

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 MModel

```
##
## Call:
## glm(formula = SR ~ ., family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.0768  -0.7357  -0.4388   0.8014   2.5194
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -0.348653   2.038295  -0.171  0.864183
## NASA        -0.028494   0.026856  -1.061  0.288693
## TA          -0.036878   0.023686  -1.557  0.119491
## EXT         -0.011454   0.065231  -0.176  0.860610
## AGR         -0.001868   0.085698  -0.022  0.982608
## CS          -0.033143   0.089880  -0.369  0.712311
## NT           0.016931   0.095441   0.177  0.859196
## OP           0.000436   0.077230   0.006  0.995495
## AV           0.019453   0.027535   0.706  0.479877
## EM           0.028594   0.035808   0.799  0.424551
## Task         0.014452   0.040223   0.359  0.719370
## H            0.613495   0.279698   2.193  0.028277 *
## RS2         -0.546950   0.278284  -1.965  0.049364 *
## WH2          0.311280   0.533074   0.584  0.559265
## TWR          0.009699   0.009962   0.974  0.330272
## BR2          0.177957   0.289470   0.615  0.538708
## NP2         -1.165218   0.300350  -3.880  0.000105 ***
## NP3         -2.366442   0.428287  -5.525  3.29e-08 ***
## FA2         -0.296665   0.364432  -0.814  0.415617
## FA3         -0.257934   0.645191  -0.400  0.689319
## FA4          1.109944   0.568775   1.951  0.051002 .
## FA5          0.075427   0.858962   0.088  0.930026
## FA6          1.488131   0.541774   2.747  0.006018 **
## AP           0.132741   0.370227   0.359  0.719939
## AR          -0.059534   0.110867  -0.537  0.591280
## DWH2        -0.518275   0.428215  -1.210  0.226159
## DWR          0.002704   0.008530   0.317  0.751235
## T2           0.256861   0.287002   0.895  0.370797
## DS2         -0.550427   0.325108  -1.693  0.090444 .
## Rank1       -0.978354   0.422185  -2.317  0.020484 *
## Rank2       -0.612189   0.434049  -1.410  0.158418
## ---
## 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: 364.91  on 347  degrees of freedom
## AIC: 426.91
##
## 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 + Rank
##
##
```

	Step	Df	Deviance	Resid. Df	Resid. Dev	AIC
##	1			347	364.9140	426.9140
##	2	- OP	1 3.187468e-05	348	364.9140	424.9140
##	3	- AGR	1 4.627297e-04	349	364.9144	422.9144
##	4	- EXT	1 3.132979e-02	350	364.9458	420.9458
##	5	- NT	1 2.961918e-02	351	364.9754	418.9754
##	6	- DWR	1 9.831104e-02	352	365.0737	417.0737
##	7	- AP	1 1.227959e-01	353	365.1965	415.1965
##	8	- Task	1 1.354428e-01	354	365.3319	413.3319
##	9	- CS	1 8.531670e-02	355	365.4173	411.4173
##	10	- AR	1 2.854253e-01	356	365.7027	409.7027
##	11	- BR	1 3.199171e-01	357	366.0226	408.0226
##	12	- AV	1 4.201670e-01	358	366.4428	406.4428
##	13	- WH	1 6.630343e-01	359	367.1058	405.1058
##	14	- NASA	1 7.464724e-01	360	367.8523	403.8523
##	15	- EM	1 7.754731e-01	361	368.6278	402.6278
##	16	- T	1 8.747927e-01	362	369.5025	401.5025
##	17	- TWR	1 1.512991e+00	363	371.0155	401.0155
##	18	- DWH	1 1.837685e+00	364	372.8532	400.8532

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ TA + H + RS + NP + FA + DS + Rank, family = "binomial",
##      data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9302  -0.7702  -0.4551   0.8102   2.5096
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)   0.42307    1.00488   0.421  0.67374
## TA            -0.02831    0.01407  -2.012  0.04426 *
## H              0.65124    0.26210   2.485  0.01296 *
## RS2           -0.51950    0.26649  -1.949  0.05124 .
## NP2           -1.13919    0.28788  -3.957 7.58e-05 ***
## NP3           -2.40200    0.40029  -6.001 1.96e-09 ***
## FA2           -0.25744    0.34910  -0.737  0.46085
## FA3           -0.15395    0.61322  -0.251  0.80177
## FA4            1.05074    0.54176   1.939  0.05244 .
## FA5           -0.04054    0.83285  -0.049  0.96118
## FA6            1.56153    0.51014   3.061  0.00221 **
## DS2           -0.76153    0.27765  -2.743  0.00609 **
## Rank1         -0.97233    0.41116  -2.365  0.01804 *
## Rank2         -0.69176    0.42327  -1.634  0.10219
## ---
## 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: 372.85  on 364  degrees of freedom
## AIC: 400.85
##
## 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 + Rank
## 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         364      372.85 13   91.639 6.784e-14 ***
## 3         347      364.91 17    7.939  0.9678
## ---
## 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 + H + RS + FA + TA + Rank
##
##
```

##	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	+ H	1	6.578118	373	398.5226	408.5226
## 5	+ RS	1	4.206595	372	394.3160	406.3160
## 6	+ FA	5	11.971585	367	382.3444	404.3444
## 7	+ TA	1	3.808978	366	378.5354	402.5354
## 8	+ Rank	2	5.682201	364	372.8532	400.8532

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
## -1.9302  -0.7702  -0.4551   0.8102   2.5096
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.42307    1.00488   0.421  0.67374
## NP2          -1.13919    0.28788  -3.957 7.58e-05 ***
## NP3          -2.40200    0.40029  -6.001 1.96e-09 ***
## DS2          -0.76153    0.27765  -2.743  0.00609 **
## H              0.65124    0.26210   2.485  0.01296 *
## RS2          -0.51950    0.26649  -1.949  0.05124 .
## FA2          -0.25744    0.34910  -0.737  0.46085
## FA3          -0.15395    0.61322  -0.251  0.80177
## FA4           1.05074    0.54176   1.939  0.05244 .
## FA5          -0.04054    0.83285  -0.049  0.96118
## FA6           1.56153    0.51014   3.061  0.00221 **
## TA          -0.02831    0.01407  -2.012  0.04426 *
## Rank1        -0.97233    0.41116  -2.365  0.01804 *
## Rank2        -0.69176    0.42327  -1.634  0.10219
## ---
## 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: 372.85  on 364  degrees of freedom
## AIC: 400.85
##
## 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 + Rank
## 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         364      372.85 13   91.639 6.784e-14 ***
## 3         364      372.85  0    0.000
## 4         347      364.91 17    7.939  0.9678
## ---
## 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 + H + RS + FA + TA + Rank
##
##
##      Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1
## 2  + NP  2 47.588825      375    416.9038 422.9038
## 3  + DS  1 11.803077      374    405.1007 413.1007
## 4    + H  1  6.578118      373    398.5226 408.5226
## 5  + RS  1  4.206595      372    394.3160 406.3160
## 6  + FA  5 11.971585      367    382.3444 404.3444
## 7  + TA  1  3.808978      366    378.5354 402.5354
## 8 + Rank  2  5.682201      364    372.8532 400.8532

##
## Call:
## glm(formula = SR ~ NP + DS + H + RS + FA + TA + Rank, family = "binomial",
##      data = lm_DF)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.9302  -0.7702  -0.4551   0.8102   2.5096
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.42307    1.00488   0.421  0.67374
## NP2         -1.13919    0.28788  -3.957 7.58e-05 ***
## NP3         -2.40200    0.40029  -6.001 1.96e-09 ***
## DS2         -0.76153    0.27765  -2.743 0.00609 **
## H            0.65124    0.26210   2.485 0.01296 *
## RS2         -0.51950    0.26649  -1.949 0.05124 .
## FA2         -0.25744    0.34910  -0.737 0.46085
## FA3         -0.15395    0.61322  -0.251 0.80177
## FA4          1.05074    0.54176   1.939 0.05244 .
## FA5         -0.04054    0.83285  -0.049 0.96118
## FA6          1.56153    0.51014   3.061 0.00221 **
## TA          -0.02831    0.01407  -2.012 0.04426 *
## Rank1       -0.97233    0.41116  -2.365 0.01804 *
## Rank2       -0.69176    0.42327  -1.634 0.10219
## ---
## 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: 372.85  on 364  degrees of freedom
```

```
## AIC: 400.85
##
## 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 + Rank
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + DS + H + RS + FA + TA + Rank
## 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         364      372.85 13   91.639 6.784e-14 ***
## 3         364      372.85  0    0.000
## 4         364      372.85  0    0.000
## 5         347      364.91 17    7.939  0.9678
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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