COMPAS and Sentencing in Broward County, FL

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Spring 2022

1 Introduction

In 2016, ProPublica published an analysis of the use of Northpointe's machine learning algorithm, COMPAS (short for Correctional Offender Management Profiling for Alternative Sanctions), in Broward County, Florida. This machine learning-trained algorithm by Northpointe, Inc. was developed to help in sentencing procedures by providing a data-based risk assessment score of a defendant's likelihood to recommit crime. In their study of sentencing data from 2013 to 2014 in Broward County, ProPublica found that the algorithm was "particularly likely to falsely flag black defendants as future criminals, wrongly labeling them this way at almost twice the rate as white defendants to be incorrectly judged to be at a higher risk of recidivism." (compas article) Northpointe reacted by unequivocally rejecting ProPublica's claims in a company-affiliated 2016 article, criticizing their statistical methods (northpointe study), leaving the debate stagnate.

Although there are multiple attempts to study potential biases in recidivism algorithms, we have, until now, been unable to locate studies that are concerned with how the use of such algorithms may affect sentencing itself, and therefore offer a contribution to the debate on the merits of algorithms in court systems. While ProPublica's study pointed strongly towards potential racial bias in the baseline distribution of COMPAS risk assessment scores to defendants who committed similar crimes in the Broward County court system, it did not check on the scores' relation to the actual sentences given to defendants.

Rather than weighing in on the bias of the algorithm itself, the goal of this study is to draw conclusions on the impact of the COMPAS algorithm on sentencing in Broward County. Analyzing sentencing behavior with respect to the risk scores and comparing sentences given prior to the use of COMPAS in Broward County with the ones during the use of the recidivism algorithm, will allow for a multilevel comparison of racial bias, gender bias, and intersectional approaches. This will entail analyzing the sentencing patterns of judges who sat on the bench before and after COMPAS was implemented. We will additionally examine changes in sentencing behavior as a result of including the assessment scores in judicial cases of felonies, domestic violence cases, and misdemeanor cases.

2 Background

2.1 COMPAS' bias, data flaws and human sentencing

ProPublica's research was based on previous scholarly work alluding to the possibility of racial bias in risk assessment tools used in courts in the United States, which, however, either did not have access to sufficiently large datasets or could not draw significant conclusions with respect to bias in the algorithms' workings (Skeem). And while COMPAS is now widely used in court systems across the US, the algorithm's code is held sealed by Northpointe, Inc. In that way, the algorithm, playing a significant role in defendants' sentences in the US legislature, can in fact not be understood, checked or reviewed by the very institutions using it. While Northpointe, Inc. claims its algorithm is fair, holding the same error rate in predictions across races according to company-intern studies, the code is not open to public inspection. Moreover, an article in the UCLA Law Review criticizes the algorithm's use not only for the foreclosure of information around it, but also for its use of data "tainted with historic and structural biases"[4]. Even though the algorithm may not in and of itself create racist outputs, the data used to develop COMPAS stems from the US justice system's past sentencing behavior. The algorithm, by virtue of being "trained on data produced by humans" in its machine learning processes, will incorporate and reproduce pre-existing structural biases, whose "taint will necessarily be imputed onto an algorithm's output" and prevent progress in criminal justice. [4]

Machine bias: The article also points out that the use of COMPAS in court comes with a number of risks concerning the judges' independence and neutrality during the sentencing process. Firstly, there is a danger of "automation bias" that occurs with the use of COMPAS in court.

> Automation bias refers to the tendency to "ascribe greater power and authority to automated aids than to other sources of advice." Studies show that automation bias rears its head in a wide variety of situations, from evacuees blindly following malfunctioning robots in emergency situations, to seasoned radiologists relying on faulty diagnostic aids when they would have fared better without them. This occurs because humans subconsciously prefer to delegate difficult tasks to machines, which we view as powerful agents with superior analysis and capability. And the more difficult the task—and the less time there is to do it—the more powerful this bias becomes.

[5]

In the context of recidivism algorithms, this means that judges might rely heavily on the computed risk score provided and overrule their own intuition. In fact, "COMPAS's manual informs judges that a "counter-intuitive risk assessment" is not an indicator that the algorithm has functioned improperly", and therefore allocated a strong authority to the algorithm. Presenting high-stakes decision makers like judges with highly authoritative, apparently 'reliable'

numbers might induce a tendency towards seeking and leaning into information about the defendant that stays in accordance with the risk score provided, provoking "confirmation bias" in sentencing.

2.2 Flaws in COMPAS' data collection

Another problem with the data used by COMPAS is that the algorithm is based on 137 different variables which are entered **manually**. This is a problem because manual data entry based on a questionnaire is riddled with errors. COMPAS is proprietary (code belongs to Northpointe, Inc.), which means its calculations cannot be double-checked for individual cases, and its methodology cannot be verified for data flaws. Furthermore, it is unclear in what manner the data parts that COMPAS collects contribute to its automated assessments. For instance, while some of the questions on the COMPAS questionnaire are the same as those in almost every risk score — age, and number of past crimes committed — other questions seem to be direct proxies for socio- economic status, such as "How hard is it for you to find a job ABOVE minimum wage compared to others?" Using such categories in a risk score involved in real-life sentencing is questionable and is suspected to reinforce criminal injustices based on existing social inequalities. [6]

2.3 COMPAS itself

The information collected through interviews, questionnaires and records are fed into the 22 scales of the algorithm, grouped into five categories: criminal involvement, relationships/lifestyles, personality/attitudes, family, and social exclusion. Since 2008, it has been used by the Pretrial Services Division, the Day Reporting and Reentry Division, and the Probation Division of the Broward County's Sheriff's Office. Based on these metrics, COMPAS produces three categories of risk: recidivism, violence, and failure to appear [at a court hearing]. Risk scores range from 1 to 10, where 1-4 is low risk, 5-7 is medium risk, and 8-10 is high risk. [2] In 2008, COMPAS was implemented by the Broward County Sheriff's Office (BSO).

2.4 COMPAS in Broward County Court System

Before we delve deeper into our analysis and findings, it is important to provide some background to Broward County's justice system. Each of the courts in a county in Florida have at least one judge. Each one serves for six-year terms and they serve individually [rather than on panels of judges]. For higher jurisdiction matters such as for criminal cases with felony charges, it is more likely to be heard by a circuit court than a county court. Broward County, FL, is in the 17th circuit which is in the 4th district of court appeals. [1] The stages of a criminal case in Broward County, FL, include the following:

First Appearance Within 24 hours after an arrest, a person in custody must be brought to court to appear in front of a judge to inform them of the

reason for which they have been detained and determine if there is probable cause for the arrest. The judge also determines the amount of bail that can be posted and whether the public defender's office should be appointed in case the person is unable to afford a private criminal defense attorney.

Filing of Formal Charges After the arrest for felony charges, a prosecutor with the State Attorney's Office has 21 days to decide whether or not to file charges, and decide about the degree of those. Criminal defense attorneys in Broward County, FL, call this stage of the case the "pre-file" investigation stage. During the pre-trial investigation, the attorney works to convince the prosecutor not to file charges or only to file the least severe charges.

Arraignment After a person is formally charged, the defendant is brought before the court to hear the formal charge, and to enter a plea of "guilty" or "not guilty." If the defendant is in need, but the public defender has not yet been appointed, the judge will inquire about whether appointing the public defender is appropriate at the arraignment.

Calendar Call At the calendar call, the prosecutor and the criminal defense attorney meet with the judge assigned to the case to determine if both sides are ready to proceed to trial. When appropriate, the court will set a trial date during the calendar call.

Status Conference At the status conference, the court will confer with the prosecutor and defense attorney to learn more about any pre-trial issues in the case that need to be decided before a jury is selected or the trial begins.

Trial At the trial, the prosecutor must bring sufficient evidence for the case to proceed to a final determination by the fact-finder of a guilty or not guilty verdict.

Plea In some cases, the defendant will decide to enter a plea instead of proceeding to trial. The court must determine whether the plea is free and voluntary.

Sentencing If the defendant enters a plea or if the defendant is found guilty at trial, then the court proceeds to trial. In a felony case, the court reviews the sentencing guidelines and any plea agreement before imposing the sentence. [3]

2.5 Methods

Getting comparative data - 2006/07 and 2013/14 In order to be able to conduct a comparative study between sentencing behaviors with and without the use of COMPAS in Broward County, we decided to use and extend the 2013/2014 database provided by ProPublica, and to build a database of comparable size and contents (except for the recidivism risk scores, of course). As a comparable period of algorithm-free sentencing, we decided to focus in on two years before the introduction of the algorithm in 2008, hence 2006 and 2007. During the early stages of our project, we therefore leaned onto ProPublica's approach to data collection with Broward County as a model for our project working with data from the same system. [**?**] According to ProPublica, the researchers chose Broward county as their research focus because of Florida's open-record laws and the county's extensive use of COMPAS as a recidivism risk assessment tool

at different stages of trial processes. After filing a public records request, they created a database of 11,757 case files of criminal defendents at the "pretrial stage" from 2013 and 2014. The procedure was the following:

1. Using the entries of the COMPAS score database, a criminal history profile for each person was built (before and after being assessed). The group created the profiles by compiling an individual's criminal records, found and matched through name and their date of birth, in a database with their recidivism score. During this process, they drew on about 80,000 criminal records from the Broward county website.

2. In the dataset they compiled, the researchers used classification categories (race, gender, ethnicity,...) in accordance with the county's definitions, and only considered cases of offenders that were arrested, excluding cases falling into the category of traffic tickets or municipal ordinance violations. The majority of their database's cases are criminal felonies and incidents of misdemeanor.

3. In order to define recidivism, the group compiled criminal records of defendants that occurred within two years after their initial risk assessment, for a new arrest. In that way, the group was able to monitor cases of recidivism for the defendants in the database.

As we found out, the group had not only gathered the risk assessment scores used in court for the years 2013 and 2014, but has collected extensive data on each defendant's biological, racial, ethnic and criminal background. Importantly, ProPublica had matched their data entries with the Broward County court case numbers of each corresponding criminal case, which can be publicly searched and seen on the county's clerk website. Using the case numbers provided by ProPublica as key to case files on the website, it was possible to create a data scraping algorithm to add essential information from each case's webpage to the entries in the existing database. We decided to cut down from the over 11000 entry database to 6641 cases of 2013 and 2014 that fell into the most frequent court divisions, criminal felony (CF) and misdemeanor (MM). We then complemented each case of the reduced database with the responsible judge's name, the sentence given for each case, as well as lacking background information that could be used later for testing for biases in sentencing, such as skin color, race, age, among others. [See Appendix for Full List].

3 Pre-algorithm phase

The second part of the data collection process turned out to be more challenging as it involved building up a database from scratch, comparable to the existing data of the 2013/14 era, and including similar numbers of CF and MM cases. Since the website's search interface demands specific information, such as full names, case numbers or filing dates in order to work, accessing case files without

a collection of existing case numbers of the years 2006 and 2007 was difficult. Despite having filed a public records request, and despite having attempted several follow up calls to acquire data from those two year, we have unfortunately been unsuccessful in finding collaborative solutions with the county's administration.

An alternative way of acquiring data was to generate our own collection of case numbers and accessing the corresponding web pages on the clerk website through further scraping. This presented itself as quite the hurdle, since the Broward County Clerk's website only provides rudimental information about the case numbers, without an explanation that would make a systematic search possible.

According to the website, 10 digit case numbers consist of two digits for the year of the case, a six digit sequential number, a two-letter abbreviation for the case's division, a two digit reference to the corresponding court of the county, and a final letter A (for single defendant).

After a significant amount of research, including meetings with leading researchers of the Florida ACLU, and numerous tests of case numbers, we were able to find a system. We found that for 2006, i.e. leading numbers 06, all eight divisions shared the same increasing sequential 6-digit count, meaning that one sequential number could be in either of the 4 courts and 8 divisions. For 2007 then, each court division had its own sequential count, while still possible in all four courts. We then developed an algorithm that would create composite case numbers applicable for the two years' case numbers, and run searches until successful. For 2006, that meant that for every sequential count, there could be a maximum of 32 case searches, 4 per each of the 8 divisions, until a case would be found. The separate sequence counts in 2007 reduced the maximum tries to find a case to four per sequence count in each division. Focusing our search on cases from the divisions 'Criminal Felony' (CF) and 'Misdemeanor' (MM) saved time and unnecessary search trials, while allowing the collection of a large dataset of 4715 cases in 2006 and 4951 cases in 2007. The data we scraped from each defendant's file whose case number we generated includes filing date, court, case type, case status, judge name and ID, gender, race, languages spoken, skin complexion, height, weight, eye color, hair color, date of birth, birth place, the type of defender and, importantly, the sentence.

References

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