

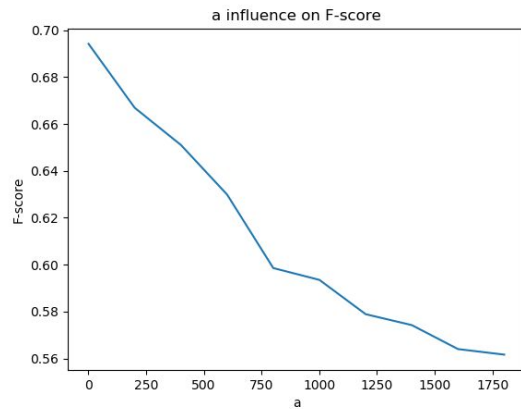
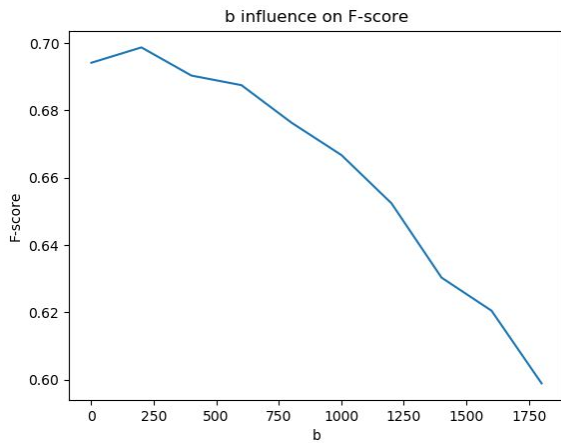
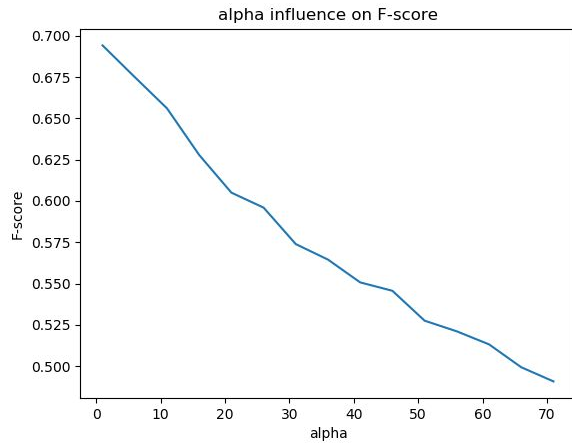
PA3 ASSIGNMENT REPORT

JUSTIN CAPPIELLO
JORDAN CHAU
TANISHA DEBASISH

CSE 474
GROUP 29

- Report the cross-validation F-score for the implemented Naive Bayes classifier on the provided data set. Vary the prior probabilities (a , b , and α) and report the results.

When varying the prior probabilities It can be seen that as all increase the F-score decreases however the degree that the decrease is not the same. Alpha was decreased at a step size of 10 and overall the F-score dropped around .2 total in 7 steps meaning if this rate is linear the slope is around -.003. Both a and b needed a significantly higher step size resulting in slopes of -.00009 for a and -.00006 for b . Additionally when increasing both at a similar rate the F-score remained constant meaning the ratio between a and b are more important than individual values which can be seen in the class probability formulas.



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- Report the Disparate Impact score of the cross-validation predictions of the Naive Bayes classifier (you can choose a specific value for the priors) for the two sensitive features - age and gender. Is your classifier unfair? State reasons why you think so.

Priors(a=1,b=1,alpha=1)

DI(gender) = 1.10

DI(age) = 1.25

Using the given priors above it can be seen that age was a larger influence than gender in the fairness. There was some unfairness seen in both cases and the easiest way to examine the results is too observe that a male is 10% more likely to be classified as good compared to a female and someone older than 25 is 25% more likely to be classified as good compared to those younger. Age appears to be a significant factor in this decision while gender does have influence, it has a smaller impact. By recognizing some of meanings behind our features in this case we can deduce that someone who is older is more likely to have positive traits in each feature relative to someone younger. The correlation at 25% is definitely significant however more features may need to be added before determining if causation is at play. In contrast gender, although it has a smaller overall influence on the result than age, may be seen as more unfair due to subjective observation of used features. In both cases it is difficult to tell how unfair this classifier is without either a larger amount of features added or investigation and analysis into biases within the features themselves.

- Using the provided resampling function, measure the disparate impact of the classifier as a function of p (probability of resampling a bad and unprivileged customer). Report your findings.

-From this analysis we can see as p increases, DI score increases as well as expected. Both cases have a similar rate of increase with age increasing slightly more overall. These functions may be exponential but further analysis would be needed. The slope in this function does show however that there is a relatively large amount of biased data included in the training data.

