Logistic Regression

```
##   x freq
## 1 0  336
## 2 1   64
```

Null Model

```
##
## Call:
## glm(formula = SR ~ 1, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.5905  -0.5905  -0.5905  -0.5905   1.9145
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -1.6582     0.1364  -12.16   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.74  on 399  degrees of freedom
## Residual deviance: 351.74  on 399  degrees of freedom
## AIC: 353.74
##
## 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
## -1.8672  -0.5548  -0.3175  -0.1698   3.1625
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.417146   2.401617  -1.006  0.31419
## NASA        -0.002540   0.034124  -0.074  0.94066
## TA          -0.028346   0.028702  -0.988  0.32334
## EXT         -0.278883   0.087521  -3.186  0.00144 **
## AGR          0.109230   0.105353   1.037  0.29983
## CS           0.049649   0.111239   0.446  0.65536
## NT           0.049715   0.115499   0.430  0.66688
## OP           0.097525   0.098170   0.993  0.32050
## AV           0.046944   0.034558   1.358  0.17433
## EM           0.027769   0.044342   0.626  0.53116
## Task         0.066499   0.052250   1.273  0.20313
## H            0.021208   0.008804   2.409  0.01600 *
## RS2         -0.457100   0.336916  -1.357  0.17487
## WH2         -0.173836   0.645344  -0.269  0.78765
## TWR          0.008921   0.012068   0.739  0.45977
## BR2          0.800764   0.364646   2.196  0.02809 *
## NP2         -1.156454   0.366447  -3.156  0.00160 **
## NP3         -2.590502   0.575266  -4.503  6.7e-06 ***
## FA2         -0.436222   0.477719  -0.913  0.36117
## FA3          1.251547   0.643307   1.945  0.05172 .
## FA4          1.461168   0.592856   2.465  0.01372 *
## FA5         -0.376792   1.231087  -0.306  0.75956
## FA6          1.481853   0.565479   2.621  0.00878 **
## AP          -0.358616   0.456126  -0.786  0.43174
## AR          -0.219454   0.135642  -1.618  0.10569
## DWH2         0.190172   0.497726   0.382  0.70240
## DWR         -0.005510   0.010291  -0.535  0.59233
## T2           0.043105   0.353386   0.122  0.90292
## DS2         -0.699909   0.405475  -1.726  0.08432 .
## Rank1       -0.405542   0.496047  -0.818  0.41362
## Rank2       -0.691739   0.535958  -1.291  0.19682
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.74  on 399  degrees of freedom
## Residual deviance: 265.56  on 369  degrees of freedom
## AIC: 327.56
##
## Number of Fisher Scoring iterations: 6
```

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 ~ EXT + AV + Task + H + BR + NP + FA + AR + DS
##
##
##      Step Df     Deviance Resid. Df Resid. Dev      AIC
## 1                               369   265.5603 327.5603
## 2  - Rank  2 1.658273e+00       371   267.2186 325.2186
## 3  - NASA  1 3.150019e-05       372   267.2186 323.2186
## 4     - T  1 8.238819e-03       373   267.2269 321.2269
## 5    - WH  1 7.440329e-02       374   267.3013 319.3013
## 6   - DWH  1 9.172948e-02       375   267.3930 317.3930
## 7    - CS  1 1.721760e-01       376   267.5652 315.5652
## 8    - NT  1 2.313532e-01       377   267.7965 313.7965
## 9   - DWR  1 2.476062e-01       378   268.0441 312.0441
## 10   - TA  1 4.859408e-01       379   268.5301 310.5301
## 11   - EM  1 1.618974e-01       380   268.6920 308.6920
## 12  - TWR  1 7.154674e-01       381   269.4075 307.4075
## 13   - AP  1 9.280723e-01       382   270.3355 306.3355
## 14  - AGR  1 1.134143e+00       383   271.4697 305.4697
## 15   - RS  1 1.153178e+00       384   272.6228 304.6228
## 16   - OP  1 1.295298e+00       385   273.9181 303.9181
```

Backward Elimination Model

```
##
## Call:
## glm(formula = SR ~ EXT + AV + Task + H + BR + NP + FA + AR +
##     DS, family = "binomial", data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.7617  -0.5554  -0.3469  -0.2009   3.1102
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.661525   1.500121  -1.774  0.07603 .
## EXT         -0.240368   0.079767  -3.013  0.00258 **
## AV           0.053676   0.033182   1.618  0.10575
## Task         0.067775   0.046200   1.467  0.14238
## H            0.018870   0.007434   2.538  0.01114 *
## BR2          0.701458   0.327529   2.142  0.03222 *
## NP2         -1.049042   0.348734  -3.008  0.00263 **
## NP3         -2.357105   0.525400  -4.486 7.25e-06 ***
## FA2         -0.421503   0.460160  -0.916  0.35967
## FA3          1.278959   0.609659   2.098  0.03592 *
## FA4          1.235202   0.566459   2.181  0.02922 *
## FA5         -0.123607   1.164425  -0.106  0.91546
## FA6          1.419494   0.525384   2.702  0.00690 **
## AR          -0.190277   0.126332  -1.506  0.13202
## DS2         -0.592592   0.329331  -1.799  0.07196 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.74  on 399  degrees of freedom
## Residual deviance: 273.92  on 385  degrees of freedom
## AIC: 303.92
##
## Number of Fisher Scoring iterations: 6
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ EXT + AV + Task + H + BR + NP + FA + AR + DS
## 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       399     351.74
## 2       385     273.92 14   77.818 7.17e-11 ***
## 3       369     265.56 16    8.358   0.9375
## ---
## 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 + EXT + BR + DS + AV
##
##
##    Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                          399   351.7359 353.7359
## 2  + NP  2 31.410774       397   320.3251 326.3251
## 3  + FA  5 17.483193       392   302.8419 318.8419
## 4   + H  1  9.092602       391   293.7493 311.7493
## 5 + EXT  1  6.472179       390   287.2772 307.2772
## 6  + BR  1  3.319028       389   283.9581 305.9581
## 7  + DS  1  3.333297       388   280.6248 304.6248
## 8  + AV  1  2.482244       387   278.1426 304.1426
```

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
## -1.4784  -0.5904  -0.3891  -0.2289   2.5293
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -0.450236   0.896416  -0.502  0.61548
## NP2         -1.071802   0.345857  -3.099  0.00194 **
## NP3         -2.292238   0.519945  -4.409 1.04e-05 ***
## DS2         -0.535207   0.330496  -1.619  0.10536
## H            0.023459   0.008146   2.880  0.00398 **
## RS2         -0.368024   0.313608  -1.174  0.24059
## FA2         -0.472652   0.442358  -1.068  0.28530
## FA3          1.000053   0.606922   1.648  0.09940 .
## FA4          1.489739   0.548834   2.714  0.00664 **
## FA5         -0.452477   1.140012  -0.397  0.69144
## FA6          1.438316   0.512809   2.805  0.00504 **
## TA          -0.010066   0.016559  -0.608  0.54326
## Rank1       -0.257430   0.468736  -0.549  0.58287
## Rank2       -0.707083   0.495630  -1.427  0.15369
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.74  on 399  degrees of freedom
## Residual deviance: 288.02  on 386  degrees of freedom
## AIC: 316.02
##
## Number of Fisher Scoring iterations: 5
```

Comparing Models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ EXT + AV + Task + H + BR + NP + FA + AR + DS
## 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       399     351.74
## 2       385     273.92 14   77.818  7.17e-11 ***
## 3       386     288.02 -1  -14.102 0.0001732 ***
## 4       369     265.56 17   22.460 0.1676784
## ---
## 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 + EXT + BR + DS + AV
##
##
##    Step Df  Deviance Resid. Df Resid. Dev      AIC
## 1                          399   351.7359 353.7359
## 2  + NP  2 31.410774       397   320.3251 326.3251
## 3  + FA  5 17.483193       392   302.8419 318.8419
## 4   + H  1  9.092602       391   293.7493 311.7493
## 5 + EXT  1  6.472179       390   287.2772 307.2772
## 6  + BR  1  3.319028       389   283.9581 305.9581
## 7  + DS  1  3.333297       388   280.6248 304.6248
## 8  + AV  1  2.482244       387   278.1426 304.1426

##
## Call:
## glm(formula = SR ~ NP + FA + H + EXT + BR + DS + AV, family = "binomial",
##     data = lm_DF)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.9051  -0.5674  -0.3729  -0.2027   2.9386
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.398236   0.785286  -1.781  0.07499 .
## NP2         -1.112486   0.345368  -3.221  0.00128 **
## NP3         -2.249086   0.519367  -4.330 1.49e-05 ***
## FA2         -0.494545   0.448258  -1.103  0.26991
## FA3          1.090950   0.606175   1.800  0.07190 .
## FA4          1.215338   0.562321   2.161  0.03067 *
## FA5         -0.130364   1.132914  -0.115  0.90839
## FA6          1.381229   0.518314   2.665  0.00770 **
## H            0.020603   0.007362   2.798  0.00513 **
## EXT         -0.224211   0.078176  -2.868  0.00413 **
## BR2          0.697443   0.320933   2.173  0.02977 *
## DS2         -0.641893   0.324736  -1.977  0.04808 *
## AV           0.051671   0.033041   1.564  0.11786
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.74  on 399  degrees of freedom
## Residual deviance: 278.14  on 387  degrees of freedom
## AIC: 304.14
```

```
##
## Number of Fisher Scoring iterations: 6
```

Comparing models

```
## Analysis of Deviance Table
##
## Model 1: SR ~ 1
## Model 2: SR ~ EXT + AV + Task + H + BR + NP + FA + AR + DS
## Model 3: SR ~ NP + DS + H + RS + FA + TA + Rank
## Model 4: SR ~ NP + FA + H + EXT + BR + DS + AV
## 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       399     351.74
## 2       385     273.92 14   77.818  7.17e-11 ***
## 3       386     288.02 -1  -14.102 0.0001732 ***
## 4       387     278.14 -1    9.877
## 5       369     265.56 18   12.582 0.8157683
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

-> -> -> ->

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-> -> -> -> ->