AI Risk Report

After we receive the dataset, we preprocess the data before further use.
We follow these criteria from link.

- **Minimum credit score of 670**. Maintaining a credit score of at least 670 will improve your chances of qualification. However, if you want to receive the most favorable terms, we recommend a minimum score of 720.
- **Consistent and steady monthly income**. Minimum income requirements may vary drastically between lenders, with some having no requirements. However, it's crucial to have consistent and steady income at the minimum to demonstrate you can afford your monthly payments.
- **DTI ratio less than 36%**. While some lenders will approve a highly qualified applicant with a ratio up to 50%, it's best to aim for a DTI that's less than 36% to improve your chances of qualifying.

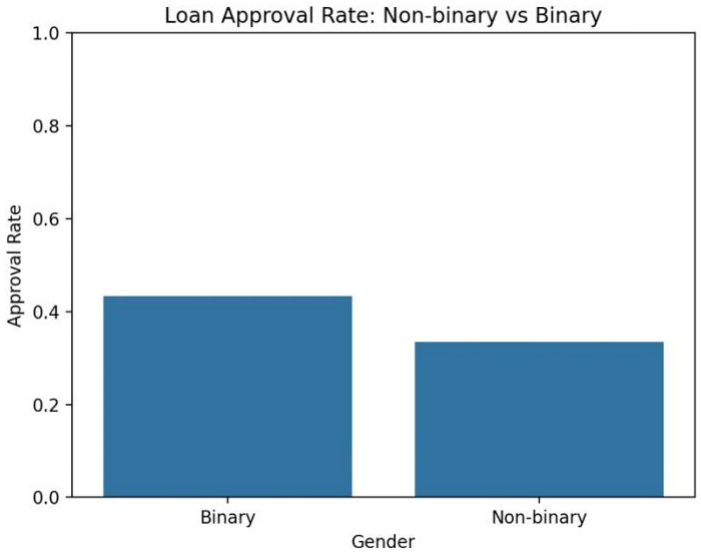
As you can see in dataset_loader.py,
We encode the non-numeric data into numeric.
And we also create a new columns 'Loan_to_Income', 'Meets_LTI_Criteria', 'Credit_Level' , which will help training model easier.

Bias Detection

We use aif360 model to detect the bias by giving the privileged and unprivileged group for the model, and also 'Loan_Approve' with favorable_label (1) as you can see in bias_detection.py.

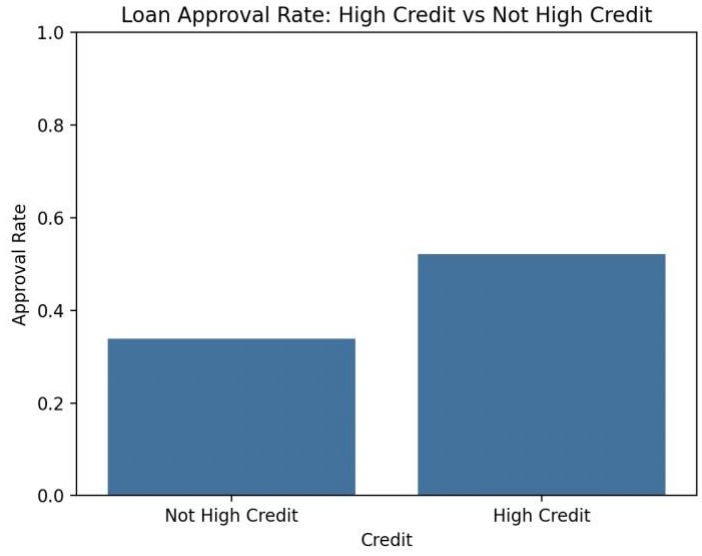
We found that the most critical part lies in Gender, Income and Credit level

Bias against Non-binary



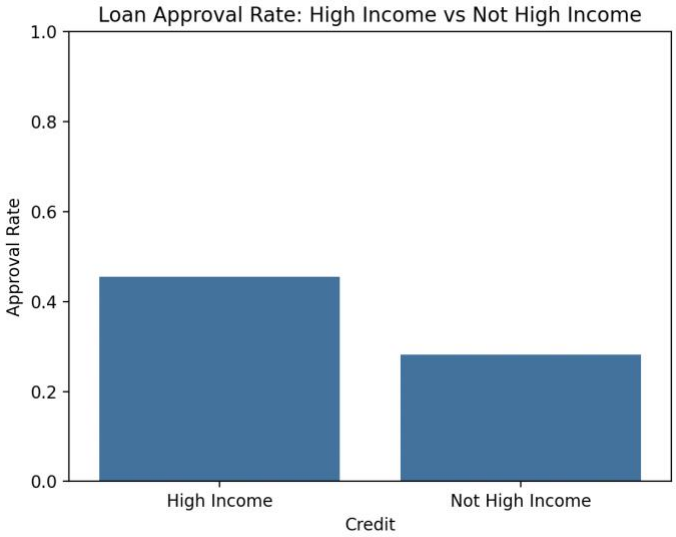
Disparate Impact: 0.7727227912835603
Statistical Parity Difference: -0.0985246815779034

Bias against Non-High Credit Score



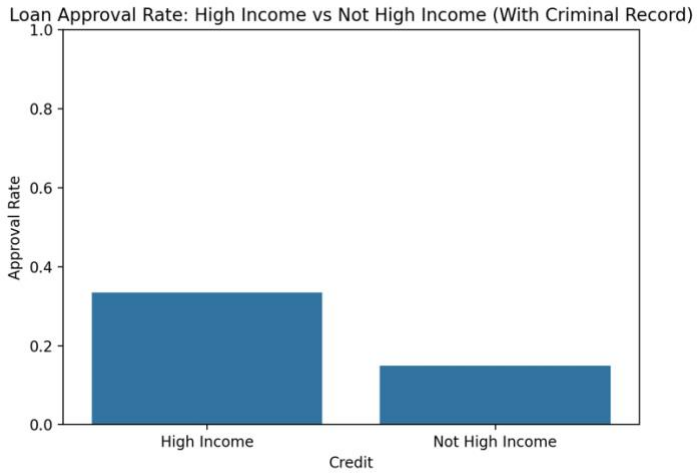
Disparate Impact: 0.6506098087570649
Statistical Parity Difference: -0.18209597159360852

Bias against Non-High Income



Disparate Impact: 0.6197659385649466
Statistical Parity Difference: -0.17286558923242212

Bias against Non-High Income with Criminal Record



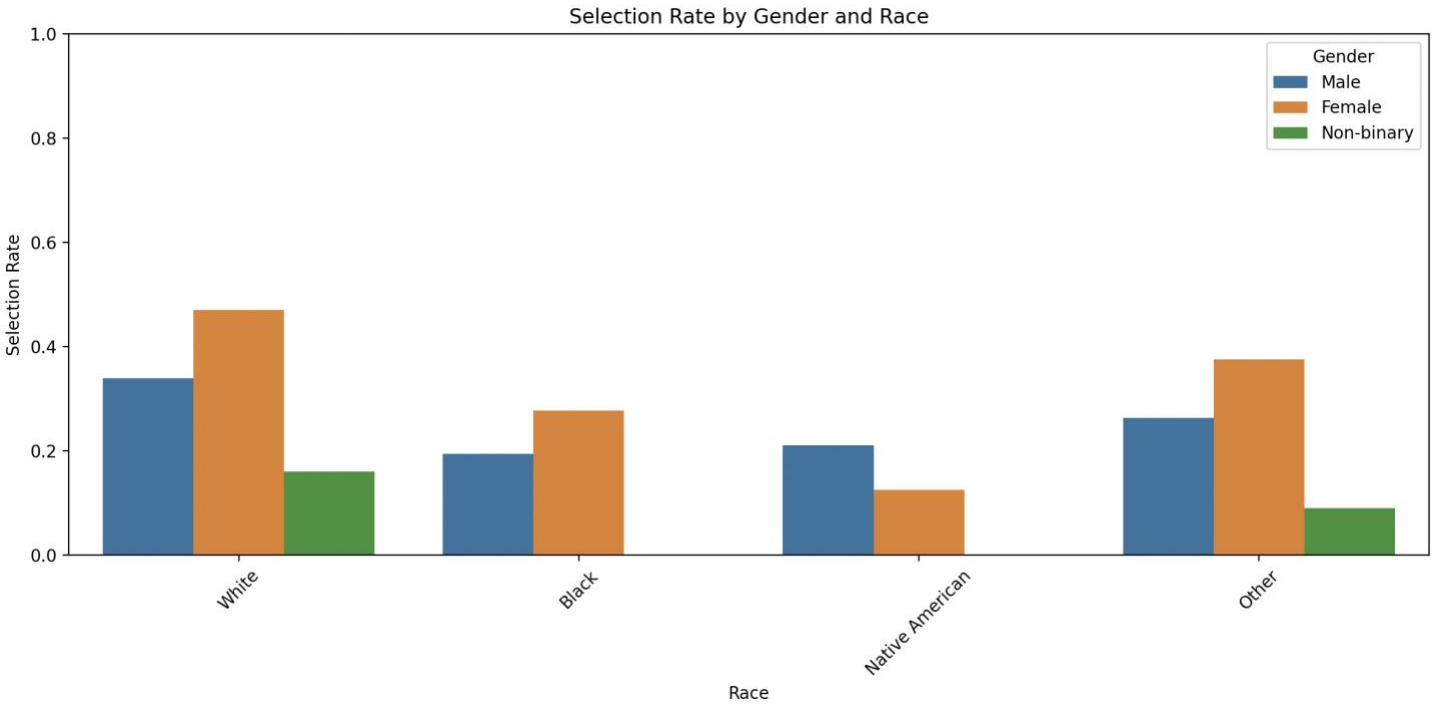
Disparate Impact: 0.4472864404000656
Statistical Parity Difference: -0.18477814015950886

We can conclude that people with less income and low credit score are disadvantaging, and even people with Criminal Record but have high income are having Approve Rate higher than people with less income.

But to be realistic, we cannot lean our model toward disadvantage group that much. So we decide to improve fairness with Gender and Race.

Fairness with fairlearn

We use fairlearn to evaluate fairness with sensitive case, which are Gender and Race.



After that we apply postprocessing with ThresholdOptimizer,