Exploration of COMPAS Biases in Broward County

Analysis by Maria Baltazar

Introduction and Demographics

It is not uncommon knowledge that nationwide the criminal justice system utilizes algorithms housing monstrous biases. This data exploration tackles COMPAS scores from Broward County, Florida for the years 2013 and 2014. To summarize from the preceding literature review, COMPAS Disparity for Hispanic Individuals, COMPAS stands for Correctional Offender Management Profiling for Alternative Sanctions. The COMPAS algorithm assesses a defendant's likelihood to reoffend. Created by Northpointe, COMPAS gives defendant's three scores "Risk of Recidivism," "Risk of Violence", and "Risk of Failure to Appear." For the purpose of my analysis, I only looked at "Risk of Recidivism" and "Risk of Violence". These scores are on a scale of 1 to 10, 1-4 are considered "Low", 5-7 are "Medium", and 8-10 are "High". These scores are summarized below.

	race	
decile_score	Caucasian	Hispanic
1	605	159
2	321	89
3	238	73
4	243	47
5	200	39
6	160	27
7	113	28
8	96	14
9	77	17
10	50	16

To begin this analysis, I filtered the dataset to look only at scores given within 30 days of the crime and those who recidivated within two years or had been scored and not recividated within two years. I then filtered by race to only include hispanic and caucasian individuals. I compiled the following demographics:

Total individuals: 2612

Age

Less than 25: 456

25-45: 1419

Greater than 45: 737

Race

Caucasian: 2103

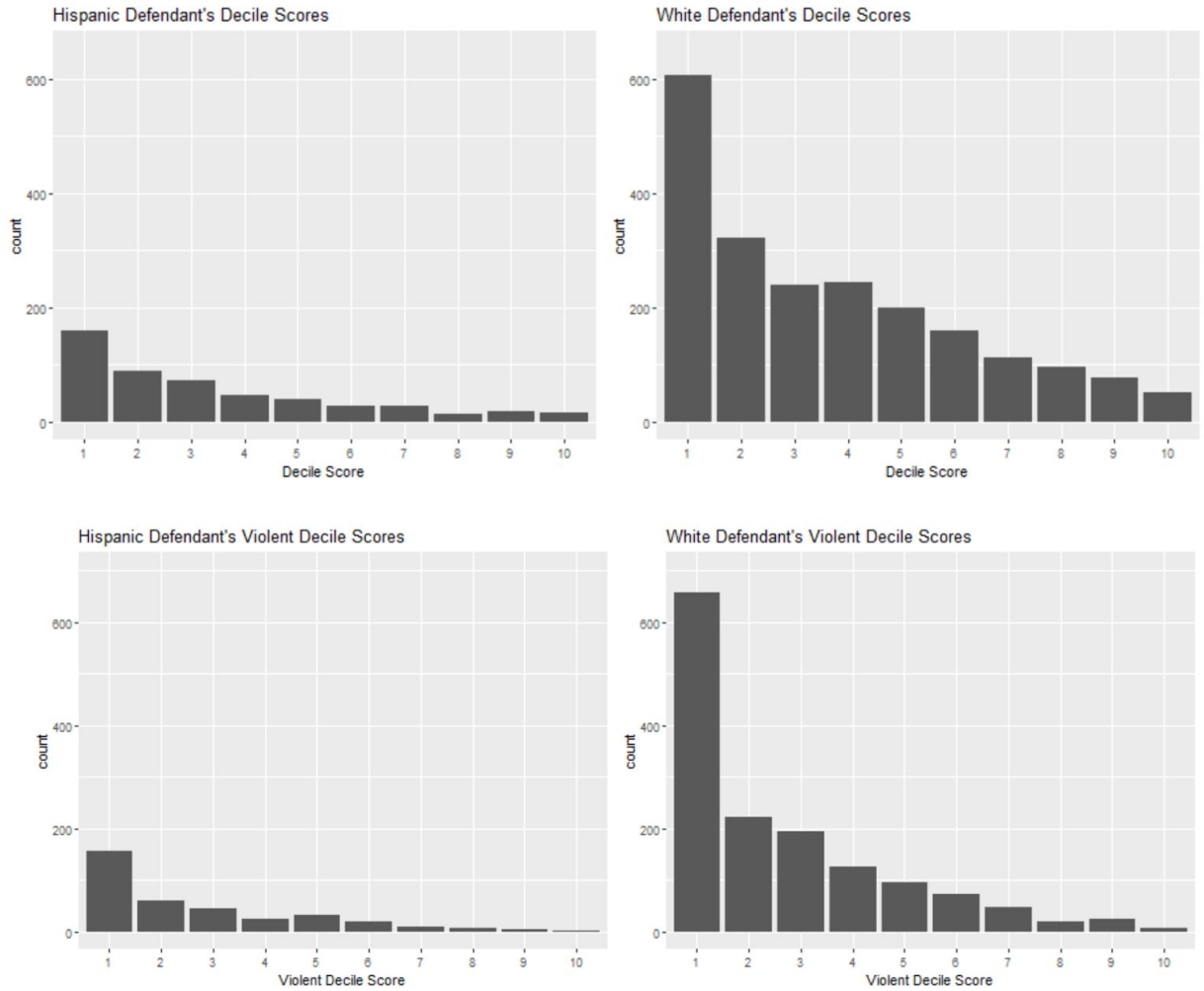
Hispanic: 509

Sex

Female: 564

Male: 2048

This dataset gives the following decile score distribution.



These histograms show a clear downward trend for both hispanic and white defendants. However, they also show an extremely imbalanced dataset. A quick calculation of distributions shows that the dataset hosts 80.51% white defendants and 19.49%

hispanic defendants. I spent countless hours on attempting to under or down sample my dataset with no success, and reluctantly chose to continue the analysis with class imbalance.

Findings

By running a logistic regression comparing low and high scores, I found that hispanic defendants are 6.9% more likely than white defendants to receive a higher score. Interestingly enough, I also found that women are 19.4% more likely to score higher than men and people under the age of 25 are 3 times as likely to receive a high score compared to defendants 45 or older.

For risk of violent recidivism, COMPAS overpredicted recidivism by 9.4% for hispanic defendants compared to white defendants. My findings also show that defendants under the age of 25 are 7.4 times more likely to receive a higher violent score than defendants 45 or older.

To continue the exploration, I tested the predictive accuracy of COMPAS using a Cox model. This showed that defendants with a high score are 3.5 times as likely to recidivate and COMPAS' concordance is 63.6%. I also found that high risk white defendants are 3.61 more likely than low risk white defendants, while high risk hispanic defendants are 3.2 more likely than low. This finding is not significant enough to say there is different behavior across races.

Next, by comparing scores between races I was able to gather the following:

```
All defendants
                Low     High
Survived        2681    1282    0.55
Recidivated     1216    2035    0.45
Total: 7214.00
False positive rate: 32.35
False negative rate: 37.40
Specificity: 0.68
Sensitivity: 0.63
Prevalence: 0.45
PPV: 0.61
NPV: 0.69
LR+: 1.94
LR-: 0.55
```

This shows an overall false positive rate of 32.4%. Using the same technique I found that the false positive rate for hispanic defendants is 32.1% and the false positive rate

for white defendants is 23.45%. This means that COMPAS misclassified hispanic defendants with a high score who go on to not commit more crimes 36.8% of the time.

Sources

D.P. Martin. 2016. Handling Class Imbalance with R and Caret - An Introduction. https://dpmartin42.github.io/posts/r/imbalanced-classes-part-1

Propublica. propublica/compas-analysis. Retrieved November 2020 from https://github.com/propublica/compas-analysis