

Flames



CS 594: 1- Harms of Data

Abolfazl Asudeh
Fall 2020



- Course Page:

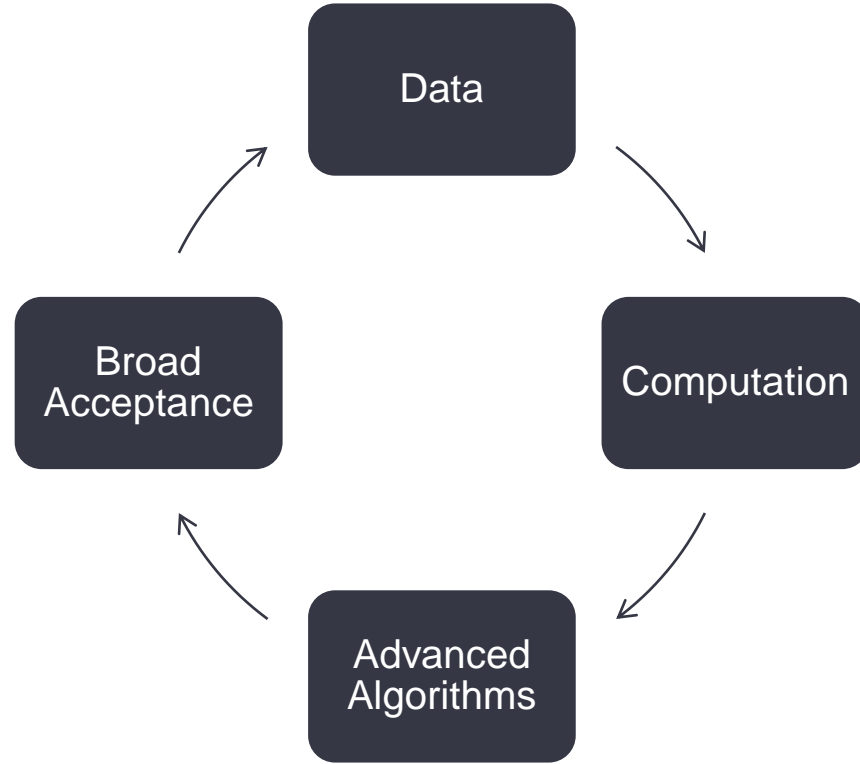
www.cs.uic.edu/~asudeh/teaching/cs594fall20/index.html

Link will be posted on Blackboard

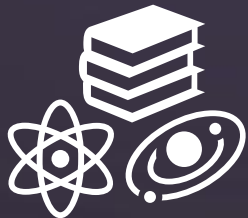
- Resources:

- Solon Barocas, Moritz Hardt, Arvind Narayanan. “**Fairness in Machine Learning, Limitations and Opportunities**” (book) – link available in the course page
- Cathy O’Neil “Weapons of Math Destruction” (book)

Power of Data

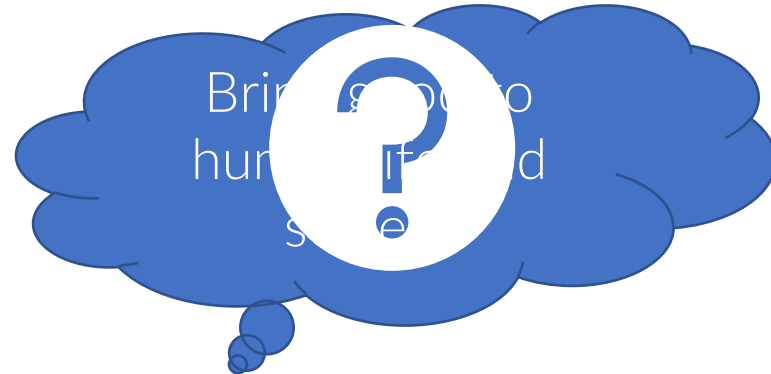


“We” have changed the world



Why?

ENJOY



Undeniable benefits

- Higher living standards
- Easier communication
- Boosted Scientific Advancements – Medicine
- Smart cities
- IoT
- Business Advancement
- New jobs
- ...
- **Smart Decision making (knowledge is power)**



Harms of the Data

Demographic Disparities

Truth:

**We might have had good
wills, but we screwed up**

How government use
of big data can harm
communities

TECHNOLOGY

How Big Data Harms Poor Communities



Crysta Jentile, Communications Assoc

Michelle Lawrence, Communications

30 AUGUST 2016

TO PROTECT AND SERVE —

Is “Big Data” racist? Why policing by data isn’t necessarily objective

"Concerns with predictive big data technologies appear in most big data policing models."

ANDREW FERGUSON - 12/29/2017, 7:23 AM

The Harm That Data Do

Paying attention to how algorithmic systems **impact marginalized people** worldwide is key to a just and equitable future

Artificial intelligence is racist, sexist because of data it's fed

By Alahna Kindred, The Sun

November 19, 2018 | 10:10am | Updated

MARCH 23, 2018

The Mind-Benders: How to Harvest Facebook Data, Brainwash Voters, and Swing Elections

by ROBERTO J. GONZÁLEZ



By Rachel Goodman, Staff Attorney, ACLU Racial Justice Program

JULY 19, 2018 | 2:15 PM

TAGS: Race and Economic Justice, Racial Justice, Big Data, Surveillance Technologies, Privacy & Technology

Motivation

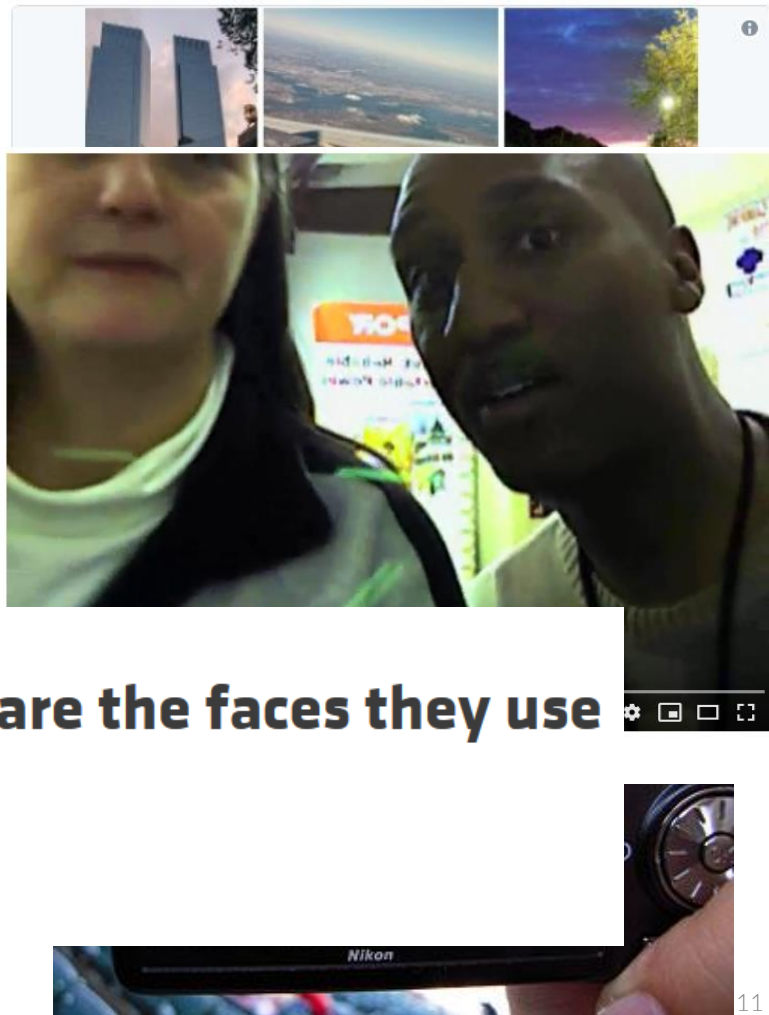
- Google Gorilla
- Nikon camera's open eyes detection
- The face tracking feature of the HP web cams

ARTIFICIAL INTELLIGENCE DIVERSITY

Most engineers are white – and so are the faces they use to train software

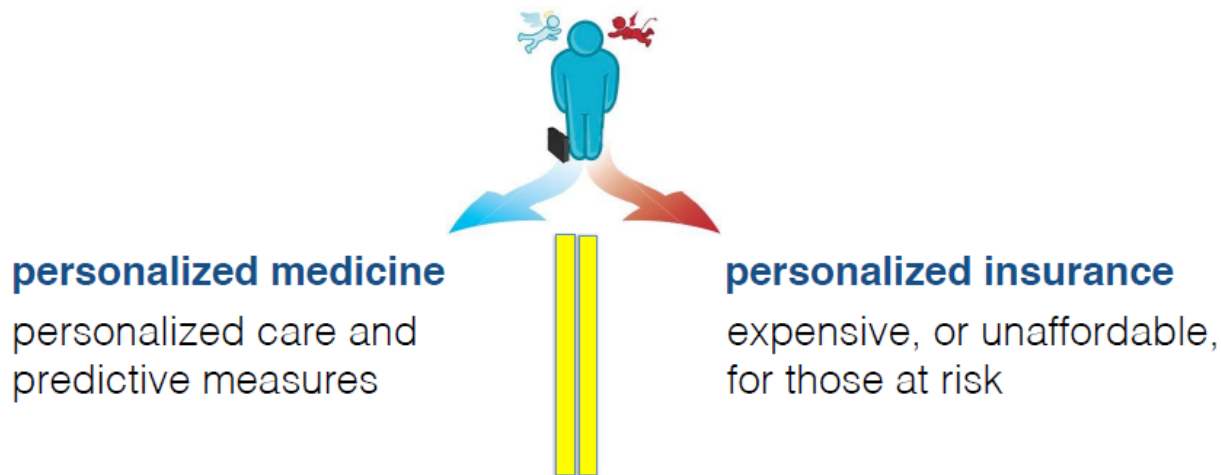
A black researcher had to wear a white mask to test her own project.

By [Tess Townsend](#) | Jan 18, 2017, 11:45am EST



Example: personalized medicine

Analysis of a person's medical data, genome, social data



the same technology makes both possible!

Online price discrimination

THE WALL STREET JOURNAL.

WHAT THEY KNOW

Websites Vary Prices, Deals Based on Users' Information

By JENNIFER VALENTINO-DEVRIES,
JEREMY SINGER-VINE and ASHKAN SOLTANI

December 24, 2012

It was the same Swingline stapler, on the same [Staples.com](#) website. But for Kim Wamble, the price was \$15.79, while the price on Trude Frizzell's screen, just a few miles away, was \$14.29.

A key difference: where Staples seemed to think they were located.

WHAT PRICE WOULD YOU SEE?



lower prices offered to buyers who live in more affluent neighborhoods

<https://www.wsj.com/articles/SB10001424127887323777204578189391813881534>

Online job ads

theguardian

Samuel Gibbs

Wednesday 8 July 2015 11.29 BST

Women less likely to be shown ads for high-paid jobs on Google, study shows

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



One experiment showed that Google displayed adverts for a career coaching service for executive jobs 1,852 times to the male group and only 318 times to the female group. Photograph: Alamy

The AdFisher tool simulated job seekers that did not differ in browsing behavior, preferences or demographic characteristics, except in gender.

One experiment showed that Google displayed ads for a career coaching service for “\$200k+” executive jobs **1,852 times to the male group and only 318 times to the female group**. Another experiment, in July 2014, showed a similar trend but was not statistically significant.

<https://www.theguardian.com/technology/2015/jul/08/women-less-likely-ads-high-paid-jobs-google-study>

Job-screening personality tests

THE WALL STREET JOURNAL.

Are Workplace Personality Tests Fair?

Growing Use of Tests Sparks Scrutiny Amid Questions of Effectiveness and Workplace Discrimination

By **LAUREN WEBER** and **ELIZABETH DWOSKIN**

Sept. 29, 2014 10:30 p.m. ET



Kyle Behm accused Kroger and six other companies of discrimination against the mentally ill through their use of personality tests. TROY STAINS FOR THE WALL STREET JOURNAL

The Equal Employment Opportunity commission is **investigating whether personality tests discriminate against people with disabilities**.

As part of the investigation, officials are trying to determine if the tests **shut out people suffering from mental illnesses** such as depression or bipolar disorder, even if they have the right skills for the job.

<http://www.wsj.com/articles/are-workplace-personality-tests-fair-1412044257>

Weapons of Math Destruction

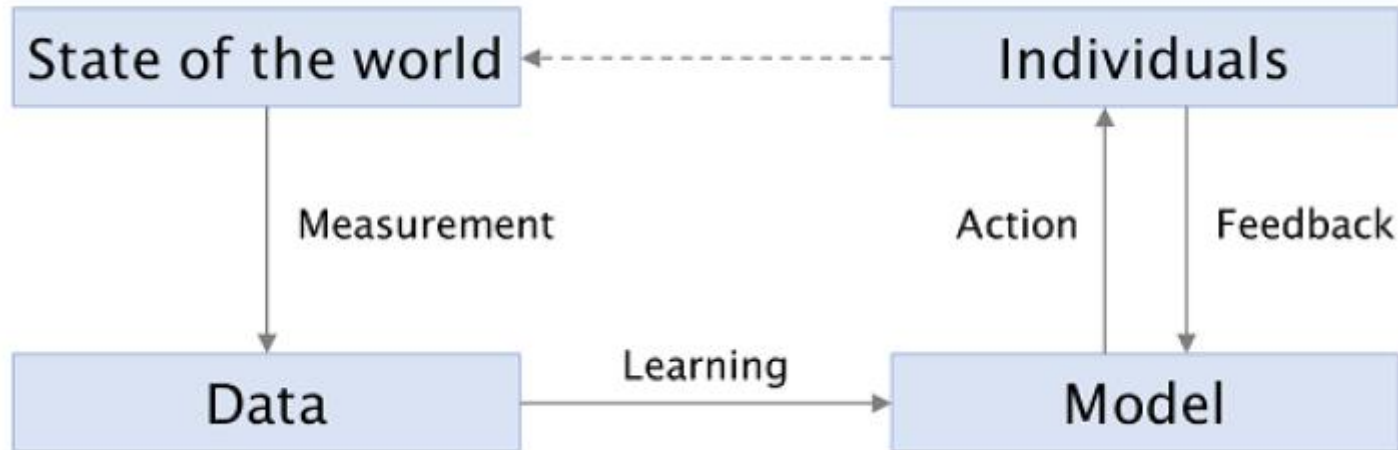
How does big data increase inequality and threaten democracy?

Cathy O' Neil

- Instances of WMD's in online advertising
- Instances of WMD's in predictive policing
- Instances of WMD's in job applications
- Workplace-related instances of WMD's
- Instances of WMD's in credit
- Instances of WMD's in insurance
- Instances of WMD's in employee data usage
- Role of big data in politics

- Summary in course page

The machine learning loop



Recidivism Scores

Recidivism Scores

- Judges in many US jurisdictions consider scores based on the criminal record and background of individuals as guidance when sentencing or setting bail.
- This is valuable as it can make the society safer!
- It has a significant impact on the life of individuals

Machine Bias

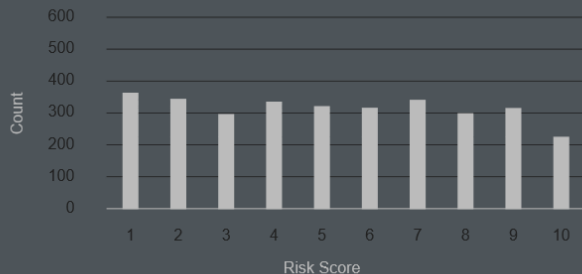
There's software used across the country to predict future criminals. And it's biased against blacks.

by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica

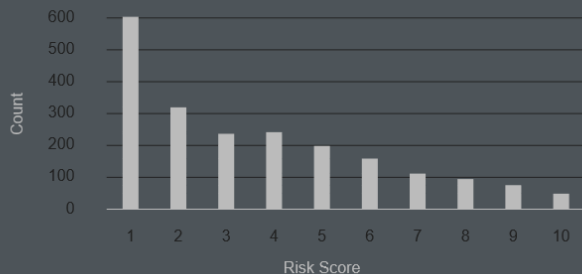
May 23, 2016

 PROPUBLICA

Black Defendants' Risk Scores



White Defendants' Risk Scores



Two Drug Possession Arrests

DYLAN FUGETT

Prior Offense
1 attempted burglary

Subsequent Offenses
3 drug possessions

BERNARD PARKER

Prior Offense
1 resisting arrest
without violence

Subsequent Offenses
None

Demographic Disparity

Northpointe Inc. Responses to “Machine Bias”

- **Equal accuracy** across different groups

Response to ProPublica: Demonstrating accuracy equity and predictive parity

US Court



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Statistics & Reports

Publications

Civil Litigation Management Manual

Courtroom Technology Manual

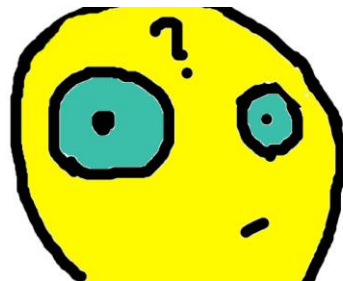
Dodd Frank Act Report

False Positives, False Negatives, and False Analyses: A Rejoinder to "Machine Bias: There's Software Used Across the Country to Predict Future Criminals. And It's Biased Against Blacks."

Download the Issue

[Federal Probation Journal - September 2016 \(PDF, 2.68 MB\)](#)

Different Claims

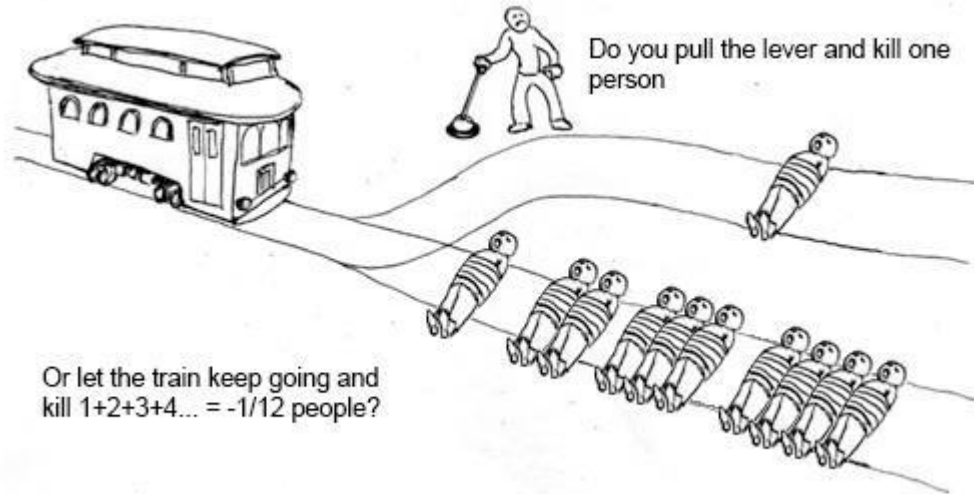


- Propublica $Pr(h(x) = 1|g_1) > Pr(h(x) = 1|g_2)$
- Northpoint $Pr(h(x) = y|g_1) \simeq Pr(h(x) = y|g_2)$
- US Court $Pr(h(x) = 1|g_i, y = 0) \simeq Pr(h(x) = 1|g_j, y = 0)$
 $Pr(h(x) = 0|g_i, y = 1) \simeq Pr(h(x) = 0|g_j, y = 1)$

The Supreme Court ruled for the continued use of COMPAS to aid judges with sentencing decisions. However the court expressed hesitation about the future use of the software in sentencing without information highlighting the limitations of COMPAS. (Supreme Court of Wisconsin, 2016).

Social Norms Matter

Train Dilemma

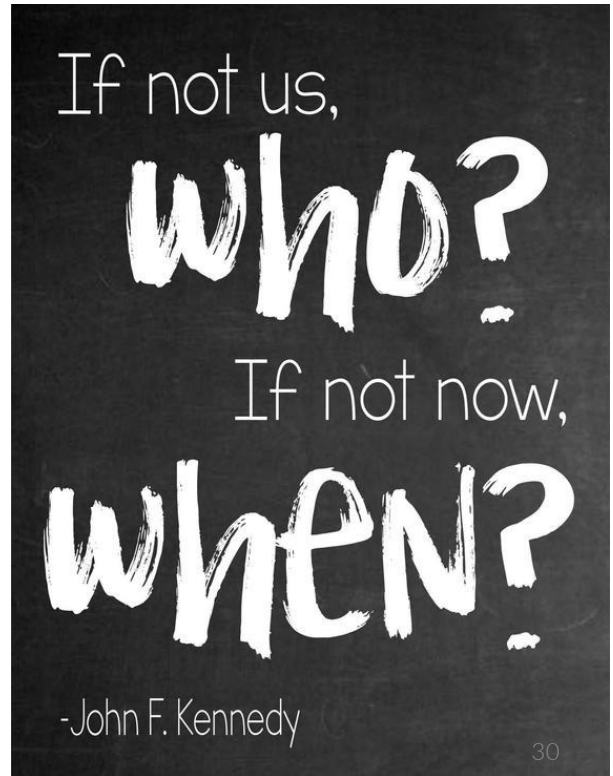
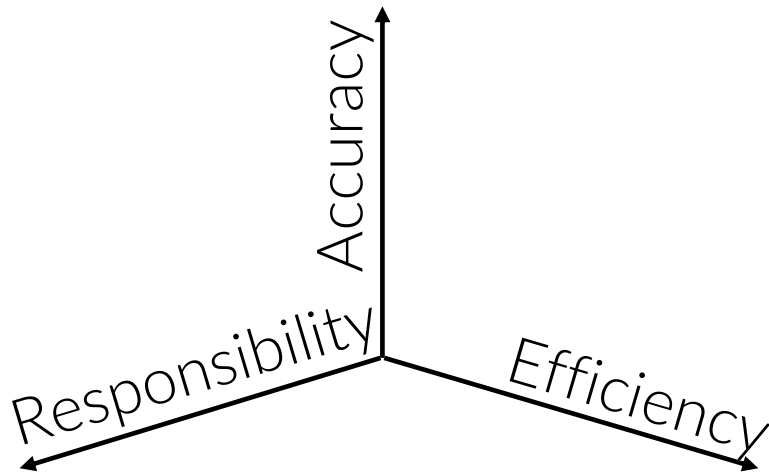


If you are a doctor?



Should we care?

Of course, a full solution will also need non-technical things, including societal consensus, new laws and regulations, etc.



What can we do?

- Can we have everything together?
 - Unfortunately NO!
 - I mean not perfectly...
- Consider societal impacts
 - Understand the problem/norms
 - **Don't design for the average user.**
- Design tools to:
 - Identify/Audit
 - Resolve
 - Profile