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Machine learning: risks and bias

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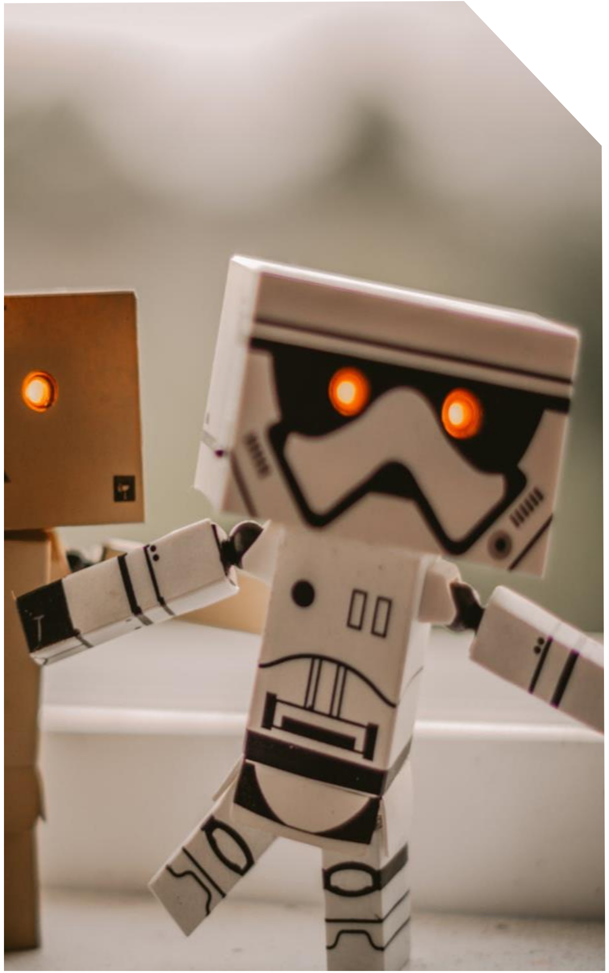

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Trust & Technology Initiative

- Multi-disciplinary research initiative exploring the dynamics of trust and distrust around internet technologies, society, and power.

- Website: www.trusttech.cam.ac.uk
- Twitter: @CamTrustTech
- Mailing list: www.bit.ly/CamTrustTechList
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ANNALS OF TECHNOLOGY MARCH 4, 2019 ISSUE

ARE ROBOTS COMPETING FOR YOUR JOB?

Probably, but don't count yourself out.

By Jill Lepore

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The Troubling Trajectory Of Technological Singularity

Jayshree Pandya Contributor
COGNITIVE WORLD Contributor Group
AI & Big Data
Jayshree Pandya is Founder of Risk Group & Host of Risk Roundup.

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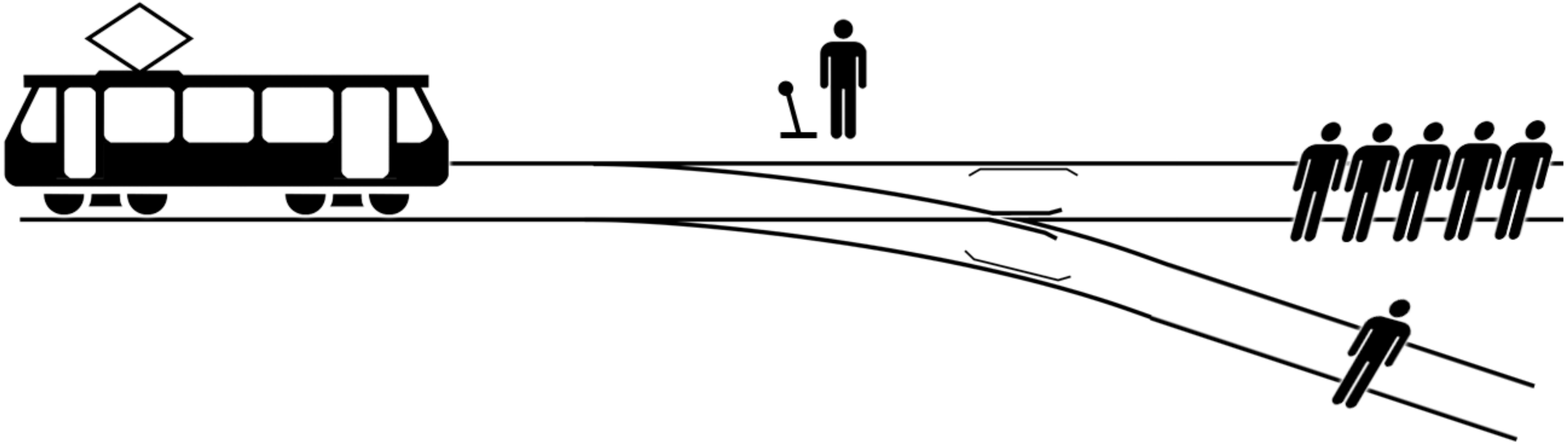

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Introduction

- Automation bias
- Opacity
- Normativity
- Errors
- Bias
- Discrimination
- Predictive privacy harms
- Surveillance
- Solutionism

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Automation bias

- People are…
    - More likely to trust decisions made by machines than by other people
    - Less likely to exercise meaningful review of or identify problems with automated systems

- Problem for…
    - Engineers
    - Users
    - Reviewers

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Opacity

- Problems for
  - Design and engineering
  - Problems for accountability and oversight

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Normativity

- Technology is neither good nor bad – but also not neutral
- Algorithm: “a series of steps undertaken in order to solve a particular problem or accomplish a defined outcome” (Diakopoulos 2015).
- Technology – including ML – is inherently normative
- In what context could a given ML system be used and for what purpose?

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Errors

- All predictive systems have margins of error
  - Training = to within an acceptable margin of error

- ML systems will make mistakes and these mistakes will have consequences

- Engineers need to think about
  - Detecting errors
  - Rectifying of errors
  - Accommodating errors

Technology Is Biased Too. How Do We Fix It?

Algorithms were supposed to free us from our unconscious mistakes. But now there's a new set of problems to solve.

By Laura Hudson

Filed under If Then Next

Published Jul. 20, 2017

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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

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Bias

- Sentencing algorithm used in US criminal justice system

- Of those predicted to reoffend, 61% were subsequently arrested

- But not equal – when other factors controlled for:
  - White defendants routinely mislabelled as low risk
  - Black defendants 77% more likely to be rated at a higher risk of committing a violent crime
  - Black defendants 45% more like to be predicted to commit any crime

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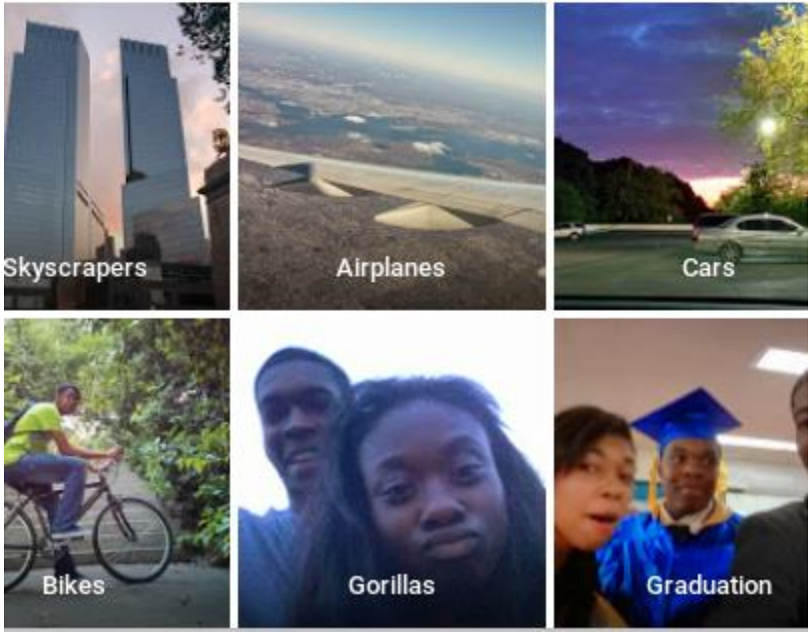
Skyscrapers
Airplanes
Cars
Bikes
Gorillas
Graduation

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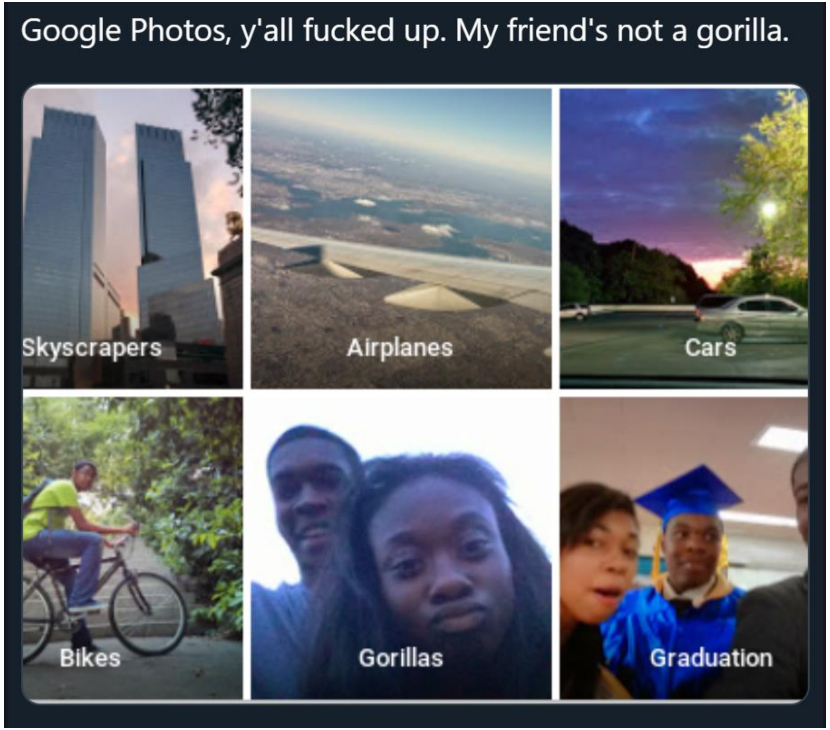

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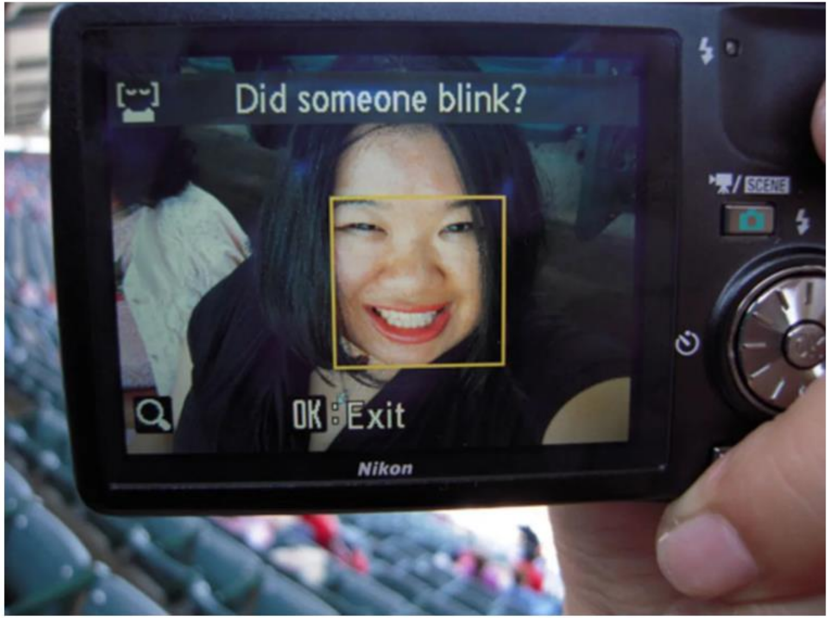
Camera Misses the Mark on Racial Sensitivity

Odelia Lee
5/15/09 7:40pm • Filed to: BLINK DETECTION

87.8K 14 Save



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BUSINESS NEWS OCTOBER 10, 2018 / 4:12 AM / 4 MONTHS AGO

Amazon scraps secret AI recruiting tool that showed bias against women

Jeffrey Dastin

8 MIN READ

SAN FRANCISCO (Reuters) - Amazon.com Inc's (AMZN.O) machine-learning specialists uncovered a big problem: their new recruiting engine did not like women.

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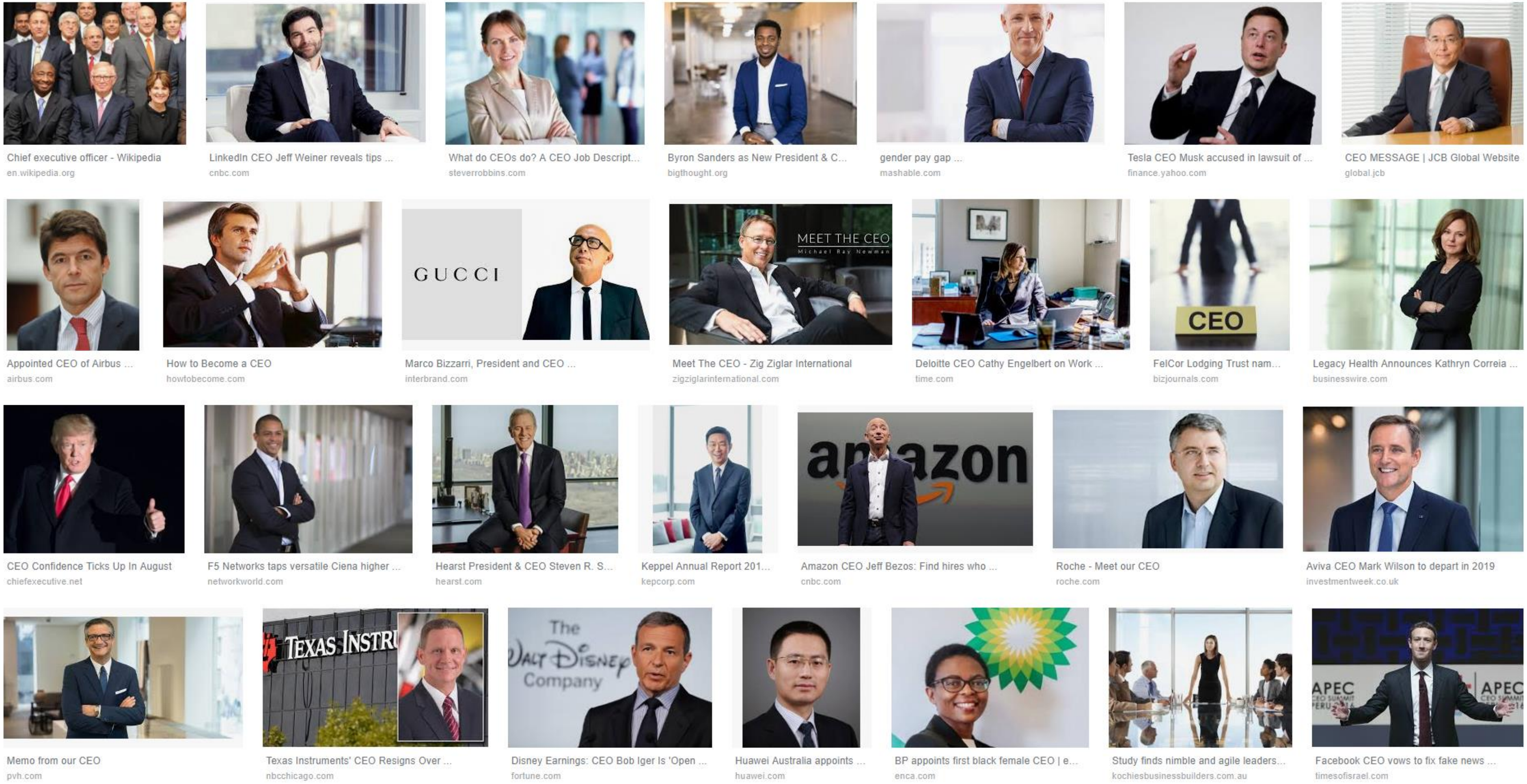
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LinkedIn CEO Jeff Weiner reveals tips ...
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howtobecome.com
Marco Bizzarri, President and CEO ...
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Legacy Health Announces Kathryn Correia ...
businesswire.com
CEO Confidence Ticks Up In August
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F5 Networks taps versatile Ciena higher ...
networkworld.com
Hearst President & CEO Steven R. S...
hearst.com
Keppel Annual Report 201...
kepcorp.com
Amazon CEO Jeff Bezos: Find hires who ...
cnbc.com
Roche - Meet our CEO
roche.com
Aviva CEO Mark Wilson to depart in 2019
investmentweek.co.uk
Memo from our CEO
pvh.com
Texas Instruments' CEO Resigns Over ...
nbcchicago.com
Disney Earnings: CEO Bob Iger Is 'Open ...
fortune.com
Huawei Australia appoints ...
huawei.com
BP appoints first black female CEO | e...
enca.com
Study finds nimble and agile leaders...
kochiesbusinessbuilders.com.au
Facebook CEO vows to fix fake news ...
timesofisrael.com

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TOM SIMONITE BUSINESS 08.21.17 09:00 AM

MACHINES TAUGHT BY PHOTOS LEARN A SEXIST VIEW OF WOMEN

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Twitter taught Microsoft's AI chatbot to be a racist asshole in less than a day

By James Vincent | Mar 24, 2016, 6:43am EDT

Microsoft 'deeply sorry' for racist and sexist tweets by AI chatbot

Company finally apologises after 'Tay' quickly learned to produce offensive posts, forcing the tech giant to shut it down after just 16 hours

Microsoft's racist chatbot returns with drug-smoking Twitter meltdown

Short-lived return saw Tay tweet about smoking drugs in front of the police before suffering a meltdown and being taken offline

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https://www.youtube.com/watch?v=TWWsW1w-BVo&t=74s

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Bias

- Particular groups are or historically were treated less favourably -> model which repeats this difference in treatment

- Particular groups are or were societally disadvantaged -> model which repeats the disadvantage

- Training data not sufficiently varied for the system to have been trained to adequately handle all possible inputs -> model which is incapable of dealing with certain inputs equally to others

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Bias

- ML can encode historical practices into predictions about the future
- ML systems are limited by their training data
- ML trained on data about society will reflect society’s biases and prejudices
- Poorest, most marginalised, and most vulnerable are most likely to be affected

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Discrimination

- ‘Fair’ systems can still be discriminatory

- Discrimination is a legal term (Equality Act 2010)
    - Direct discrimination: *where people are treated less favourably on the basis of a protected characteristic*
    - Indirect discrimination: *where rules that appear to treat everyone equally have the practical effect of excluding, placing onerous requirements on, or disadvantaging people who share a protected characteristic*

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Predictive privacy harms

- Inaccurate predictions with consequences for individual
- Accurate predictions disclosed to wrong person
- Predictive privacy harms can feed into discriminatory actions and other problems

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Predictive privacy harms

How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did

Facebook recommended that this psychiatrist's patients friend each other

Kashmir Hill
8/29/16 4:21pm • Filed to: REAL FUTURE
27.4K 6 5

FACEBOOK

How Facebook Outs Sex Workers

Kashmir Hill
10/11/17 2:20pm • Filed to: PEOPLE YOU MAY KNOW
663.9K 659 46

How Facebook's Targeted Ads Revealed One User's Sexuality

Adrian Chen
10/23/10 11:57AM Filed to: PRIVACY
27.09K

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Predictive privacy harms

New AI can guess whether you're gay or straight from a photograph

An algorithm deduced the sexuality of people on a dating site with up to 91% accuracy, raising tricky ethical questions

AI that can determine a person's sexuality from photos shows the dark side of the data age


Machine gaydar: AI is reinforcing stereotypes that liberal societies are trying to get rid of

September 13, 2017 11.35am BST

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Surveillance

- ML is increasingly used in surveillance
    - Predictive analytics
    - Biometric identification
- Surveillance capitalism
- State security and intelligence agencies
- Voter surveillance and microtargeting

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Solutionism

- Technology is often presented as an obvious solution to difficult problems

- But: socio-economic problems are rarely solved by technology

- Questions:
  - What problem are we trying to solve?
  - Is the best solution to that problem a technical one?
  - If so, is machine learning the correct technical solution to that problem?

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Conclusions

- Machine learning problems are human problems with human responsibility
    - Training datasets compiled by people
    - Models constructed by people
    - Models trained and tested by people
    - Systems used for purposes determined by people to achieve outcomes desired by people

- Replicating human bias is an engineering failure

- Problems can only be avoided if you know about the risks and proactively take steps to avoid them

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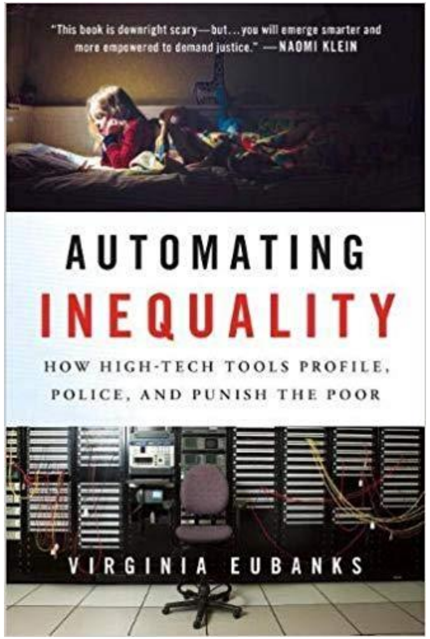

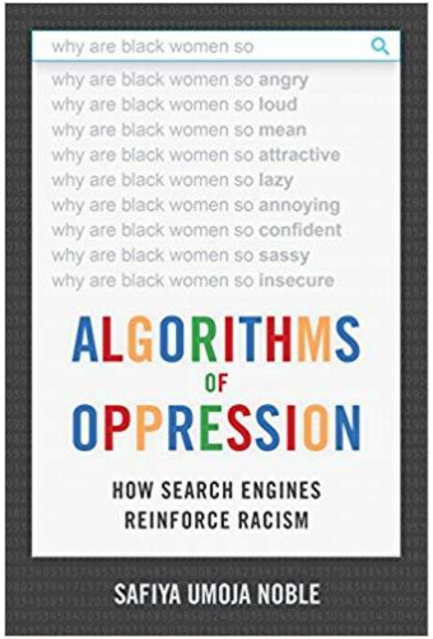

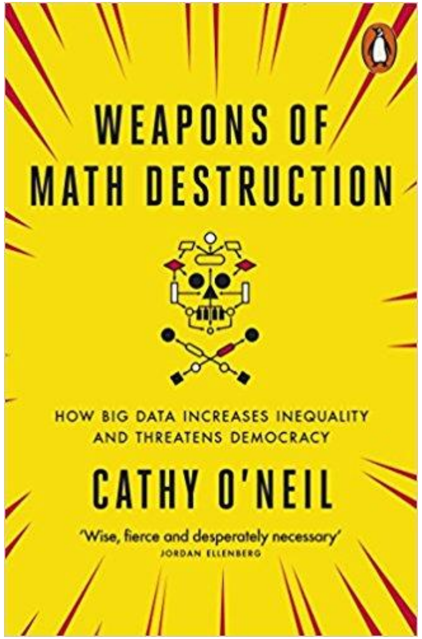

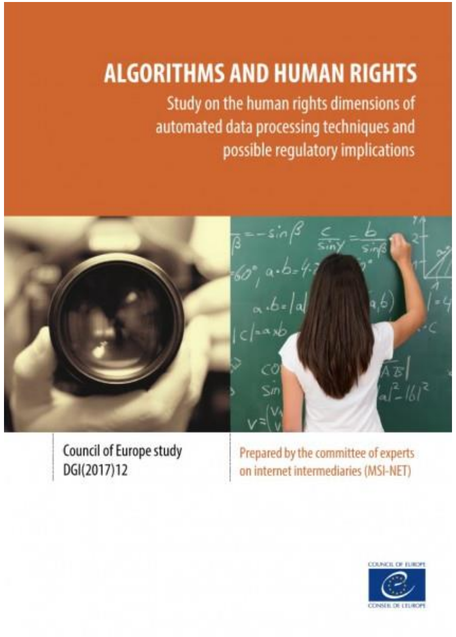

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End

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