

FAIRNESS OBSERVATIONS AND CONCLUSIONS

For my fairness metric, I am using 5 different models. The first model is Logistic Regression, the second model is decision Tree, third is Naïve Bayes, fourth is Random Forest, and fifth is XGBoost. For my tests of fairness, I checked four of the 20 attributes that could be tested. I chose 3 attributes that I believe play an important role in real life too. The last one is an attribute that is not important whatsoever. I want to see the contrasts and compare them.

For my first attribute, I have the attribute “foreign worker”. Foreign workers usually have large overheads with credits, and therefore, I would assume that there might be biases towards them. It seems like the Demographic Parity Difference for when foreign workers are a protected attribute is the highest with Naïve Bayes. This means that we don’t have an equal rate of positive outcomes for each segment of a protected class. We have a value of almost 0.28 is the most biased in all the models. The lowest we have is 0.07 which is the Random Forest classifier. For Equalized Odds, Model 3 and 1 have the highest difference. This means that for these models, the odds of getting an equal percentage of two answer cases (I.e. 0, 1) for the two cases (I.e. 0, 1) in protected attribute are same. In our case, for foreign worker attribute, model 1 and 3 have most disparity for equalized odds. We have a high value for Equalized Odds for all models and it seems like there is a bias with Equalized Odds for foreign workers. Model 5 seems to be doing the best since we have the lowest score for Equalized Odds in that case. We can also see the consistency of our models with this dataset as well with Random Forest performing the best with 88%.

For my second attribute, I have the attribute “telephone”. For this one, the highest Demographic parity difference exists in random forest. Although, this is still extremely low in comparison to foreign worker attribute. We have a great performance on all models close to 0. The highest Equal Opportunity difference is in model 4 as well, still comparatively lower than foreign worker. The lower the numbers for these fairness metrics, the better our model performs in terms of bias and fairness.

For my third attribute, I have chosen “people_liable”. It seems like the values for Demographic Parity difference, and Equalized Odds are low which means there is very little bias overall, and all our models are performing well.

These are just few attributes that I decided to test. We can, however, derive good conclusions on which model consistently performs well in terms of fairness. From my observations, it seems like Model 2 and Model 5 seem to be doing the best. This means that, for the South German Credit Dataset, Decision Tree and XGBoost seem to perform the best in terms of fairness. However, considering the decision tree

did not perform as well as XGBoost in terms of accuracy, I'd choose XGBoost as the best performing model in both fairness and accuracy.