On the Long-term Impact of Algorithmic Decision Policies:
Effort Unfairness & Feature Segregation via Social Learning

Hoda Heidari, Vedant Nanda, Krishna Gummadi

Automated Decision Making

techWorld FROM IDG — Features Technology Innovation Partner Zone the techies

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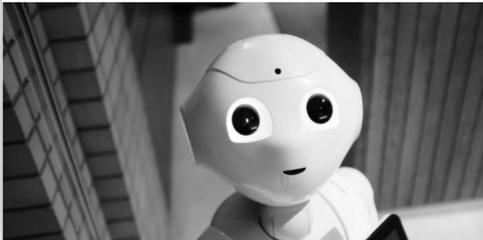**Researcher explains how algorithms can create a fairer legal system**

SCI-FI VISIONS

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...o robot surgeons, artificial intelligence is already ...edicine.

8 WAYS MACHINE LEARNING WILL IMPROVE EDUCATION

BY MATTHEW LYNCH | JUNE 12, 2018 | 5

How Machine Learning Is Quietly Transforming Small Business Lending

Forbes Finance Council

Trevor Dryer Forbes Councils
Forbes Finance Council CommunityVoice

The New York Times

TheUpshot

ROBO RECRUITING

Can an Algorithm Hire Better Than a Human?

By Claire Cain Miller

Algorithmic Unfairness

MEDICAL MALAISE
If you're not a white male, artificial intelligence's use in healthcare could be dangerous
By Robert David Hart · July 10, 2017

A beauty contest was judged by AI and the robots didn't like dark skin
The first international beauty contest decided by an algorithm has sparked controversy after the result... linking the winners

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Automated testing and analysis of company's advertising system reveals male job seekers are shown far more adverts for high-...g executive jobs

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SPEAK FREELY
How Facebook Is Giving Sex Discrimination in Employment Ads a New Life
By Galen Sherwin, ACLU Women's Rights Project
SEPTEMBER 18, 2018 | 10:00 AM

The Switch
Wanted: The 'perfect babysitter.' Must pass AI scan for respect and attitude.

20 JAN 2017 | Insight
Kevin Petrasic | Benjamin Saul
Algorithms and bias: What lenders need to know
The algorithms that power fintech may discriminate in ways that can be difficult to anticipate—and financial institutions can be held accountable even when alleged discrimination is clearly unintentional.
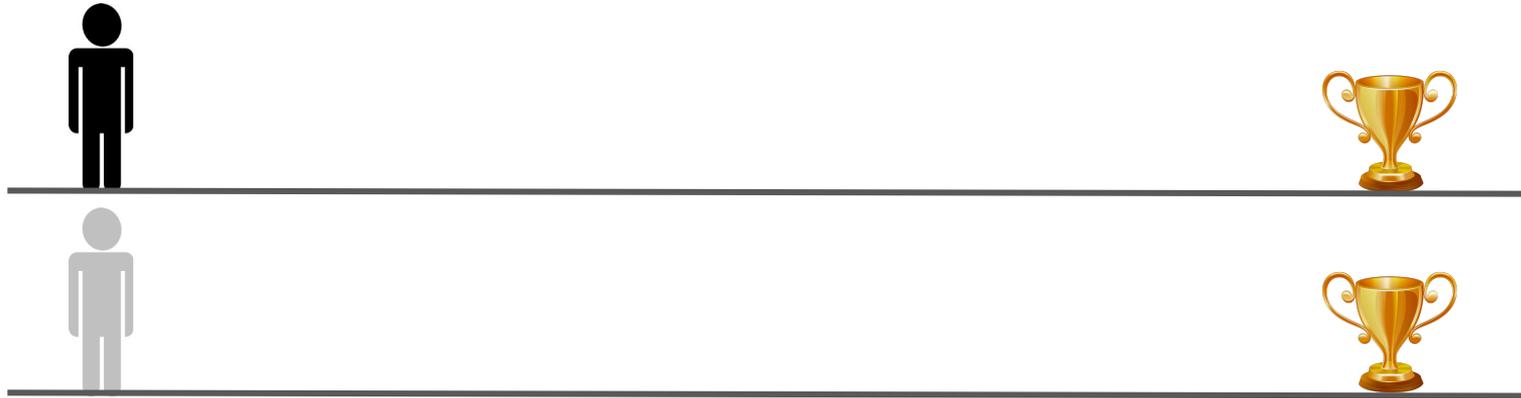
PRO PUBLICA
Machine Bias
There's software used across the country to predict future criminals. And it's biased against blacks.
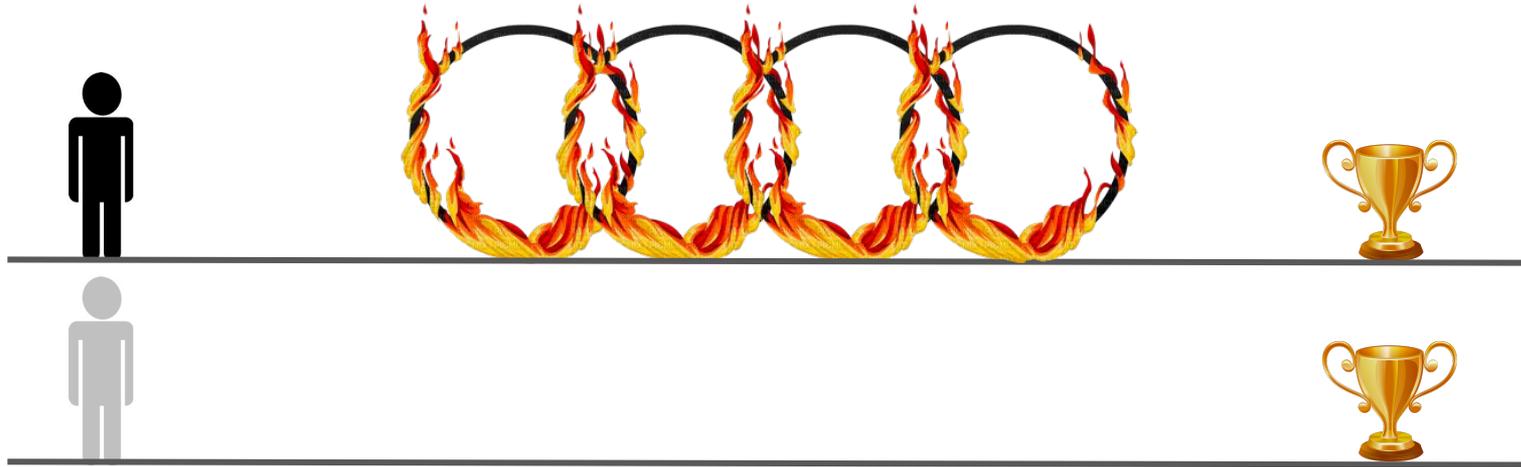by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica
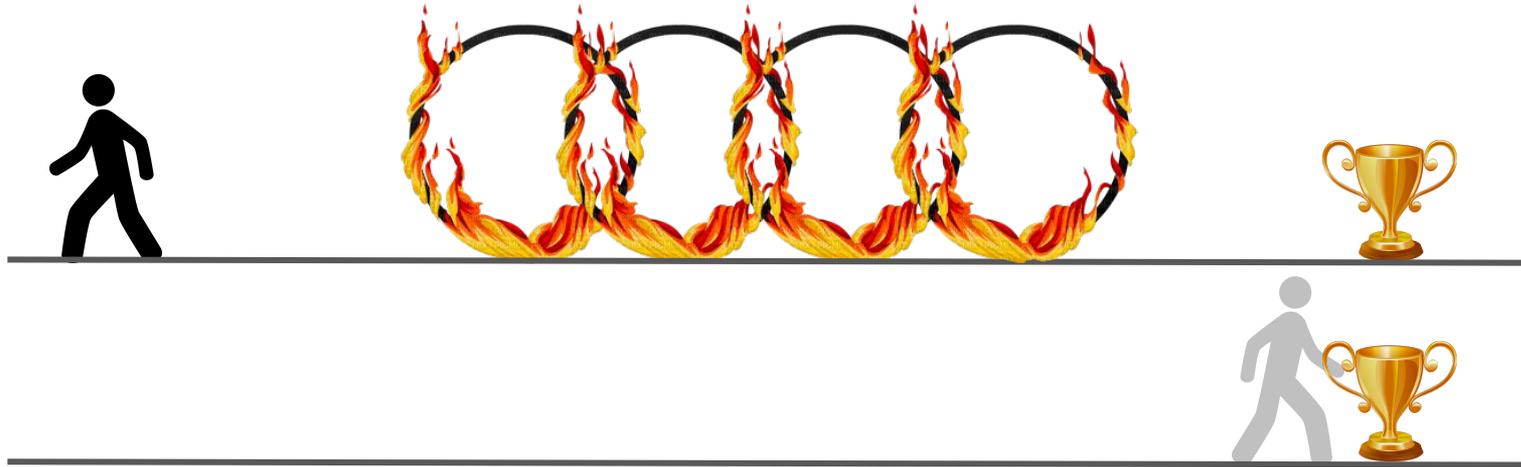May 23, 2016

Problems with Static Notions of Fairness

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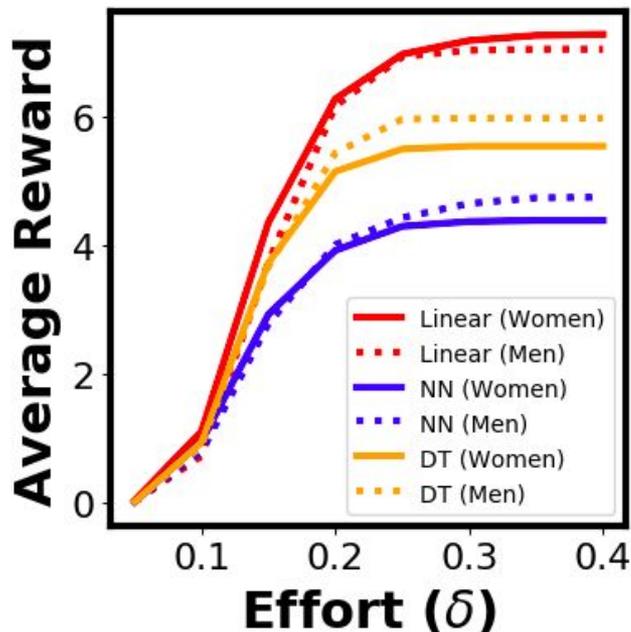
Problems with Static Notions of Fairness

Problems with Static Notions of Fairness

Effort Unfairness

- Economic models of Equality of Opportunity (Roemer, 2002)

- For an individual in group s
- changing a *monotone* feature from x to x'
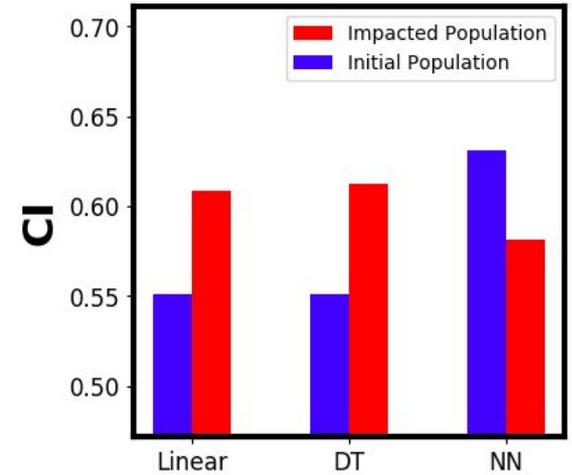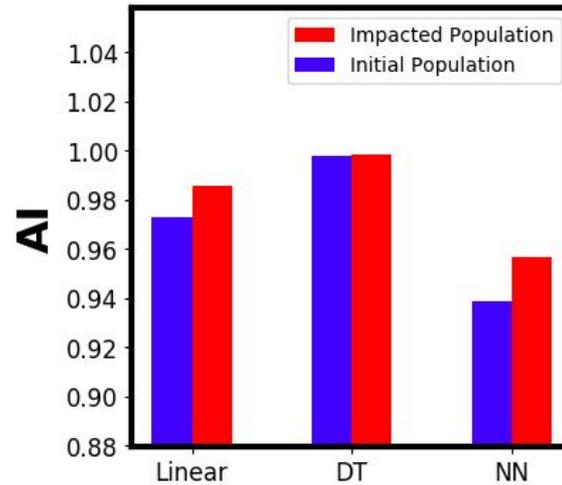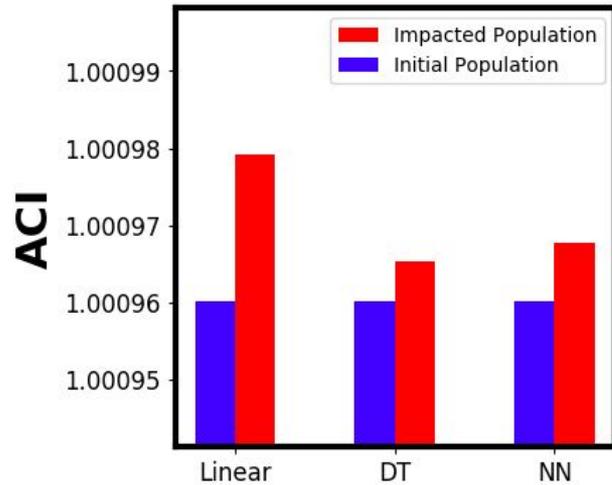- takes effort max { 0, $Q_s(x')$ - $Q_s(x)$ }.

Long-term Impact

- Our proposal:
  - People will exert **effort** and invest in qualifications
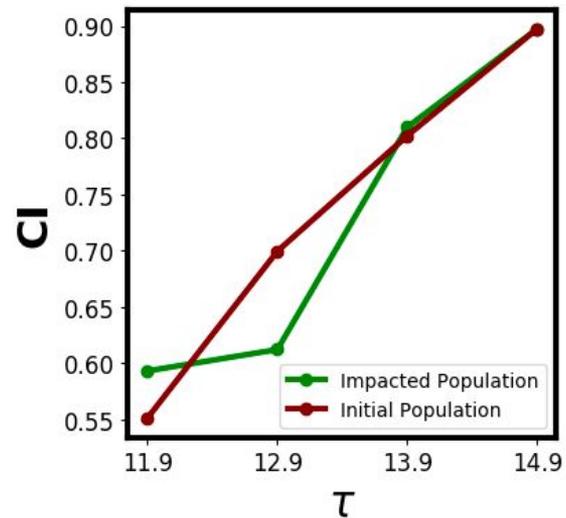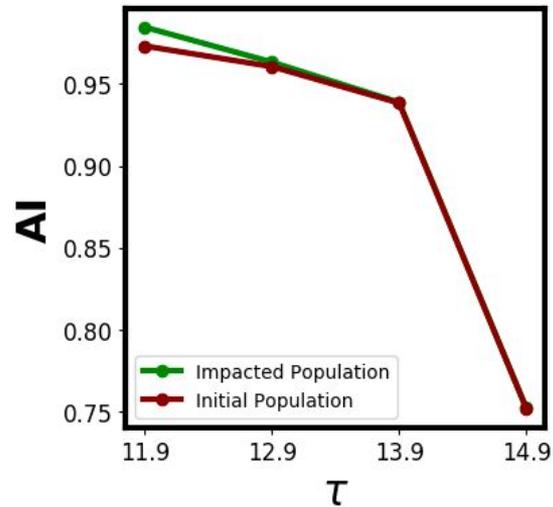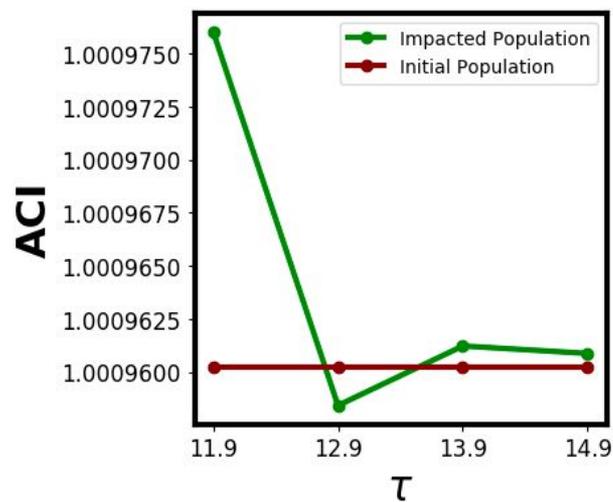 - that improve their **utility (= reward - effort)**.

- Individual-level model: **social learning** (Bandura, 1962)
  - Individuals imitate the behavior of their **social models**.
  - *Social model* is another decision subject imitating whom maximizes *utility*
- Population-level measure: **segregation**

Measuring Impact on Qualifications

Fairness Interventions

Food for Thought

- What is the ultimate purpose of a fair model?
- Are all errors created equal?
- Is it ethically acceptable
  - To incentivize different groups to obtain different qualification?
  - To employ an "unfair" model today to guarantee long-term equality?
- ...