

Wesley Addo

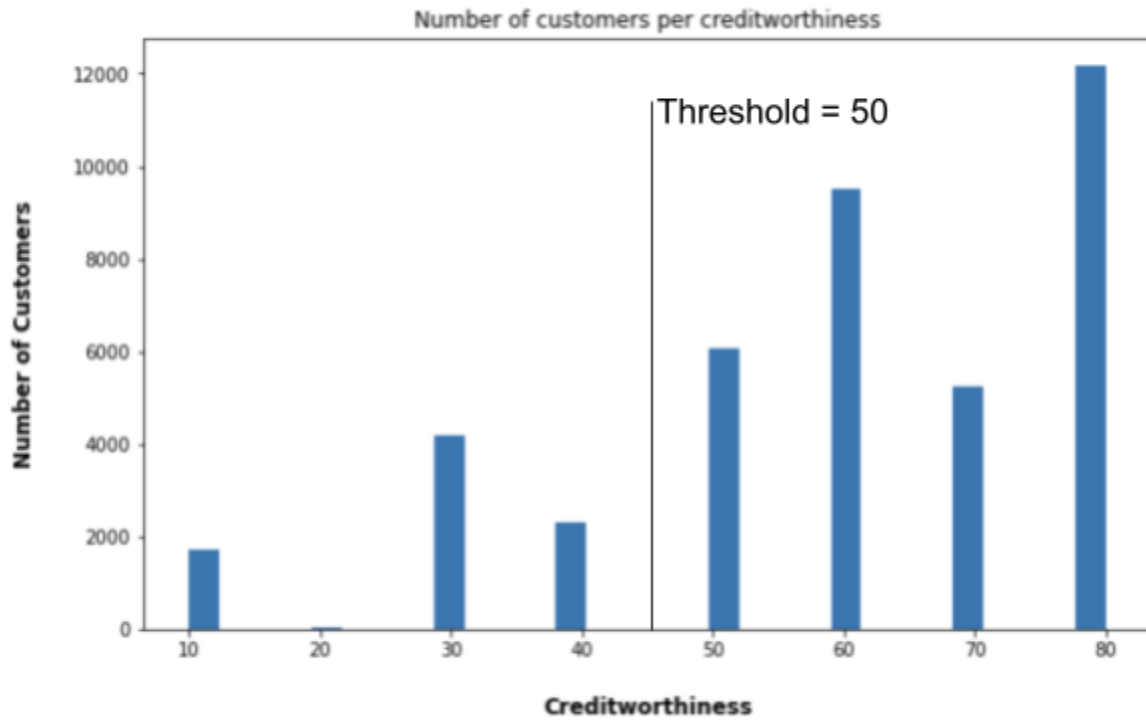
Step 2

- Dataset: Portuguese Bank Marketing Data Set (bank-additional-full.csv)
- Observation numbers: 41188
- Variables: 21
- Protected class and legal precedence:
 - age - Age (Discrimination in Employment Act of 1967)
 - marital - Familial status (Civil Rights Act of 1968)

Step 3

- Outcome variable: Creditworthiness derived from education level
- Formula used to score members creditworthiness from 0 to 100:
 - unknown = 10
 - illiterate = 20
 - basic.4y = 30
 - basic.6y = 40
 - basic.9y = 50
 - high.school = 60
 - professional.course = 70
 - university.degree = 80
- Protected Class Attribute: Age
- Privileged group: Young (age < 40); Number of Members in Training Set: 11516; Number of Members in Testing Set: 12252
- Unprivileged group: Older (age >=40); Number of Members in Training Set: 9078; Number of Member in Testing Set: 8342

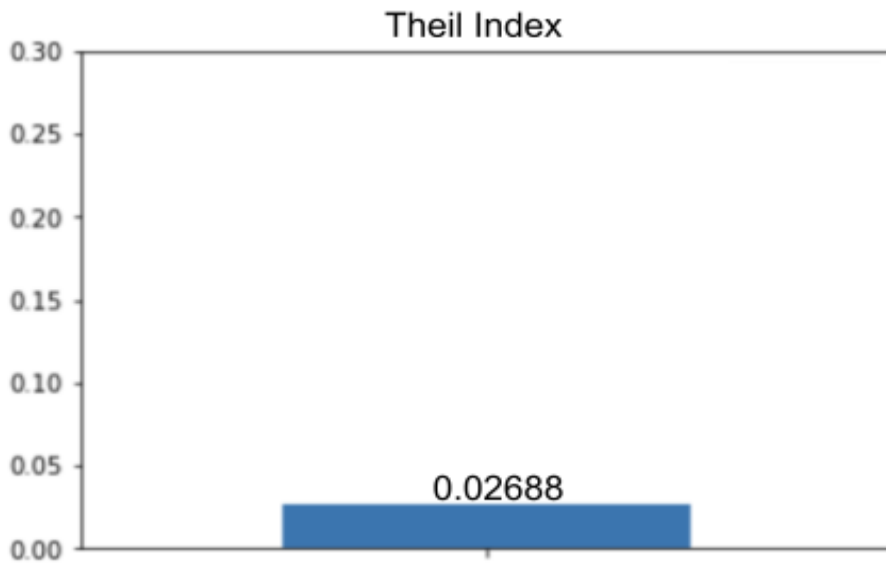
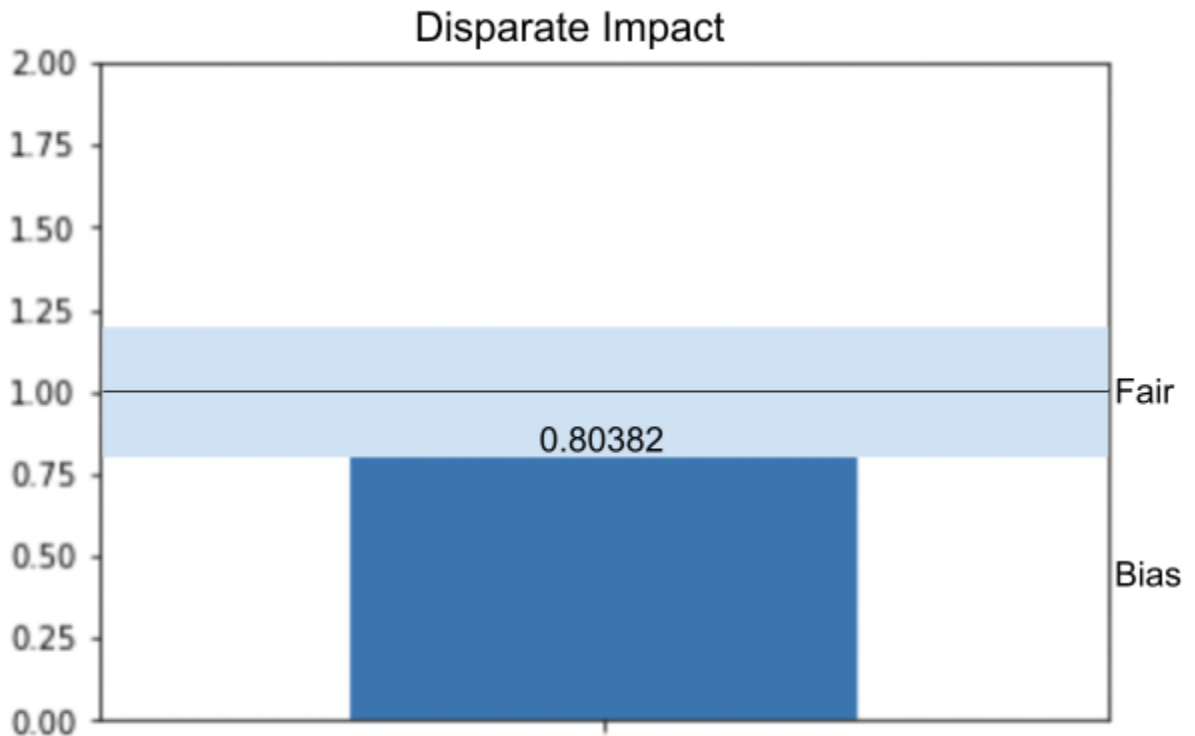
Step 4



- Threshold value: 50
- Profit = 329710

	Favorable	Unfavorable
Privileged	20656	5105
Unprivileged	12315	3112

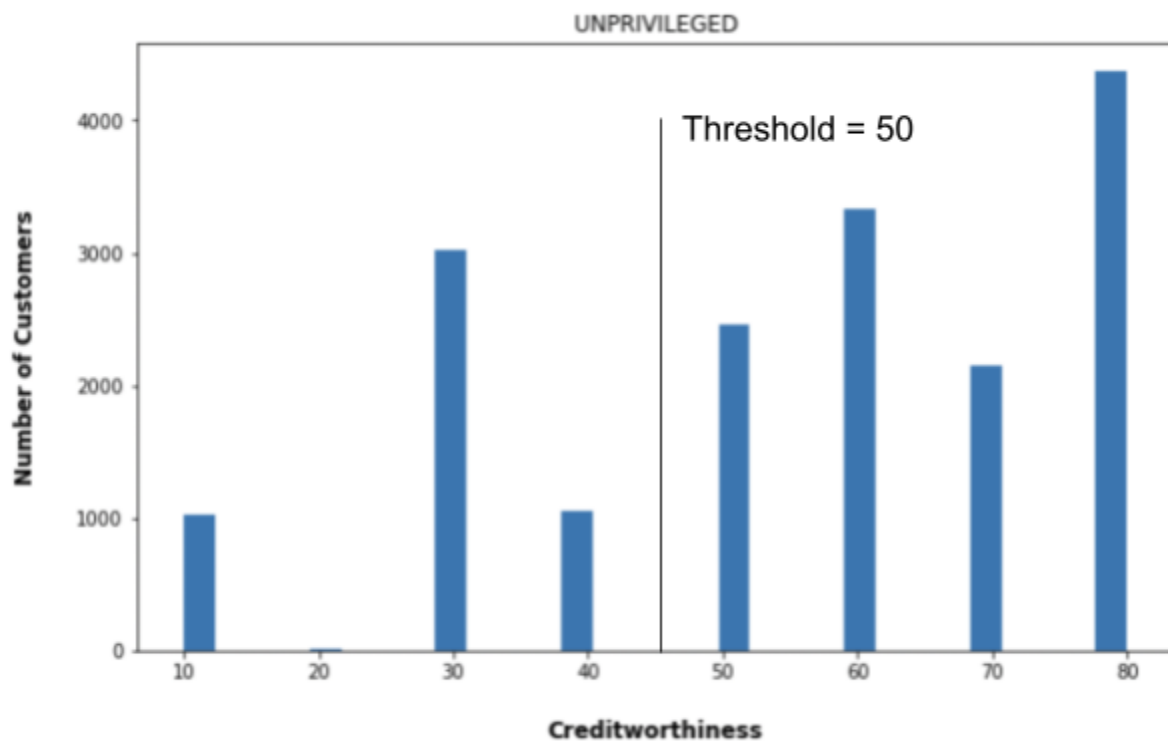
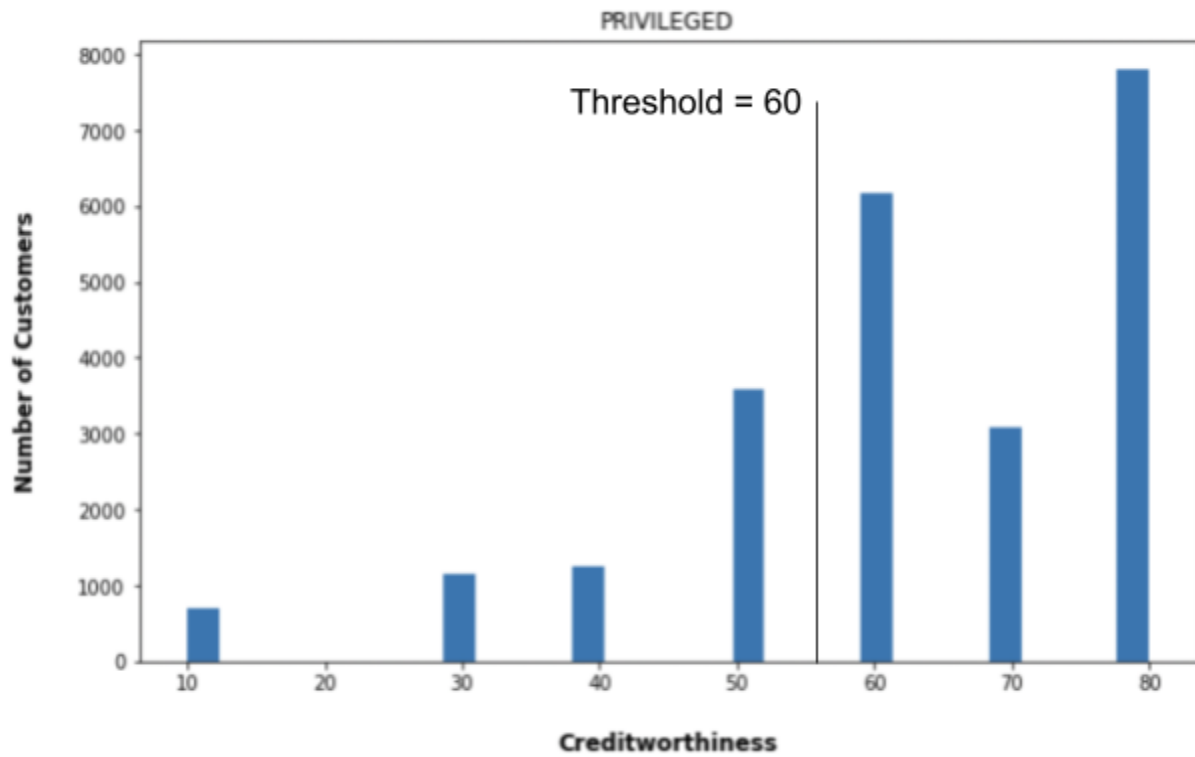
Step 5



The results from the Disparate Impact fairness metric indicate a slight bias for the privileged group, and the Theil Index also shows a slight bias for the privileged group. They fall just within the range of fairness, however

	Disparate Impact	Theil Index
Result	0.80382	0.02688

Step 6



- Creditworthiness formula remains the same (based on education level)
- Threshold value for a) privileged: 60, b) unprivileged: 50
 - (creditworthiness ≥ 60) & (age ≤ 40) → **approved**
 - (creditworthiness < 60) & (age ≤ 40) → **declined**
 - (creditworthiness < 50) & (age > 40) → **declined**
 - (creditworthiness ≥ 50) & (age > 40) → **approved**
- Profit = 283014

	Favorable	Unfavorable
Privileged	17064	6704
Unprivileged	12315	5105

Step 7

The Theil Index showed that there was little difference in outcomes between privileged and unprivileged groups. Although the Disparate Impact metric showed a difference in outcome between privileged and unprivileged groups (favoring the privileged group), it was well within the bounds of fairness.

The mitigation step was successful and it benefited the unprivileged group, as the result showed the Disparate Impact value becoming 0.98468. This indicates that the difference in outcome between privileged and unprivileged groups was reduced to a negligible, inconsequential level.

The privileged group was disadvantaged, since more of the group's members with good credit were rejected, and unprivileged members were still accepted at previous levels.

The issue that could arise would be calls of unfairness and discrimination against the privileged group since they are being given the short end of the stick and being handled unequally.