

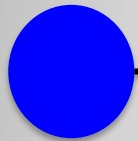
Ethics and Data Science

Katie Shelef, PhD.

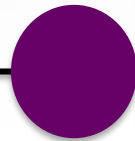
Co-instructor for Ethics in Data Science, Fall 2017

Introduction to Data Science
Spring 2019

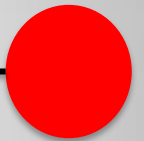
It is fair to use machines to judge humans



Strongly
Agree



Neutral or
Unsure



Strongly
Disagree



Hiring

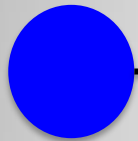


College admission

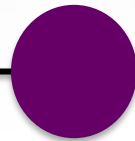


Loan

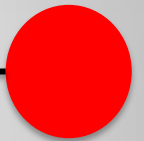
Data scientists have no responsibility for the outcome of their analyses



Strongly
Agree



Neutral or
Unsure



Strongly
Disagree



Hiring



College admission



Loan

Data scientists have no responsibility for the outcome of their analyses

“Even if AI is evil, most developers don't think it's the fault of the programmers. Fifty-eight percent say that ethics are the responsibility of upper management, 23 percent the inventor of the unethical idea, and just 20 percent think that they're the responsibility of the developer who actually wrote the code.”

- Peter Bright, ars Technica, 3/13/18

<https://arstechnica.com/gadgets/2018/03/developers-love-trendy-new-languages-but-earn-more-with-functional-programming/>

What is “Ethics”?

The field of ethics involves systematizing, defending and recommending concepts of right and wrong behavior

- Internet Encyclopedia of Philosophy

<https://www.iep.utm.edu/ethics/>

Algorithms can't be unfair!

“Data is truth”

“Math is not racist”

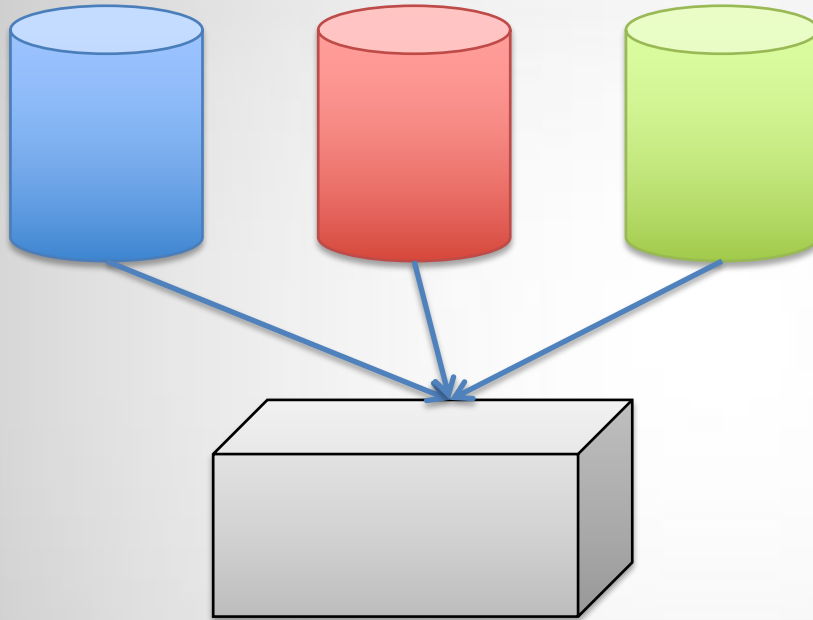
“This is not a CS/Data Science problem”

The age of automated decision-making



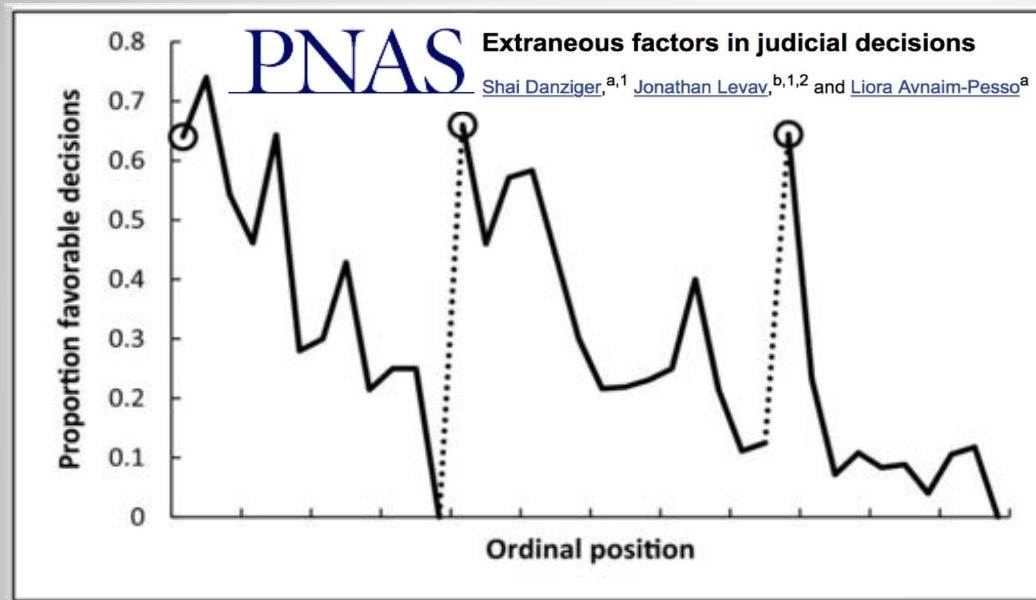
- Dealing with scale

The age of automated decision-making



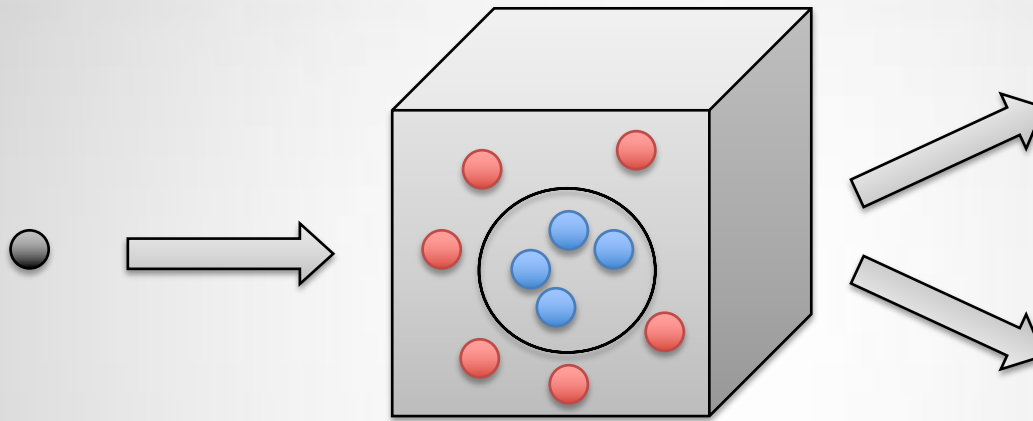
- Dealing with scale
- Dealing with complexity

The age of automated decision-making



- Dealing with scale
- Dealing with complexity
- Dealing with objectivity

Where does bias come from?



Data
Sources

Algorithm
design

Feedback
&
Prediction

Where does bias come from?

Many Cars Tone Deaf To Women's Voices

Female voices pose a bigger challenge for voice-activated technology than men's voices



Where is Street Bump being used?

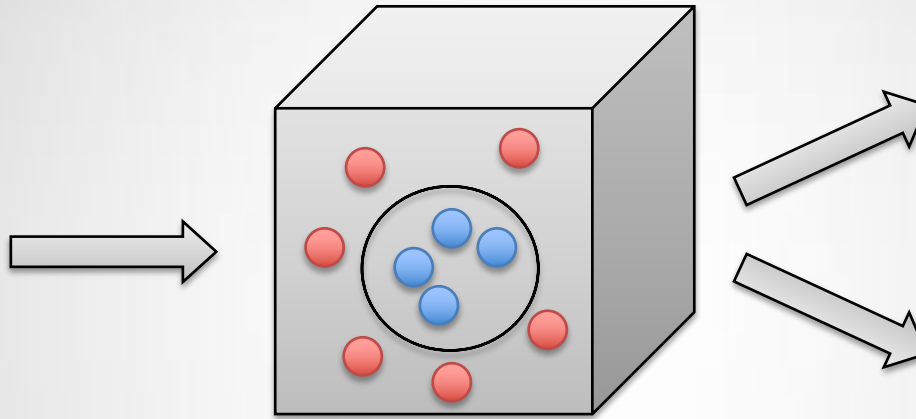
2,459 trips recorded, 149,727 bumps detected

48 bumps reported in Boston, Massachusetts 5 days ago



Data
Sources

Where does bias come from?



Algorithm
design

Where does bias come from?

Discrimination in Online Ad Delivery

Latanya Sweeney
Harvard University



Ad related to latanya sweeney ⓘ

Latanya Sweeney Truth
www.instantcheckmate.com/
Looking for Latanya Sweeney? Check Latanya Sweeney's Arrests.

Ads by Google

Latanya Sweeney Arrested?
1) Enter Name and State. 2) Access Full Background Checks Instantly.
www.instantcheckmate.com/

Latanya Sweeney
Public Records Found For: Latanya Sweeney. View Now.
www.publicrecords.com/

La Tanya
Search for La Tanya Look Up Fast Results now!
www.ask.com/La+Tanya

(c)

checkmate

LATANYA SWEENEY
High Quality Data
Background, Sex, Gender
DOB: 10/1/77 100% 100% 100%

Criminal History Rate This Content ⭐⭐⭐⭐⭐

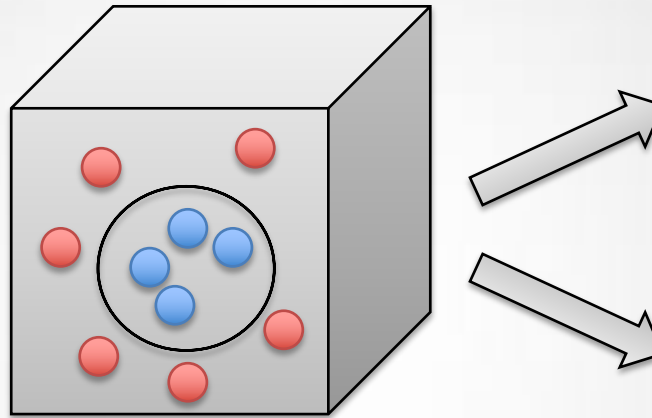
This system includes possible criminal, arrest, and criminal records for the subject of this report. While our database does contain hundreds of millions of arrest records, different countries have different rules regarding what information they will and will not release.

We claim with you no trust information as we provide you. But in clear state laws should not be disclosed as it provides that Latanya Sweeney has never been arrested. I don't know. For me were not able to locate any matching arrest records in the data that is available to us.

Name	County and State	Offense	How Severe
No matching arrest records were found.			

(d)

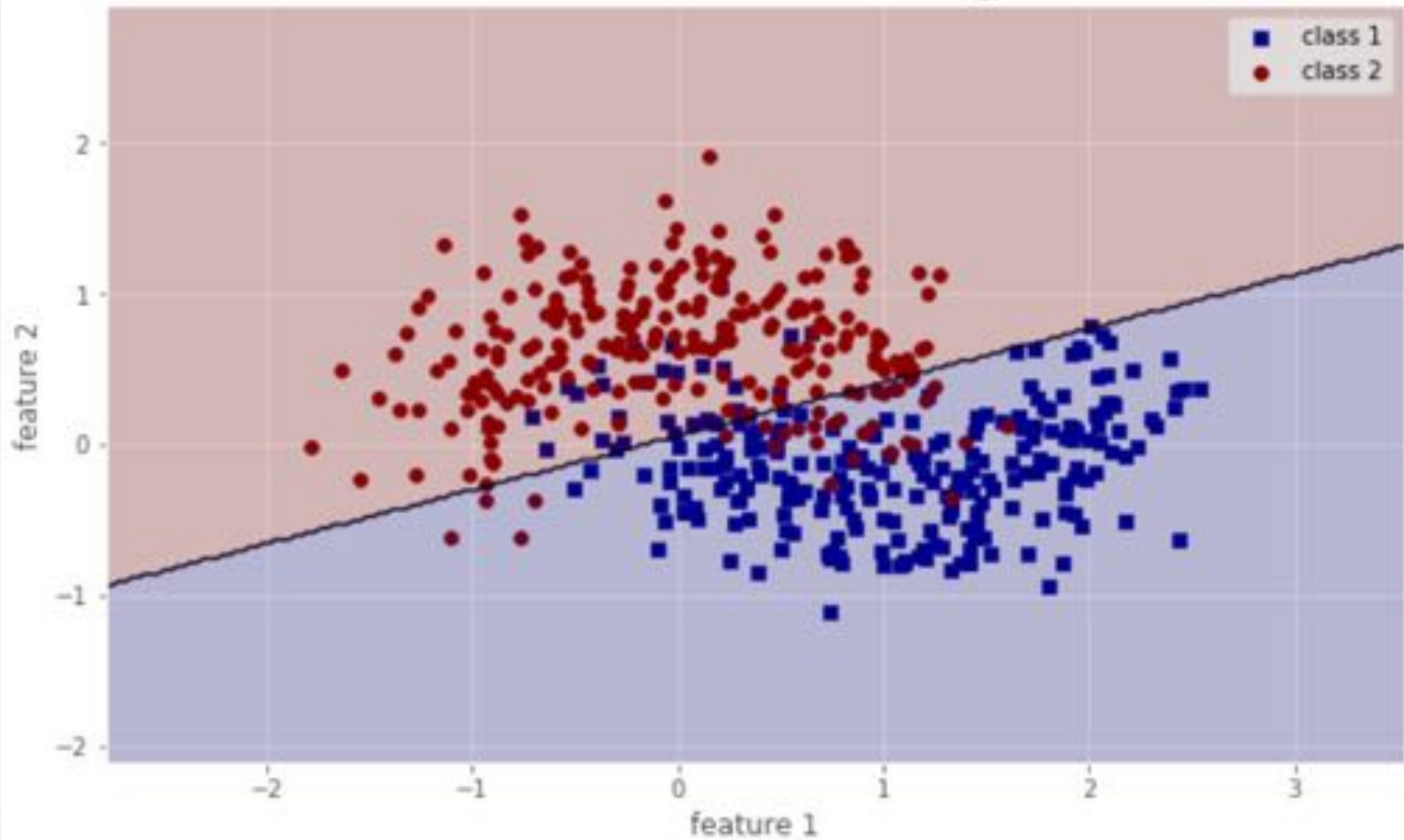
Where does bias come from?



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

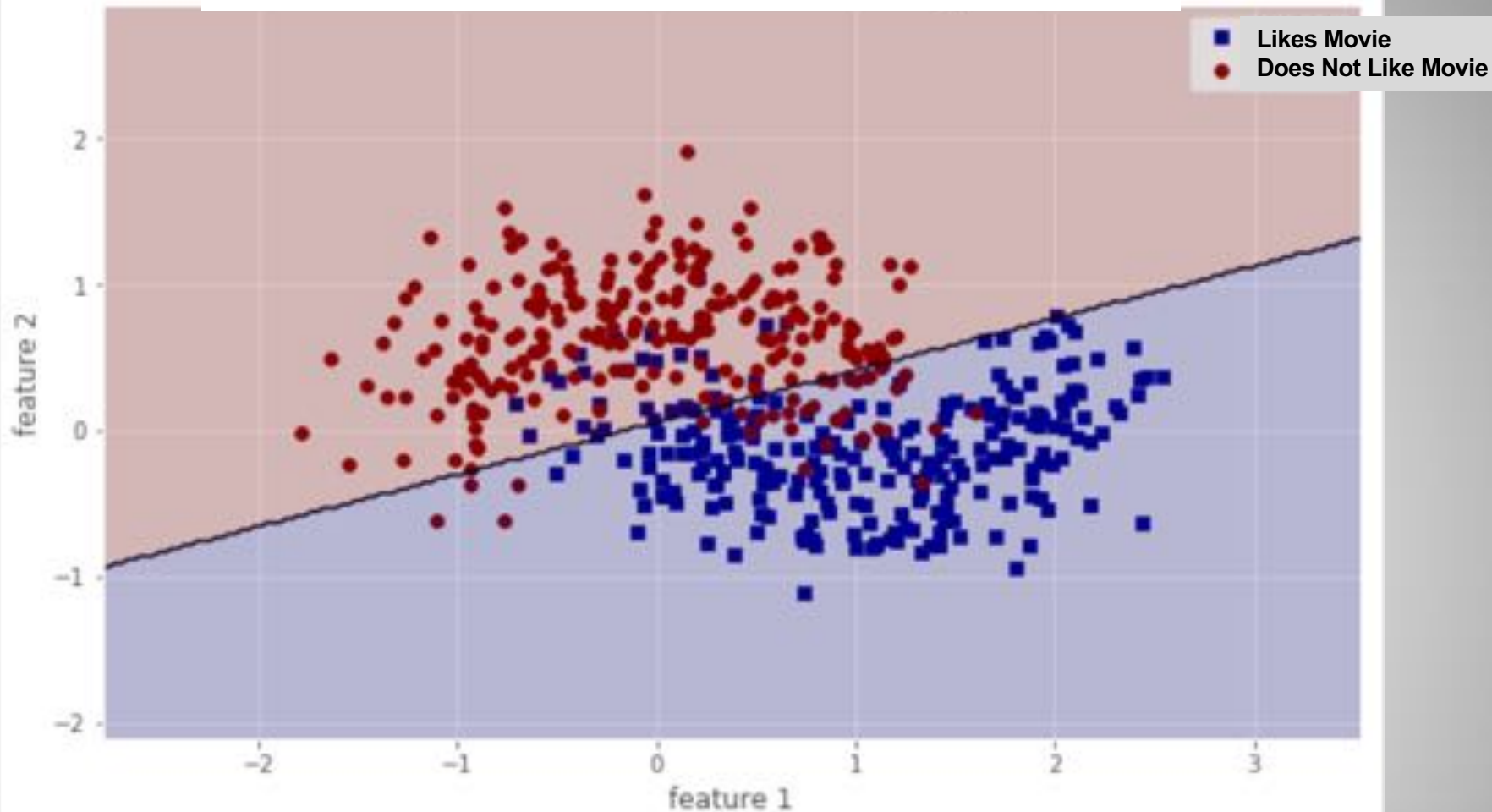
Feedback
&
Prediction

Classification of Two Moons using SVM



	Predicted Class 1	Predicted Class 2
Actual Class 1	213	37
Actual Class 2	33	217

Classification of Movie Preference Given Past Preferences

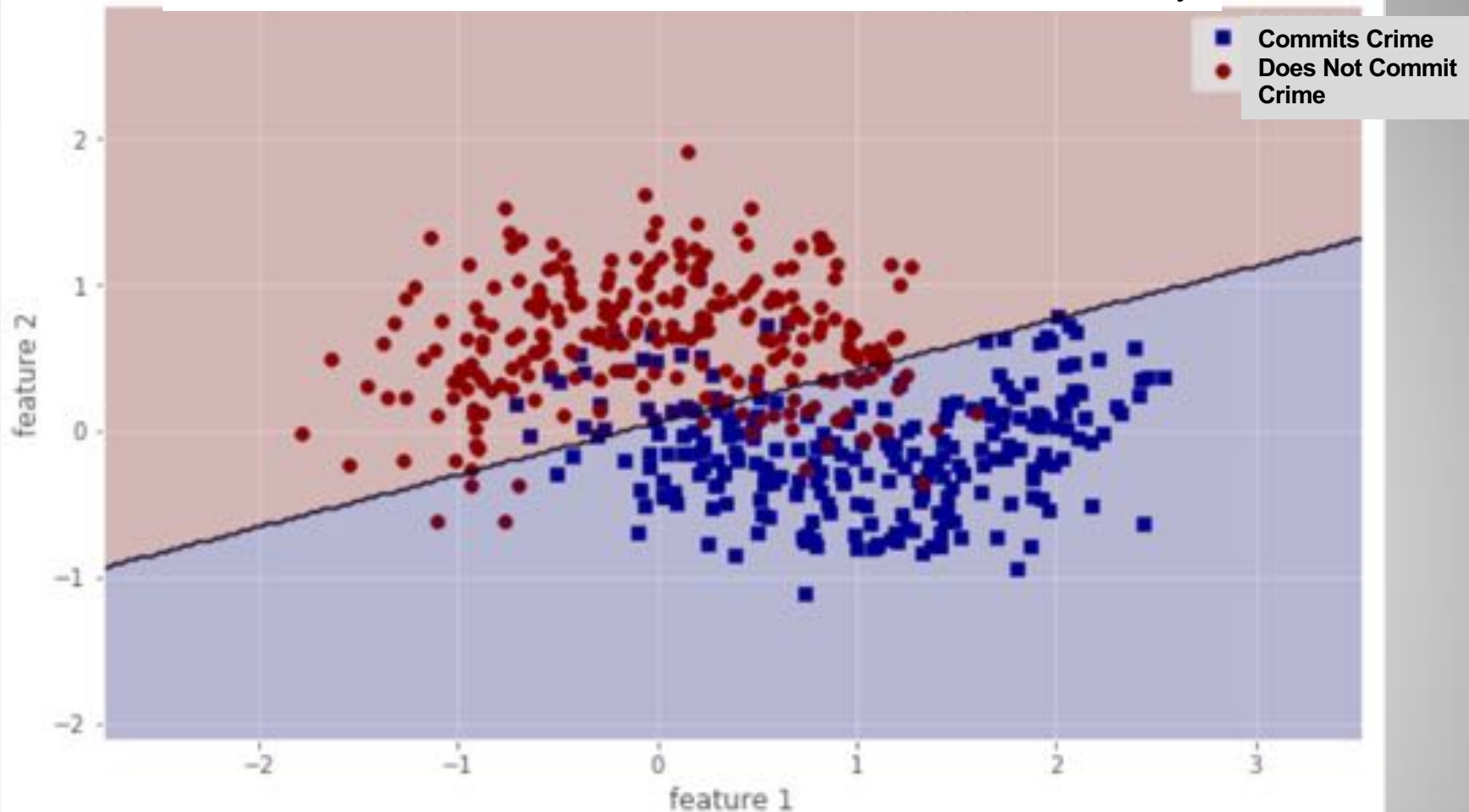


	Predicted Likes Movie	Predicted Does Not Like
Actual Likes Movie	213	37
Actual Does Not Like	33	217

False positive: Annoyed customers? False negative: Lost business



Classification of Post-Parole Recidivism Given Personal History



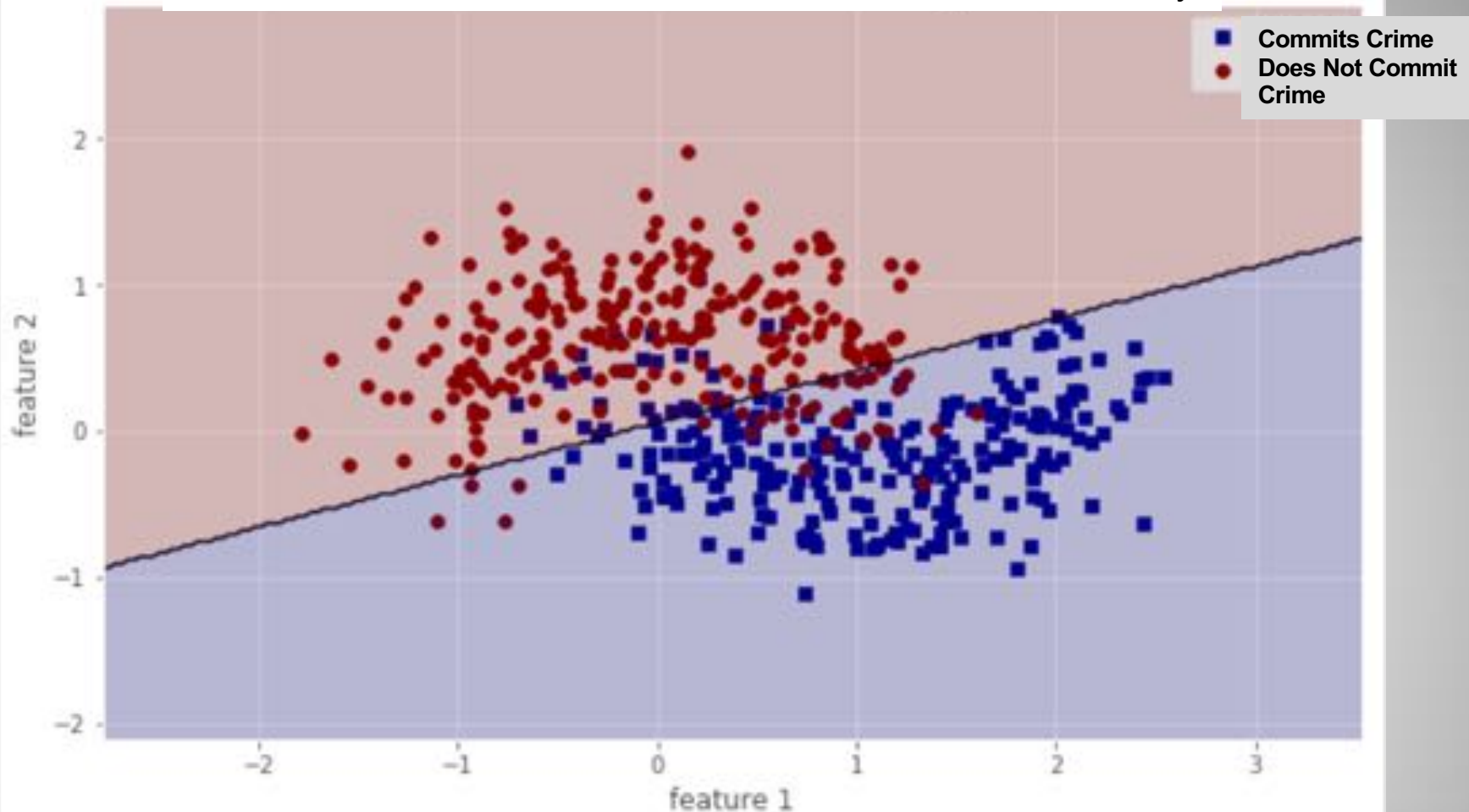
	Predicted Commits Crime	Predicted Does Not Commit
Actual Commits Crime	213	37
Actual Does Not Commit	33	217

False positive: Punish Innocent People

science

False negative: More Victims

Classification of Post-Parole Recidivism Given Personal History



	Predicted Commits Crime	Predicted Does Not Commit
Actual Commits Crime	213	37
Actual Does Not Commit	33	217

Racial Bias?

False positive: Punish Innocent People

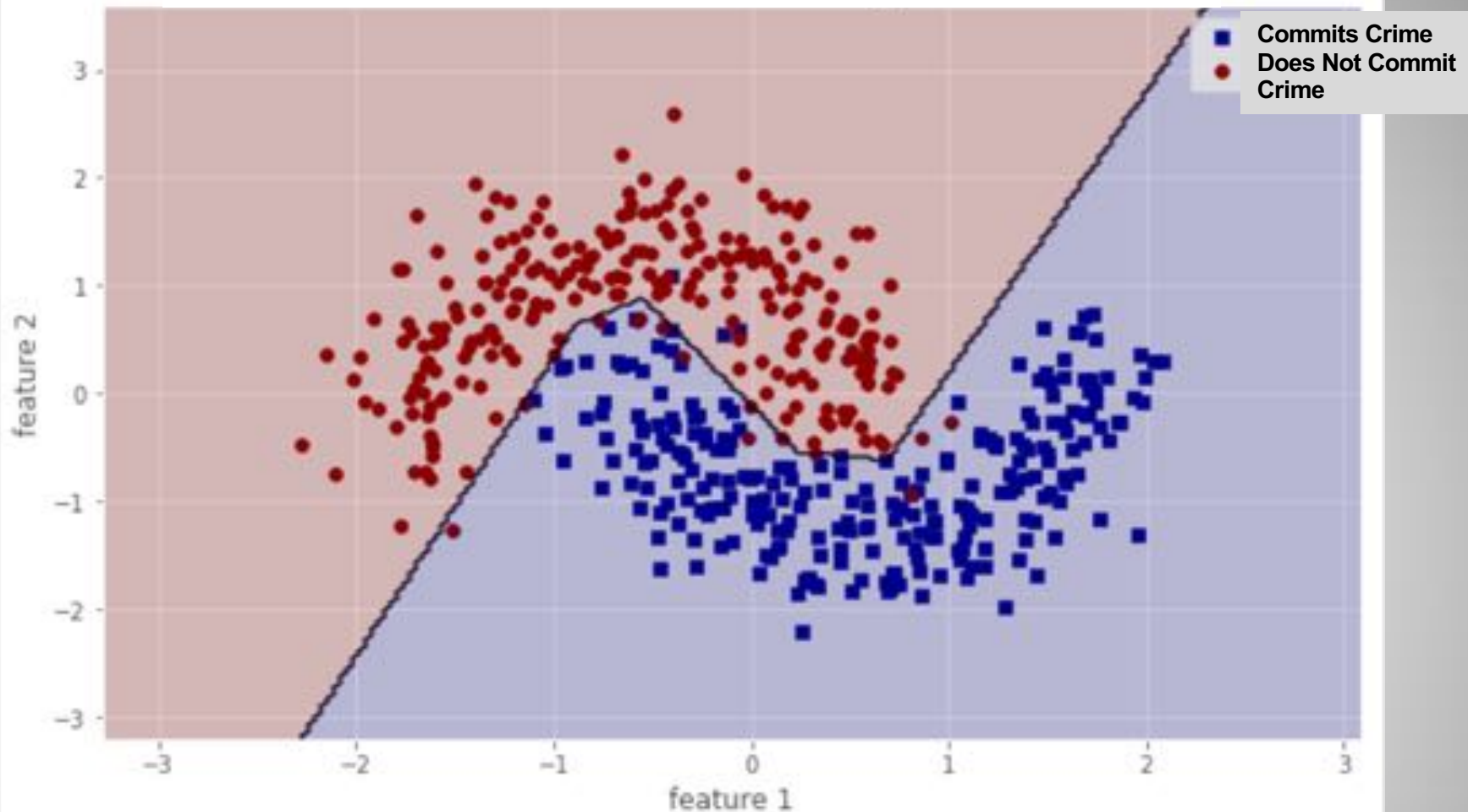
False negative: More Victims

“ I did then what I knew how to do. Now that I know better, I do better.”

- Maya Angelou



Classification of Post-Parole Recidivism Given Personal History



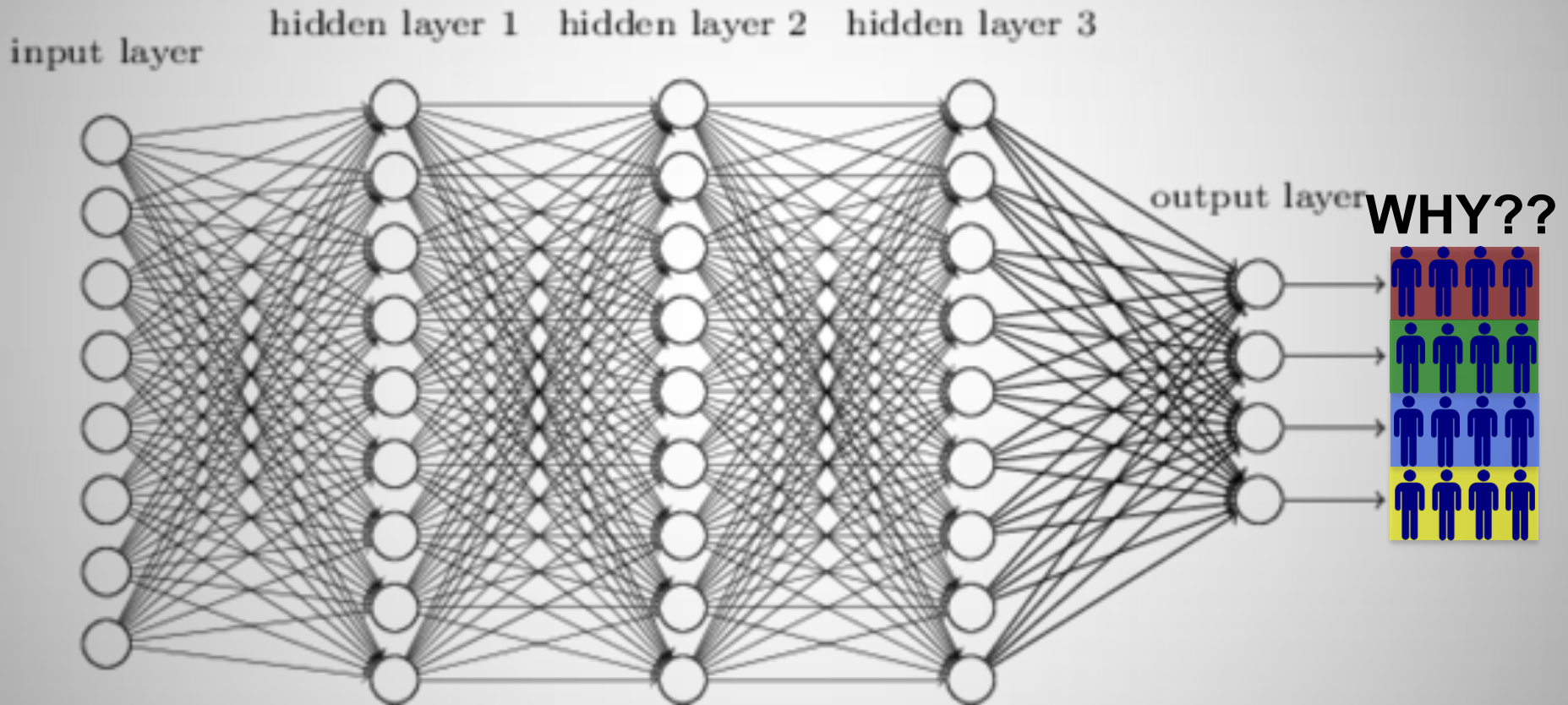
	Predicted Commits Crime	Predicted Does Not Commit
Actual Commits Crime	237	13
Actual Does Not Commit	4	246

False positive: Punish Innocent People

science

False negative: More Victims

Make sure algorithms are *interpretable and transparent*



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/>

Make sure we can query black box algorithms



Model auditing: Analysis of the influence of features used to train the model

- Features independent and identically distributed
- Co-variance among features
- Joint interactions – features only important when they interact with other features

Make sure we can query black box algorithms



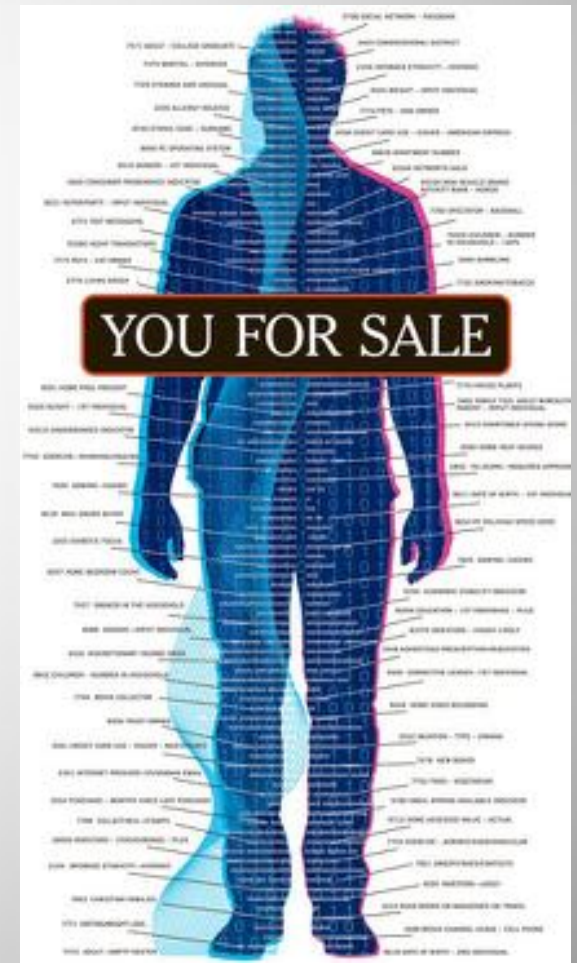
Relationships to Data

Commodity – Data Mined and Monetized

- Data Brokers (e.g. Acxiom)
- Cambridge Analytica



Cambridge Analytica



Relationships to Data

Personal Property

- Privacy
- Informed Consent



Relationships to Data

Public Resource

- NIH All of Us: Collect genetic data of over 1,000,000 people for new insights into disease treatment
- Eviction Lab: Publically available nationwide eviction database (evictionlab.org)



Data is People

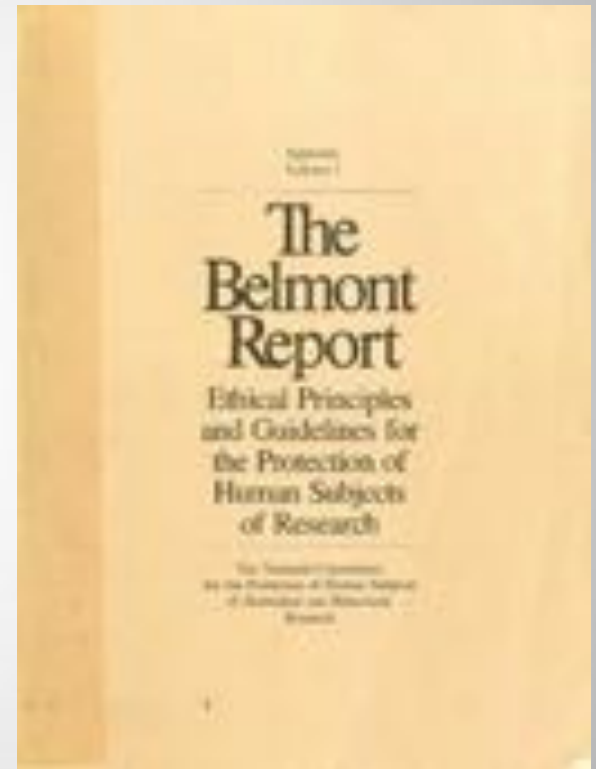
Human experimentation in medical research

- JM Sims and the birth of gynecology, 1845-1849
- Medical experimentation by Nazi regime, 1941-1945
- Tuskegee Syphilis experiment, 1932-1972



Belmont Report (1979) – Ethical Principles

- Respect for persons
 - Treat individuals as autonomous agents
 - Protect those with diminished autonomy
- Beneficence
 - Minimize possible harms
 - Justify possible benefits
- Justice
 - Equitable distribution of the burdens and benefits of research



(Physical) Data is People

Institutional Review Boards

- Review and monitor biomedical research involving human subjects
- Protects the rights and welfare of human subjects



Data is People

Human experimentation by tech companies

PNAS

Experimental evidence of massive-scale emotional contagion through social networks

Adam D. I. Kramer, Jamie E. Guillory and Jeffrey T. Hancock

PNAS June 17, 2014. 111 (24) 8788-8790; published ahead of print June 2, 2014.

<https://doi.org/10.1073/pnas.1320040111>

facebook®



Cornell University

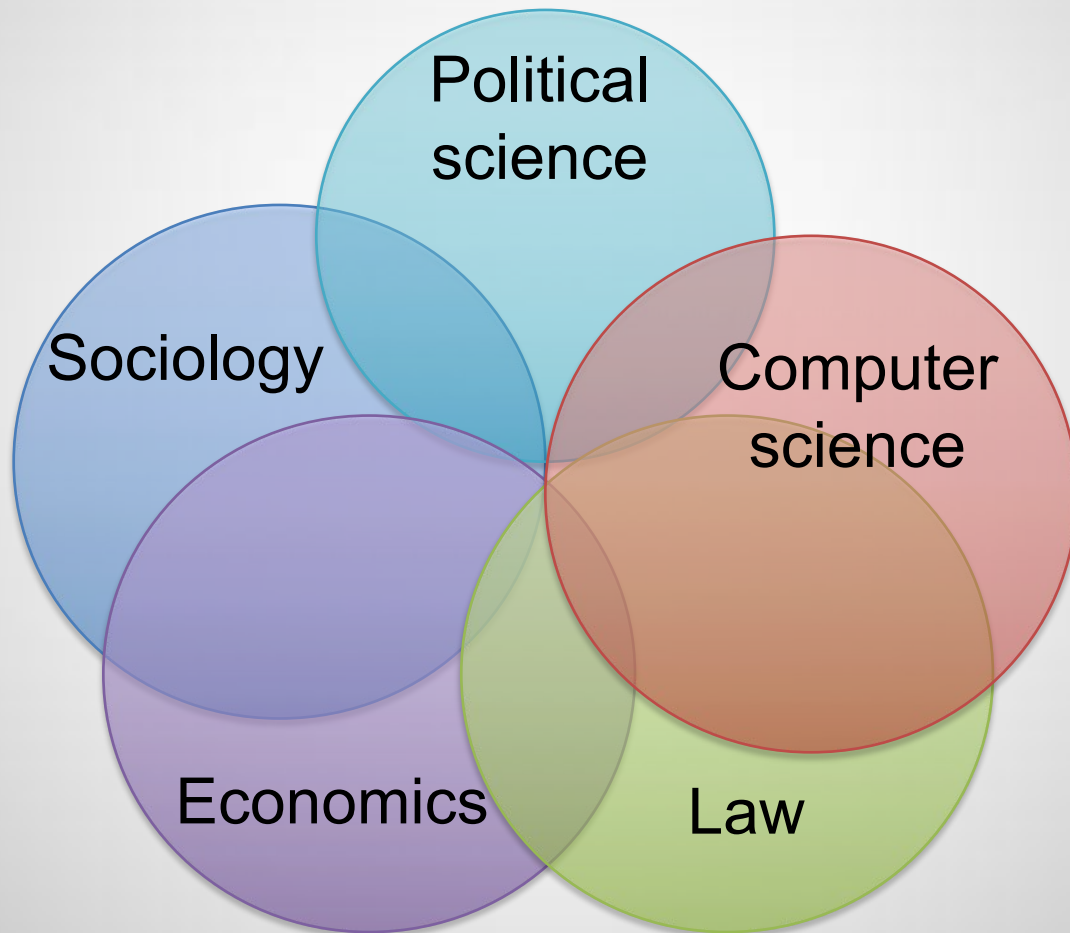
(Digital) Data is People

Consumer Subject Review Boards (Ryan Calo, UW)

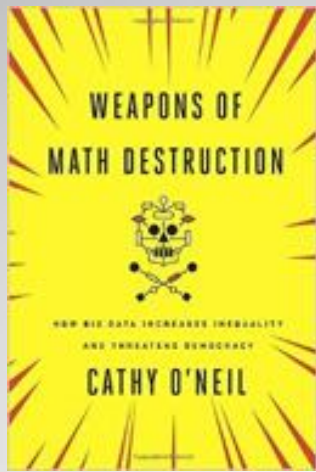
- Ensure informed consent and limit data experimentation when informed consent impossible
- Perform risk/benefit analysis for non-contextual data uses
- Conduct disparate impact analysis: Biases, burdens, and the use of sensitive attributes



The questions



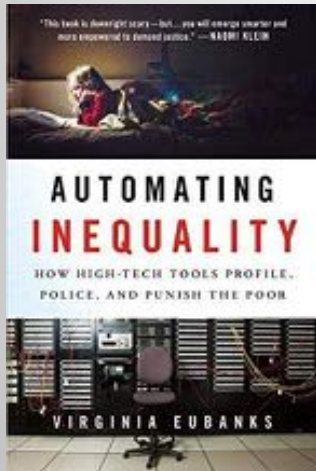
Ethics and Data Science



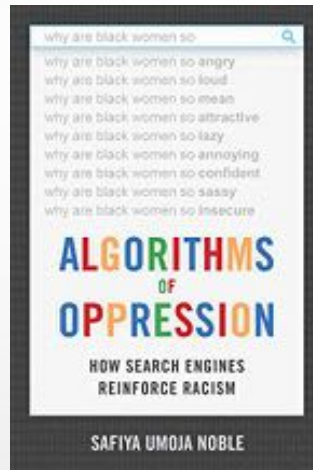
Weapons of Math Destruction
Cathy O'Neil (2016)



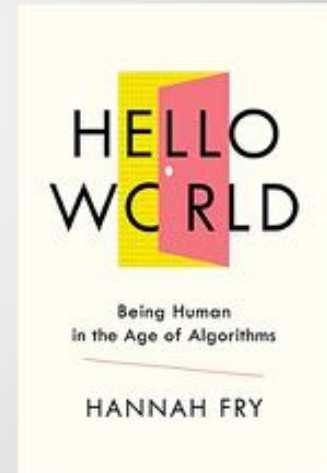
Data and Goliath
Bruce Schneier (2015)



Automating Inequality
Virginia Eubanks (2018)



Algorithms of Oppression
Safiya Umoja Noble (2018)



Hello, World: Being Human
in the Age of Algorithms
Hannah Fry (2018)



How to prepare for Europe's new privacy regulation GDPR

GDPR:

- Right to access all personal data
- Right to correct errors
- Right to access personal data
- Right to withdraw consent
- Right to data erasure
- Right to stop third-party transfer



CCPA:

- Right to access all personal data collected in the last 12 months
- No right to correct errors
- Right to access personal data
- Right to opt-out of selling personal data
- Right to data erasure
- Right to opt-out of selling to third-parties



THE
UNIVERSITY
OF UTAH

Source:

<https://www.pwc.com/us/en/services/consulting/cybersecurity/california-consumer-privacy-act.html>



Source: <https://www.wired.com/story/utah-digital-privacy-legislation/>

H.B. 57 Electronic Information or Data Privacy Passed March 12, 2019

- Requires a search warrant to obtain electronic information or data
- Requires notification that electronic information or data was obtained
- Permits electronic information or data collected without a warrant to be excluded

Ethical considerations of Final Projects

- Where in the process of your analysis were ethical decisions made? What were they?
- Stakeholder analysis
 - Who are the different “personas” relevant to your project?
 - What are some incentives that may align or compete among these groups?
- Successive iterations of analysis: What would you change? Why?