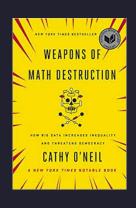
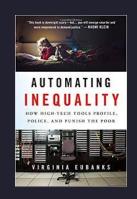
Big Data and Al

Algorithmic Fairness Equitable Impact

Big Data Under Review







Weapons of Math Destruction

Automating Inequality

ProPublica COMPASS

General Data Protection Regulation



European Union Regulatory Framework

- Curbs algorithmic decision making
- Defines "right to explanation"



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Table of Content

Definitions of Fairness, "Catalog of Evils"

Framework for testing models for fairness

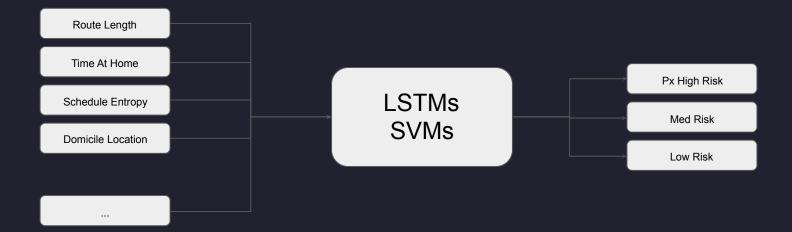
Case Study

Questions

Retention Model

PROBLEM: Extreme driver turn-over in transportation industry, and high driver replacement cost.

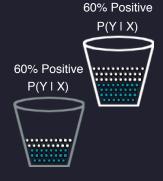
SOLUTION: Retention model to predict drivers at high risk of leaving. Retain through intervention.



Model is deemed safe

Definitions of Fairness







Statistical Parity
The rate of positives is the same between groups

Conditional SP
The rate of positives is the same between groups when controlled for legitimate factors

Predictive Equality

The rate False Positives is the same between groups.



Definition of Fairness - 2

- Calibration for each group, the same fraction of people in each are positive
- 2. Balance for positive class the average score for positive members in group A equals the average score of positive members in group B
- 3. Balance for negative class the average score of negative members in group A equals the average score of negative members in group B





Catalog of Evils

- 1. Mis-calibration systematic overestimation of group's risk
- 2. Redlining ignoring relevant attributes
- 3. Sample bias and label bias not representative population, wrong targets
- 4. Subgroup Validity using differentially predictive features
- 5. Use of protected characteristics race, gender, sex, or proxies
- 6. Disparate impact adverse effects at different rates
- 7. Disparate error rates unequal false positive rates



Retention for Hiring

Using retention model for maximizing the utility of each hire:

- 1. Can the retention model remain fair?
- 2. Is the hiring model non-discriminatory?

Goal - Predictive Equality:

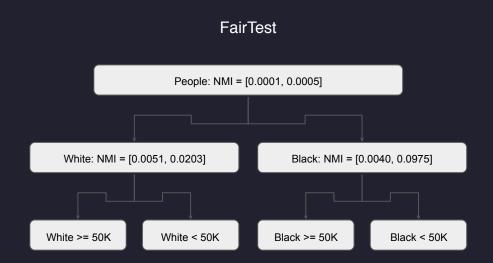
- 1. Inversion Test
- 2. Identify sub-populations
- 3. Evaluate feature importance



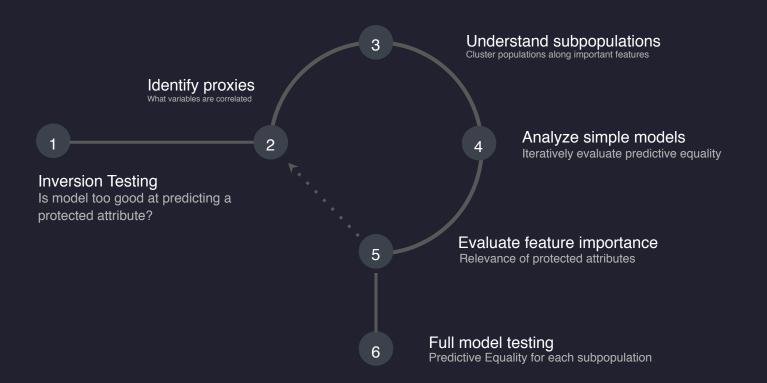
Existing Frameworks for Testing Fairness

- 1. Enterprise tools:
 - a. Microsoft Al toolkit
 - b. Facebook FairFlow
 - c. Accenture Fairness Tool

- 1. Open Source tools:
 - a. FairTest
 - b. Fair ML



Fairness Audit





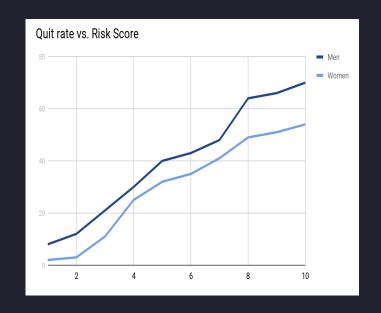
Fixing the models

Option 1: Thresholding scores

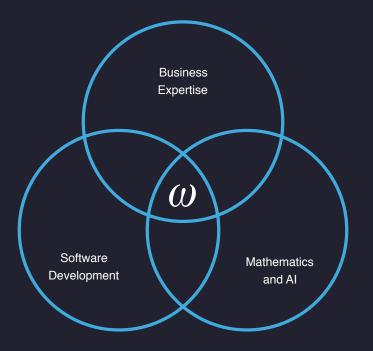
Option 2: 'Repairing' the data

In cases of

- Different base rates
- Differentially predictive features
- Specific priorities for sub-population
- Correcting implicit bias in data
- etc.



(not actual for demonstration only)



Confluence of science and business