APPENDIX B

*** Sensitivity Analysis of the Name-Prism Tool *

We have done a sensitivity analysis and studied what affect the threshold has on the main outcomes of interest (model coefficients). In this analysis we set three unique thresholds for all ethnicities (0.7, 0.8, and 0.9). Then, we selected a random sample of 100 developers (25 of each ethnicity) from our dataset and identify the number of false negatives and false positives of the Name-Prism tool for each threshold.

###################### MODEL Threshold 0.7 ##################
All Ethnicities (threshold 0.7), Excluding unknowns (Submitters)
and Submitter as random effect

```
                                  Estimate Std. Error z value Pr(>|z|)
(Intercept)                       2.310e+00  1.651e-02 139.908  < 2e-16 ***
repo_pr_tenure_mnth              -7.904e-03  5.648e-03  -1.399   0.1617
repo_pr_popularity                9.081e-02  8.887e-03  10.219  < 2e-16 ***
repo_pr_team_size                 0.000e+00  8.960e-03   0.000   1.0000
perc_external_contribs           -4.696e-02  4.469e-03 -10.508  < 2e-16 ***
prs_succ_rate                     1.876e-01  3.391e-03  55.324  < 2e-16 ***
pr_files_changed                 -3.569e-04  1.971e-05 -18.108  < 2e-16 ***
prs_main_team_member1             1.436e-01  2.357e-02   6.095 1.10e-09 ***
prs_popularity                    8.744e-02  4.953e-03  17.653  < 2e-16 ***
prs_watched_repo1                 7.768e-02  6.985e-03  11.122  < 2e-16 ***
prs_followed_pri1                 1.264e-01  9.188e-03  13.756  < 2e-16 ***
prs_tenure_mnth                   5.508e-02  3.911e-03  14.081  < 2e-16 ***
pr_comments_counts               -1.003e-03  2.470e-03  -0.406   0.6847
pr_num_commits                   -2.197e-01  2.499e-03 -87.896  < 2e-16 ***
prs_eth_7Black                   -8.904e-02  5.187e-02  -1.717   0.0860 .
prs_eth_7API                     -8.775e-02  1.315e-02  -6.674 2.49e-11 ***
prs_eth_7Hispanic                -6.647e-02  1.910e-02  -3.481   0.0005 ***
prs_experience                   -7.344e-02  7.258e-03 -10.118  < 2e-16 ***
pr_nth                            5.163e-01  6.915e-03  74.661  < 2e-16 ***
prs_continentAsia                -1.053e-01  1.525e-02  -6.906 4.99e-12 ***
prs_continentAfrica              -2.128e-01  5.174e-02  -4.113 3.91e-05 ***
prs_continentSouth America       -7.459e-02  2.933e-02  -2.543   0.0110 *
prs_continentAntarctica          -6.099e-01  5.151e-01  -1.184   0.2364
prs_continentUnknown             -1.006e-01  1.227e-02  -8.193 2.55e-16 ***
prs_continentEurope               7.475e-02  1.073e-02   6.967 3.24e-12 ***
prs_continentOceania              5.374e-02  2.559e-02   2.100   0.0357 *
prs_pri_same_nationalityDifferent -1.995e-01  9.507e-03 -20.984  < 2e-16 ***
prs_pri_same_nationalityUnknown    2.337e-03  1.109e-02   0.211   0.8331
intra_branch1                      2.524e-01  1.349e-02  18.713  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Ethnicity	False Positives	True Positives	True Negative	False Negatives
White	5	20	0	0
Black	12	13	0	0
Hispanic	0	25	0	0
API	2	23	0	0

###################### MODEL Threshold 0.8 ############
All Ethnicities (threshold 0.8), Excluding unknowns
Submitter as random effect

```
                                  Estimate Std. Error z value Pr(>|z|)
(Intercept)                       2.244e+00  1.781e-02 126.028  < 2e-16 ***
repo_pr_tenure_mnth               1.115e-02  6.327e-03   1.763  0.07792 .
repo_pr_popularity                0.000e+00  9.871e-03   0.000  1.00000
repo_pr_team_size                 1.397e-02  9.926e-03   1.407  0.15931
perc_external_contribs           -2.672e-02  5.027e-03  -5.315 1.06e-07 ***
prs_succ_rate                     1.810e-01  3.905e-03  46.358  < 2e-16 ***
pr_files_changed                 -3.558e-04  2.459e-05 -14.468  < 2e-16 ***
prs_main_team_member1             1.609e-01  2.625e-02   6.130 8.81e-10 ***
prs_popularity                    8.320e-02  5.663e-03  14.691  < 2e-16 ***
prs_watched_repo1                 7.134e-02  7.996e-03   8.922  < 2e-16 ***
prs_followed_pri1                 1.741e-01  1.050e-02  16.578  < 2e-16 ***
prs_tenure_mnth                   3.237e-02  4.756e-03   6.806 1.00e-11 ***
pr_comments_counts                1.268e-03  2.877e-03   0.441  0.65931
pr_num_commits                   -2.112e-01  2.915e-03 -72.454  < 2e-16 ***
prs_eth_8Black                   -5.498e-02  9.627e-02  -0.571  0.56793
prs_eth_8API                     -1.093e-01  1.521e-02  -7.182 6.89e-13 ***
prs_eth_8Hispanic                -6.831e-02  2.226e-02  -3.068  0.00215 **
prs_experience                   -7.051e-02  8.209e-03  -8.589  < 2e-16 ***
pr_nth                            4.983e-01  7.878e-03  63.248  < 2e-16 ***
prs_continentAsia                -7.518e-02  1.810e-02  -4.153 3.28e-05 ***
prs_continentAfrica              -1.817e-01  6.147e-02  -2.956  0.00312 **
prs_continentSouth America       -6.040e-02  3.485e-02  -1.733  0.08311 .
prs_continentAntarctica           1.758e-01  8.670e-01   0.203  0.83932
prs_continentUnknown              8.721e-02  1.439e-02   6.062 1.35e-09 ***
prs_continentEurope               7.107e-02  1.170e-02   6.075 1.24e-09 ***
prs_continentOceania              5.147e-02  2.770e-02   1.858  0.06314 .
prs_pri_same_nationalityDifferent -2.011e-01  1.056e-02 -19.047  < 2e-16 ***
prs_pri_same_nationalityUnknown   -1.955e-01  1.308e-02 -14.946  < 2e-16 ***
intra_branch1                     2.944e-01  1.538e-02  19.147  < 2e-16 ***
```

Ethnicity	False Positives	True Positives	True Negative	False Negatives
White	2	17	3	3
Black	10	10	2	3
Hispanic	0	21	0	4
API	2	18	0	5

```
#####################     MODEL Threshold 0.9   ####################
### All Ethnicities (threshold 0.9), Excluding unknowns (Submitters)       #####
### Without same_eth, and Submitter as random effect                       #####
```

```
                                  Estimate Std. Error z value Pr(>|z|)
(Intercept)                       2.247e+00  1.878e-02 119.649  < 2e-16 ***
repo_pr_tenure_mnth               2.292e-02  6.673e-03   3.435 0.000594 ***
repo_pr_popularity                8.206e-02  1.041e-02   7.884 3.16e-15 ***
repo_pr_team_size                 7.343e-18  1.057e-02   0.000 1.000000
perc_external_contribs           -5.882e-02  5.378e-03 -10.937  < 2e-16 ***
prs_succ_rate                     1.897e-01  4.110e-03  46.143  < 2e-16 ***
pr_files_changed                 -3.512e-04  2.446e-05 -14.362  < 2e-16 ***
prs_main_team_member1             1.379e-01  2.775e-02   4.971 6.65e-07 ***
prs_popularity                    7.974e-02  5.941e-03  13.424  < 2e-16 ***
prs_watched_repo1                 7.798e-02  8.442e-03   9.237  < 2e-16 ***
prs_followed_pri1                 1.319e-01  1.112e-02  11.865  < 2e-16 ***
prs_tenure_mnth                   4.737e-02  4.855e-03   9.755  < 2e-16 ***
pr_comments_counts               -3.991e-04  2.994e-03  -0.133 0.893970
pr_num_commits                   -2.113e-01  3.043e-03 -69.432  < 2e-16 ***
prs_eth_9Black                   -6.474e-02  1.010e-01  -0.641 0.521563
prs_eth_9API                     -1.059e-01  1.606e-02  -6.595 4.26e-11 ***
prs_eth_9Hispanic                -8.226e-02  2.594e-02  -3.171 0.001521 **
prs_experience                   -6.903e-02  8.640e-03  -7.990 1.35e-15 ***
pr_nth                            4.994e-01  8.267e-03  60.414  < 2e-16 ***
prs_continentAsia                -9.123e-02  1.875e-02  -4.865 1.15e-06 ***
prs_continentAfrica              -1.999e-01  6.774e-02  -2.952 0.003159 **
prs_continentSouth America       -2.165e-02  4.269e-02  -0.507 0.612041
prs_continentAntarctica          -1.084e+00  5.929e-01  -1.828 0.067614 .
prs_continentUnknown             -1.096e-01  1.490e-02  -7.354 1.92e-13 ***
prs_continentEurope               6.715e-02  1.251e-02   5.366 8.05e-08 ***
prs_continentOceania              6.321e-02  3.018e-02   2.094 0.036244 *
prs_pri_same_nationalityDifferent -1.981e-01  1.131e-02 -17.515  < 2e-16 ***
prs_pri_same_nationalityUnknown    2.262e-02  1.352e-02   1.673 0.094419 .
intra_branch1                      2.788e-01  1.614e-02  17.277  < 2e-16 ***
```

Ethnicity	False Positives	True Positives	True Negative	False Negatives
White	1	16	4	4
Black	4	4	8	9
Hispanic	0	12	0	13
API	1	12	1	11

We can see that the coefficients for perceptible Hispanic developers are stable and always negative in the three models. The coefficients for perceptible API and Black developers are stable in the models with threshold 0.8 and 0.9 and always negative in the three models. Moreover, for perceptible Hispanic and API developers the results of the three models are always statistically significant and there is no statistically significance for perceptive Black developers in any of the models.

Besides the stability of the variables, we have analyzed the number of false positives and negatives. When choosing the threshold 0.7, the number of false negatives is 0 but, the number of false positive is the highest. Contrary, when choosing the threshold 0.9, the number of false positives is the lowest but, the numbers of false negative is the highest.

Therefore, we chose the threshold 0.8 because the number of false positives and false negatives are balanced when comparing with 0.7 and 0.9