Ethics and Data Science

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Introduction to Data Science

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The age of automated decision-making
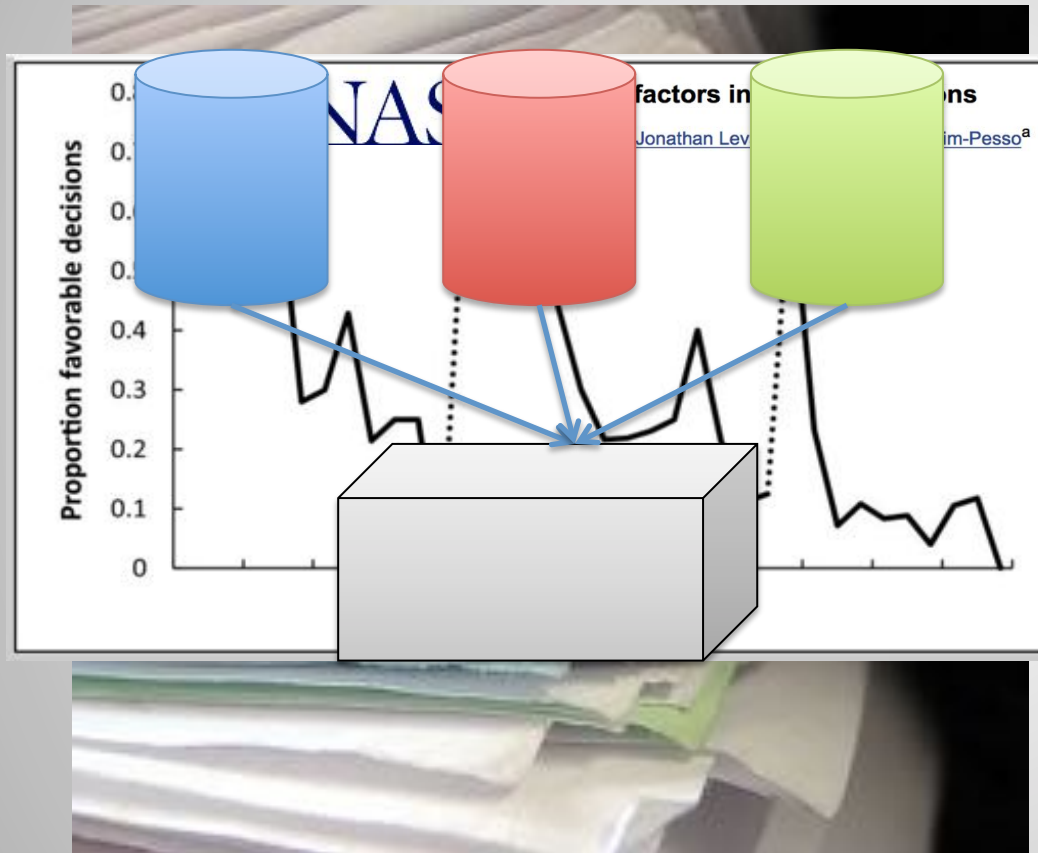
- Dealing with scale
- Dealing with complexity
- Dealing with objectivity

The age of automated decision-making: Hiring

The age of automated decision-making: Credit

The age of automated decision-making: Criminal justice

The age of automated decision-making: Transportation

The age of automated decision-making: The future

New Bloomberg Law Litigation Analytics Solution Provides In

How to Avoid a Box Office Disaster

We use analytics to predict baseball, elections, and even pop music.

Quantifying the evolution of individual scientific impact

Can AI be ethical?

…we're not opposed to the use of [algorithms] for some applications, even most applications, with appropriate safeguards and checks and balances. No nation on earth has the reliance that we do on these [systems]. Are they an appropriate way of advising you on the best way to get to the mall on a busy Saturday? Absolutely, provided that everyone gets the best advice the system can give, regardless of economic status or influence. But should they be used to figure out whom the FBI should open an investigation into? Absolutely not. We use judges and grand juries and evidence to establish the sufficiency of a request to investigate a private citizen who is considered innocent until proven guilty. We learned that lesson the hard way, during the War on Terrorism and the Ashcroft witch-hunts. Should we trade grand juries and judges for [machines? Do you want the warrant for your wiretap issued by an accountable human being or by a [deep learning system]?"

Cory Doctorow "Human Readable", 2010.

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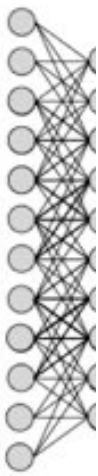
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Decision by algorithm: Bad?

Big Data: A Report on Algorithmic Systems, Opportunity, and Civil Rights

Executive Office of the President

May 2016

- Learned models are complex
- They are not accountable
- They might lead to unfair outcomes

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Case Studies in Algorithmic Fairness

- Facial recognition: https://theintercept.com/2016/10/13/how-a-facial-recognition-mismatch-can-ruin-your-life
- Risk assessment: Propublica on risk assessment
- Bias in pricing: Propublica on differential pricing
- Gender skew in advertising.

And many other cases ranging from the absurd (the gorila case) to the needlessly discriminatory (the facebook nymwars)

Case Studies in Algorithmic Fairness
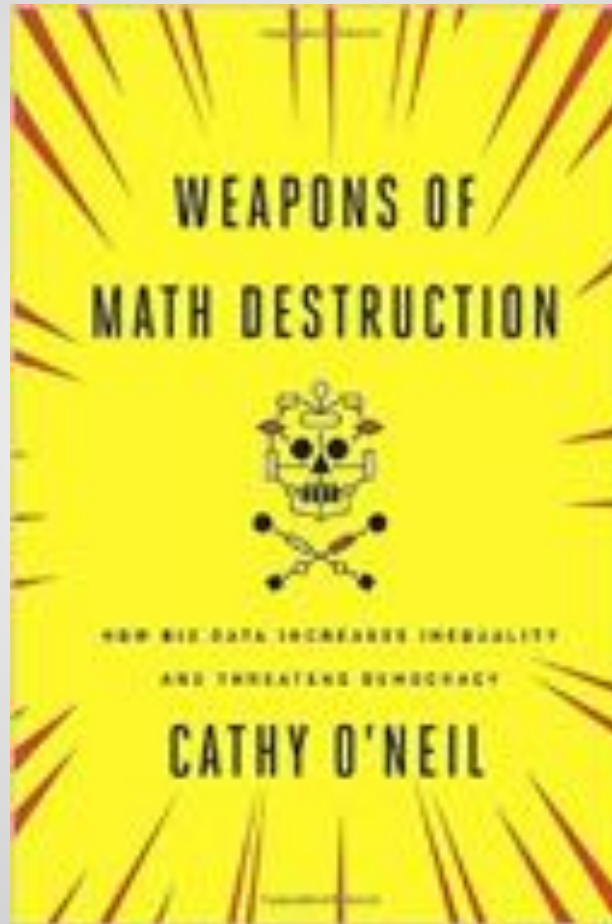

LOSING FACE

How

Machine Bias

The Tiger Mom Tax: Asians Are Nearly Twice as

Sections

Wonkblog

Uber seems to offe
with more white pe
tough questions.

Seeking fairness in ads

Researcher outlines how 'bias score' could be calculated in online delivery

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Weapons of Math Destruction

The questions

Accountability

Fairness   **Transparency**

…in Machine Learning

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The questions

Accountability

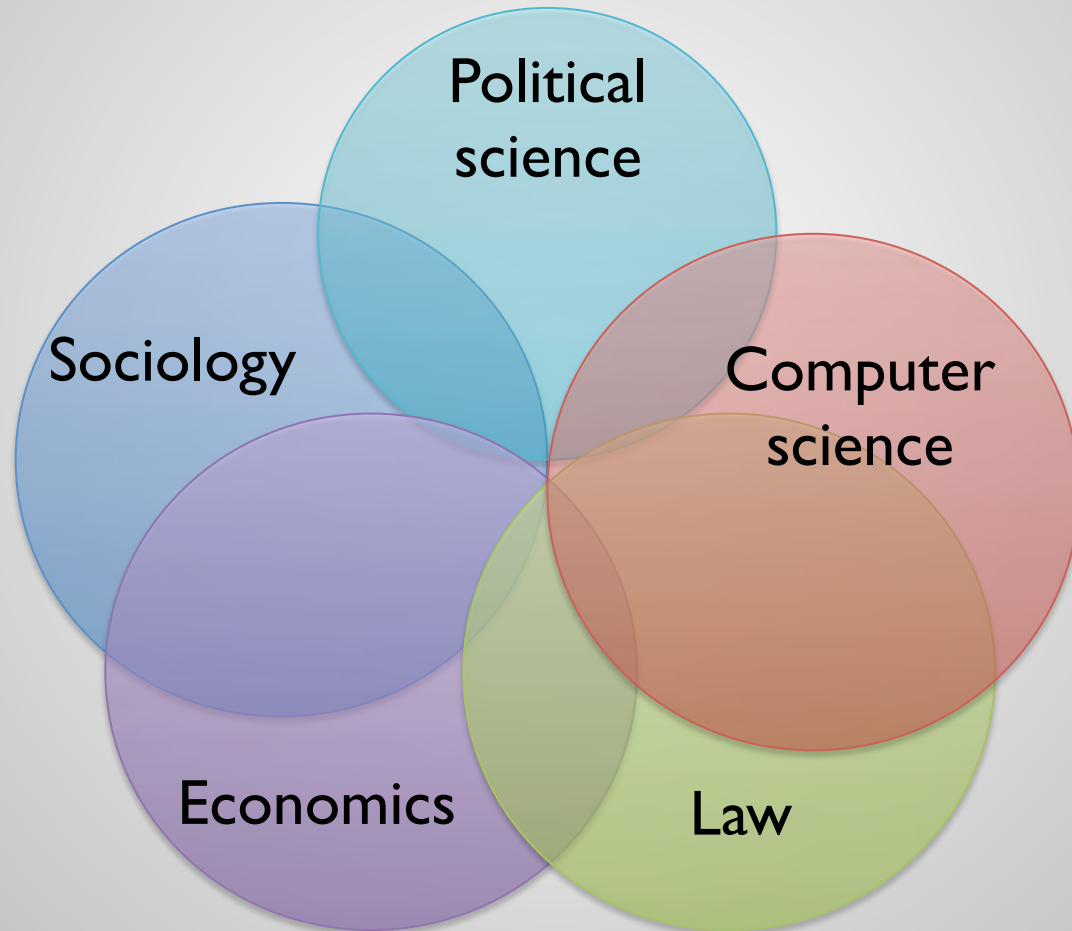**Fairness**   **Transparency**

…in ~~Machine Learning~~ Computer Science

The questions

Bake it into how we design algorithms

Use it to validate existing algorithms

Guide for best practices

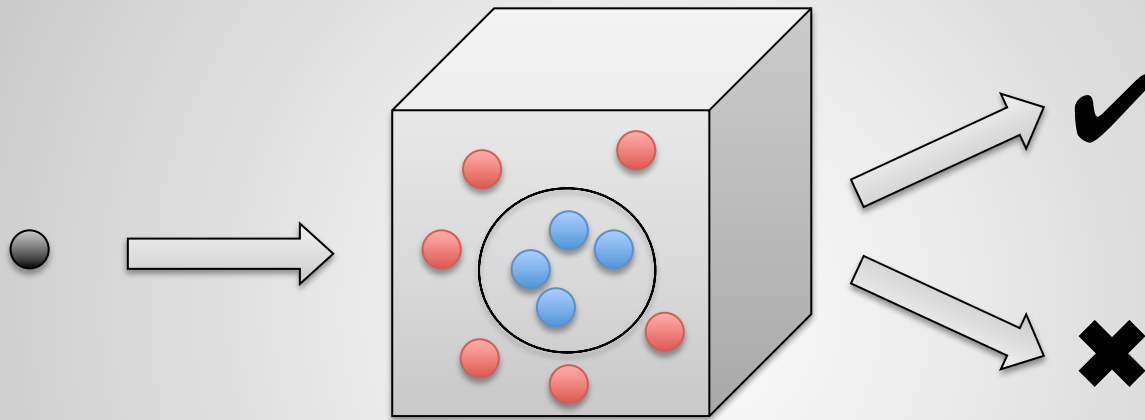# A MATHEMATICAL PERSPECTIVE ON FAIRNESS

Algorithms can't be unfair!

- "Data is truth"

- "Math is not racist"

  See more at algorithmicfairness.wordpress.com

- "This is not a CS problem"

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A simple problem: classification

Hiring   College admission   Loan

Where does bias come from?

Many Cars Tone Deaf To Women's Voices

Female v...

(Exclusive) Crime-prediction tool PredPol amplifies racially biased policing, study shows

Facebo... screwe... ...ady

Posted Aug 29, 2016 by Kate Conger (@kateconger)

Data Sources

Algorithm design

Feedback

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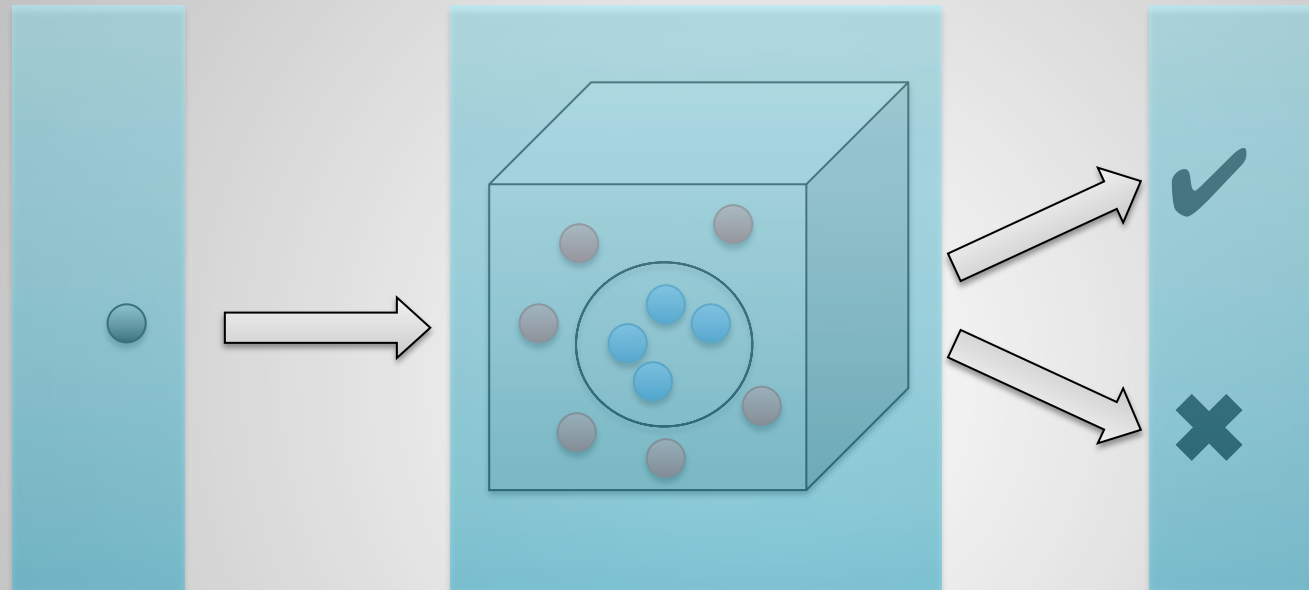
CHALLENGES

Make algorithmic decision-making fair

Modify the input

Modify the algorithm

Modify the output

Make sure algorithms are *interpretable*

Because my neural network said so...
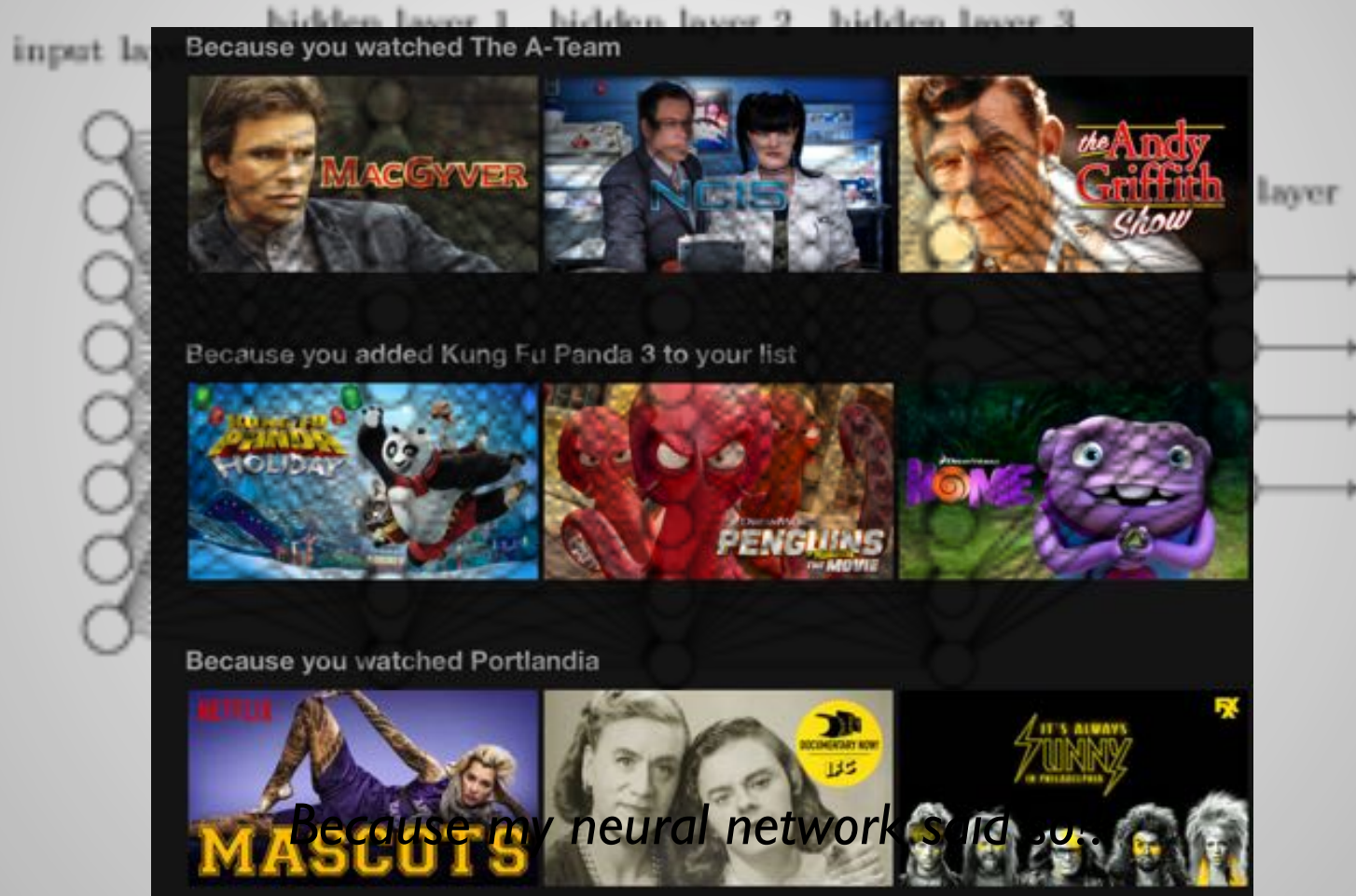
Make sure we can query black box algorithms

In six major same-day delivery cities, however, the service area excludes predominantly black ZIP codes to varying degrees, according to a Bloomberg analysis that compared Amazon same-day delivery areas with U.S. Census Bureau data.

http://www.bloomberg.com/graphics/2016-amazon-same-day/

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Think about mathematical basis of fairness

- Can we separate *beliefs* about a fair society from *mechanisms* to guarantee fairness?

- Is there a mechanism that is compatible with different beliefs?

- Can the "computational lens" provide insights into the age-old questions about fairness and justice?

IN CLOSING

Where are we heading?

EQUALITY VERSUS EQUITY

In the first image, it is assumed that everyone will benefit from the same supports. They are being treated equally.

In the second image, individuals are given different supports to make it possible for them to have equal access to the game. They are being treated equitably.

In the third image, all three can see the game without any supports or accommodations because the cause of the inequity was addressed. The systemic barrier has been removed.

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