

Data Structure Design

Understanding the Propublica Article

1 Reading the Propublica Article

The data we'll be working with comes from a ProPublica story about a risk assessment tool called COMPAS.

In order to understand the data, start by reading the ProPublica article:

- <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>

and the document describing how they did their analysis:

- <https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm>

Focus more on the first article which is crucial in understanding the context and therefore the dataset. For the analysis document, do not worry about the sophisticated graphs and statistics. However, you should give special attention to the contingency table that analyzes the COMPAS recidivism score for non-violent offenses and the paragraphs around it.

2 Clarification on the Chart and the Analysis

Here are some important things you should note about the chart *Prediction Fails Differently for Black Defendants*

- The chart is connected to the contingency table described above. Can you see how?
- “Higher risk” consists of all scores that are not considered “low”. “Lower risk” consists only of “low” scores.

- Though the chart labels the rows as
“Labeled Higher Risk, But Didn’t Re-Offend” and
“Labeled Lower Risk, Yet Did Re-Offend”,
it should respectively be understood more as
“Out of those that did not re-offend, this percentage was labeled
higher risk” (simply put: “Didn’t reoffend but labeled higher risk”)
and
“Out of those that did re-offend, this percentage was labeled lower
risk”. (simply put: “Did reoffend but labeled lower risk”)
- The percentages in the chart are calculated out of that specific race and not
out of all races.
- Combining two points above, consider the following example which explains
the 23.5% in the chart.
 - The 23.5% means that out of only the *white* defendants who did not
re-offend, 23.5% of them were labeled as “higher risk”.
 - It does **not** mean that out of defendants of *all races* who did not re-
offend, white defendants make up 23.5% of those that were labeled
“higher risk”.

The following explains in more depth some of the terminology from contingency
table mentioned earlier:

- The chart uses the term “survived” to describe those who did not re-offend
within 2 years of being rated “at higher risk” to recidivate.
- FP (false positive) rate refers to the number of people who were rated high
and did not re-offend out of the total number of defendants who survived
regardless of their COMPAS score:
 - For example, the FP rate for all defendants was calculated by

$$\frac{\text{All defendants who were rated high and did not re-offend}}{\text{All defendants who did not reoffend}} = \frac{1282}{1282 + 2681}$$
- FN (false negative) rate refers to the number of people who were rated low
and recidivated out of the total number of defendants who recidivated re-
gardless of their COMPAS score:
 - For example, the FN rate for all defendants was calculated by

$$\frac{\text{All defendants who recidivated and rated low}}{\text{All defendants who recidivated}} = \frac{1216}{1216 + 2035}$$