CIS399: The Science of Data Ethics	Homework 2: Feb 26, 2019
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1 Problem 1

Show that $(1 - FNR) = \frac{A}{A+C}$.

2 Problem 2

Show that $(1 - PPV) = \frac{B}{A+B}$.

3 Problem 3

Show that $\frac{BR}{1-BR} = \frac{A+C}{B+D}$.

4 Problem 4

Using the results from Problems 1, 2, and 3, show that:

$$FPR = \frac{BR}{1 - BR} \times \frac{1 - PPV}{PPV} \times (1 - FNR)$$

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5 Problem 5

The statement from Problem 4 holds for the entire population as well as for each group individually. Suppose that all three fairness notions are satisfied by our hypothesis, i.e. $FPR_1 = FPR_2$, $FNR_1 = FNR_2$, and $PPV_1 = PPV_2$. Further, assume that all of these values, as well as the base rates, are neither 0 nor 1. Show that this implies that the base rates of the groups must be equal.

6 Problem 6

Show that if our hypothesis makes no mistakes (i.e. $B_1 = B_2 = 0$ and $C_1 = C_2 = 0$), all three fairness notions will be satisfied, regardless of the base rates for each group.

6.1 Subsection 2.1

This is an example of a subsection.