072393   0.278773  -3.847  0.00012 ***
## NP3          -2.189175   0.384492  -5.694 1.24e-08 ***
## FA2          -0.269215   0.338144  -0.796  0.42594
## FA3          -0.074910   0.595667  -0.126  0.89992
## FA4           1.443137   0.508302   2.839  0.00452 **
## FA5           0.250014   0.779755   0.321  0.74849
## FA6           1.365713   0.515756   2.648  0.00810 **
## DWH2         -0.732151   0.356404  -2.054  0.03995 *
## T2            0.452618   0.260792   1.736  0.08264 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 491.30  on 398  degrees of freedom
## Residual deviance: 393.99  on 385  degrees of freedom
## AIC: 421.99
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + TWR + NP + FA + DWH + 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      491.30
## 2         385      393.99 13   97.316 5.483e-15 ***
## 3         368      384.27 17    9.714  0.9152
## ---
## 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 + FA + TA + H + RS + DWH + T
##
##
```

##	Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
##	1			398	491.3044	493.3044
##	2	+ NP	2 50.484461	396	440.8199	446.8199
##	3	+ DS	1 12.900709	395	427.9192	435.9192
##	4	+ FA	5 14.293708	390	413.6255	431.6255
##	5	+ TA	1 7.474214	389	406.1513	426.1513
##	6	+ H	1 4.856053	388	401.2952	423.2952
##	7	+ RS	1 2.659220	387	398.6360	422.6360
##	8	+ DWH	1 2.543064	386	396.0929	422.0929
##	9	+ T	1 2.043589	385	394.0494	422.0494

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
## -1.9827  -0.7624  -0.4683   0.8390   2.5431
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.694271   0.734313   2.307  0.02104 *
## NP2         -1.112001   0.279445  -3.979 6.91e-05 ***
## NP3         -2.298403   0.380926  -6.034 1.60e-09 ***
## DS2         -0.733798   0.268253  -2.735  0.00623 **
## H            0.013592   0.007146   1.902  0.05717 .
## RS2         -0.401625   0.258994  -1.551  0.12097
## FA2         -0.181621   0.334596  -0.543  0.58726
## FA3         -0.147778   0.600895  -0.246  0.80574
## FA4          1.258723   0.504361   2.496  0.01257 *
## FA5          0.058138   0.818743   0.071  0.94339
## FA6          1.519988   0.498284   3.050  0.00229 **
## TA          -0.028917   0.013597  -2.127  0.03345 *
## Rank1       -0.630419   0.382958  -1.646  0.09973 .
## Rank2       -0.276674   0.378325  -0.731  0.46459
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 491.30  on 398  degrees of freedom
## Residual deviance: 395.75  on 385  degrees of freedom
## AIC: 423.75
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + TWR + NP + FA + DWH + 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      491.30
## 2         385      393.99 13   97.316 5.483e-15 ***
## 3         385      395.75  0    -1.759
## 4         368      384.27 17   11.473    0.831
## ---
## 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 + FA + TA + H + RS + DWH + T
##
##
##      Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1
## 2  + NP  2 50.484461      396  440.8199 446.8199
## 3  + DS  1 12.900709      395  427.9192 435.9192
## 4  + FA  5 14.293708      390  413.6255 431.6255
## 5  + TA  1  7.474214      389  406.1513 426.1513
## 6   + H  1  4.856053      388  401.2952 423.2952
## 7   + RS  1  2.659220      387  398.6360 422.6360
## 8 + DWH  1  2.543064      386  396.0929 422.0929
## 9   + T  1  2.043589      385  394.0494 422.0494
##
##
## Call:
## glm(formula = SR ~ NP + DS + FA + TA + H + RS + DWH + T, family = "binomial",
##      data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9424  -0.7532  -0.4695   0.8242   2.4895
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.405009   0.734789   1.912 0.055860 .
## NP2          -1.032285   0.276860  -3.729 0.000193 ***
## NP3          -2.106079   0.376239  -5.598 2.17e-08 ***
## DS2           -0.441811   0.299382  -1.476 0.140013
## FA2           -0.219655   0.335438  -0.655 0.512578
## FA3           -0.060873   0.599770  -0.101 0.919159
## FA4            1.384045   0.507548   2.727 0.006393 **
## FA5            0.115690   0.790794   0.146 0.883688
## FA6            1.337268   0.508787   2.628 0.008580 **
## TA           -0.027707   0.013188  -2.101 0.035647 *
## H              0.012825   0.006355   2.018 0.043581 *
## RS2           -0.411605   0.256466  -1.605 0.108514
## DWH2          -0.586099   0.380492  -1.540 0.123470
## T2             0.380841   0.266786   1.428 0.153432
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 491.30  on 398  degrees of freedom
```

```
## Residual deviance: 394.05  on 385  degrees of freedom
## AIC: 422.05
##
## Number of Fisher Scoring iterations: 5
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ TA + H + RS + TWR + NP + FA + DWH + T
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + DS + FA + TA + H + RS + DWH + T
## 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      491.30
## 2         385      393.99 13   97.316 5.483e-15 ***
## 3         385      395.75  0    -1.759
## 4         385      394.05  0     1.698
## 5         368      384.27 17     9.775  0.9128
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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```