

Appendix

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Table of Minimum, Mean, and Maximum Values for Predictors

Note: I am using the uncentered values to get more meaningful insights as it does not change the predictions

| | units | income | compdist | storedist |
|---------|-----------|-----------|----------|-----------|
| Minimum | 19.0000 | 44.67300 | 0.340 | 0.870000 |
| Mean | 647.7636 | 73.83678 | 3.068 | 6.831727 |
| Maximum | 1289.0000 | 145.06500 | 6.610 | 9.900000 |

Table of Predictions (counts) from my Final Model for All Combinations of the Predictor Variables

Note: I am using the uncentered values to get more meaningful insights as it does not change the predictions

| | units_label | income_label | compdist_label | storedist_label | predicted_customers |
|----|-------------|--------------|----------------|-----------------|---------------------|
| 1 | Minimum | Minimum | Minimum | Minimum | 12.8414944 |
| 2 | Mean | Minimum | Minimum | Minimum | 21.9287305 |
| 3 | Maximum | Minimum | Minimum | Minimum | 37.8461293 |
| 4 | Minimum | Mean | Minimum | Minimum | 8.5490425 |
| 5 | Mean | Mean | Minimum | Minimum | 14.5987408 |
| 6 | Maximum | Mean | Minimum | Minimum | 25.1955228 |
| 7 | Minimum | Maximum | Minimum | Minimum | 3.1648895 |
| 8 | Mean | Maximum | Minimum | Minimum | 5.4045118 |
| 9 | Maximum | Maximum | Minimum | Minimum | 9.3274826 |
| 10 | Minimum | Minimum | Mean | Minimum | 19.6734208 |
| 11 | Mean | Minimum | Mean | Minimum | 33.5952442 |
| 12 | Maximum | Minimum | Mean | Minimum | 57.9810106 |

| | | | | | |
|----|---------|---------|---------|---------|-------------|
| 13 | Minimum | Mean | Mean | Minimum | 13.0973003 |
| 14 | Mean | Mean | Mean | Minimum | 22.3655565 |
| 15 | Maximum | Mean | Mean | Minimum | 38.6000340 |
| 16 | Minimum | Maximum | Mean | Minimum | 4.8486726 |
| 17 | Mean | Maximum | Mean | Minimum | 8.2798179 |
| 18 | Maximum | Maximum | Mean | Minimum | 14.2898859 |
| 19 | Minimum | Minimum | Maximum | Minimum | 34.2314009 |
| 20 | Mean | Minimum | Maximum | Minimum | 58.4551252 |
| 21 | Maximum | Minimum | Maximum | Minimum | 100.8859235 |
| 22 | Minimum | Mean | Maximum | Minimum | 22.7890688 |
| 23 | Mean | Mean | Maximum | Minimum | 38.9156691 |
| 24 | Maximum | Mean | Maximum | Minimum | 67.1633702 |
| 25 | Minimum | Maximum | Maximum | Minimum | 8.4366038 |
| 26 | Mean | Maximum | Maximum | Minimum | 14.4067353 |
| 27 | Maximum | Maximum | Maximum | Minimum | 24.8641464 |
| 28 | Minimum | Minimum | Minimum | Mean | 5.9378487 |
| 29 | Mean | Minimum | Minimum | Mean | 10.1397454 |
| 30 | Maximum | Minimum | Minimum | Mean | 17.4998782 |
| 31 | Minimum | Mean | Minimum | Mean | 3.9530384 |
| 32 | Mean | Mean | Minimum | Mean | 6.7503914 |
| 33 | Maximum | Mean | Minimum | Mean | 11.6502953 |
| 34 | Minimum | Maximum | Minimum | Mean | 1.4634305 |
| 35 | Mean | Maximum | Minimum | Mean | 2.4990217 |
| 36 | Maximum | Maximum | Minimum | Mean | 4.3129856 |
| 37 | Minimum | Minimum | Mean | Mean | 9.0969004 |
| 38 | Mean | Minimum | Mean | Mean | 15.5342883 |
| 39 | Maximum | Minimum | Mean | Mean | 26.8101559 |
| 40 | Minimum | Mean | Mean | Mean | 6.0561322 |
| 41 | Mean | Mean | Mean | Mean | 10.3417317 |
| 42 | Maximum | Mean | Mean | Mean | 17.8484804 |
| 43 | Minimum | Maximum | Mean | Mean | 2.2420042 |
| 44 | Mean | Maximum | Mean | Mean | 3.8285502 |
| 45 | Maximum | Maximum | Mean | Mean | 6.6075783 |
| 46 | Minimum | Minimum | Maximum | Mean | 15.8284443 |
| 47 | Mean | Minimum | Maximum | Mean | 27.0293844 |
| 48 | Maximum | Minimum | Maximum | Mean | 46.6491927 |
| 49 | Minimum | Mean | Maximum | Mean | 10.5375619 |
| 50 | Mean | Mean | Maximum | Mean | 17.9944286 |
| 51 | Maximum | Mean | Maximum | Mean | 31.0560373 |
| 52 | Minimum | Maximum | Maximum | Mean | 3.9010473 |
| 53 | Mean | Maximum | Maximum | Mean | 6.6616089 |
| 54 | Maximum | Maximum | Maximum | Mean | 11.4970683 |
| 55 | Minimum | Minimum | Minimum | Maximum | 3.9923116 |

| | | | | | |
|----|---------|---------|---------|---------|------------|
| 56 | Mean | Minimum | Minimum | Maximum | 6.8174562 |
| 57 | Maximum | Minimum | Minimum | Maximum | 11.7660404 |
| 58 | Minimum | Mean | Minimum | Maximum | 2.6578247 |
| 59 | Mean | Mean | Minimum | Maximum | 4.5386246 |
| 60 | Maximum | Mean | Minimum | Maximum | 7.8330742 |
| 61 | Minimum | Maximum | Minimum | Maximum | 0.9839373 |
| 62 | Mean | Maximum | Minimum | Maximum | 1.6802168 |
| 63 | Maximum | Maximum | Minimum | Maximum | 2.8998352 |
| 64 | Minimum | Minimum | Mean | Maximum | 6.1162995 |
| 65 | Mean | Minimum | Mean | Maximum | 10.4444763 |
| 66 | Maximum | Minimum | Mean | Maximum | 18.0258041 |
| 67 | Minimum | Mean | Mean | Maximum | 4.0718395 |
| 68 | Mean | Mean | Mean | Maximum | 6.9532617 |
| 69 | Maximum | Mean | Mean | Maximum | 12.0004229 |
| 70 | Minimum | Maximum | Mean | Maximum | 1.5074112 |
| 71 | Mean | Maximum | Mean | Maximum | 2.5741251 |
| 72 | Maximum | Maximum | Mean | Maximum | 4.4426042 |
| 73 | Minimum | Minimum | Maximum | Maximum | 10.6422520 |
| 74 | Mean | Minimum | Maximum | Maximum | 18.1732023 |
| 75 | Maximum | Minimum | Maximum | Maximum | 31.3645773 |
| 76 | Minimum | Mean | Maximum | Maximum | 7.0849281 |
| 77 | Mean | Mean | Maximum | Maximum | 12.0985512 |
| 78 | Maximum | Mean | Maximum | Maximum | 20.8805217 |
| 79 | Minimum | Maximum | Maximum | Maximum | 2.6228685 |
| 80 | Mean | Maximum | Maximum | Maximum | 4.4789317 |
| 81 | Maximum | Maximum | Maximum | Maximum | 7.7300521 |

Final Model Output

Note: The final model is still in terms of the centered predictors (only changes the intercept coefficient)

Call:

```
glm.nb(formula = customers ~ units_c + income_c + compdist_c +
        storedist_c, data = Store, link = log, init.theta = 4.637931311)
```

Coefficients:

| | Estimate | Std. Error | z value | Pr(> z) |
|-------------|-----------|------------|---------|-------------|
| (Intercept) | 2.3361873 | 0.0541336 | 43.156 | < 2e-16 *** |
| units_c | 0.0008511 | 0.0002638 | 3.226 | 0.001256 ** |

```
income_c      -0.0139509  0.0039865  -3.500  0.000466 ***
compdist_c    0.1563735  0.0456166   3.428  0.000608 ***
storedist_c   -0.1293811  0.0301078  -4.297  1.73e-05 ***
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for Negative Binomial(4.6379) family taken to be 1)

```
Null deviance: 194.85  on 109  degrees of freedom
Residual deviance: 112.41  on 105  degrees of freedom
AIC: 691.89
```

Number of Fisher Scoring iterations: 1

```
      Theta:  4.638
Std. Err.:  0.891
```

2 x log-likelihood: -679.893