XAI: HW6

December 2022

1 Task 1

1.1 Demographic Parity coefficients

Red:

$$P(\hat{Y} = 1|Red) = 0.5$$

Blue:

$$P(\hat{Y} = 1|Blue) = 0.65$$

Coefficient for red:

$$0.5/0.65 \approx 0.77 \notin [0.8, 1.25]$$

This decision rule is not fair in view of "Demographic Parity".

1.2 Equal Opportunity coefficients

Red:

$$P(\hat{Y} = 1|Red, Y = 1) = 0.5$$

Blue:

$$P(\hat{Y} = 1|Blue, Y = 1) = 60/80 = 0.75$$

Coefficient for red:

$$0.5/0.75 \approx 0.67 \notin [0.8, 1.25]$$

This decision rule is not fair in view of "Equal Opportunity".

1.3 Predictive Rate Parity coefficients

1.3.1 Positive Predictive Value

Red:

$$P(Y = 1|Red, \hat{Y} = 1) = 0.5$$

Blue:

$$P(Y = 1|Blue, \hat{Y} = 1) = 60/65 \approx 0.92$$

Coefficient for red:

$$0.5/0.92 \approx 0.54 \notin [0.8, 1.25]$$

1.3.2 Negative Predictive Value

Red:

$$P(Y = 1|Red, \hat{Y} = 0) = 0.5$$

Blue:

$$P(Y = 1|Blue, \hat{Y} = 0) = 20/35 \approx 0.57$$

Coefficient for red:

$$0.5/0.57 \approx 0.88 \in [0.8, 1.25]$$

This decision rule is not fair in view of "Predictive Rate Parity" - Negative Predictive Value is similar between groups, however Positive Predictive Value differs significantly.