Icebreaker

https://bit.ly/3mOvuuJ

Image courtesy of Unsplash

Rise Against the Machines: Understanding Algorithmic Bias

Digital Citizenship Workshop Series

Hannon Library | Loyola Marymount University

Slides inspired by: Chisholm, A. (2021). #ForYou: Algorithms & the Attention Economy workshop. ACRL Framework for Information Literacy Sandbox. https://sandbox.acrl.org/library-collection/foryou-algorithms-attention-economy

Image courtesy of Unsplash

Welcome

Reference &
Instruction Librarians:

Lex

Elisa

Shelby

Susan

What are we doing today?

- Explore how algorithms shape our online experiences through filtering
- Reflect on the role of algorithms in daily life
- Identify the potential causes of algorithmic bias and some preventive strategies

Workshop LibGuide: https://libguides.lmu.edu/digcitizen/algobias

Icebreaker

What algorithms have you interacted with today?

https://bit.ly/3mOvuuJ

Image courtesy of Unsplash

Cultural Imagery of Algorithms

- Popular representations of algorithms
- Keep in mind...algorithms fall within a spectrum
- How can we demystify algorithms?

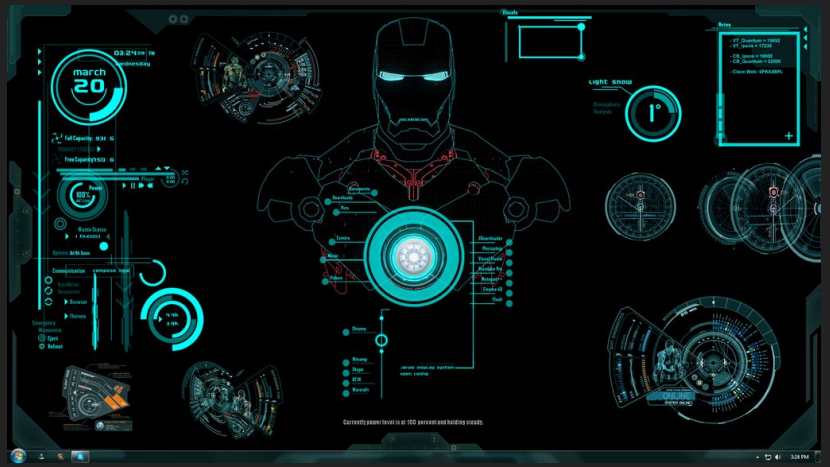


Image from Xhini, deviantART

What is an algorithm?

"[Algorithms]...are mathematical objects. They take a sequence of mathematical operations...and translate them into computer code. They are fed with data from the real world, given an objective and set to work crunching through the calculations to achieve their aim." (Fry, 2018)

See also: (Golbeck, 2016)

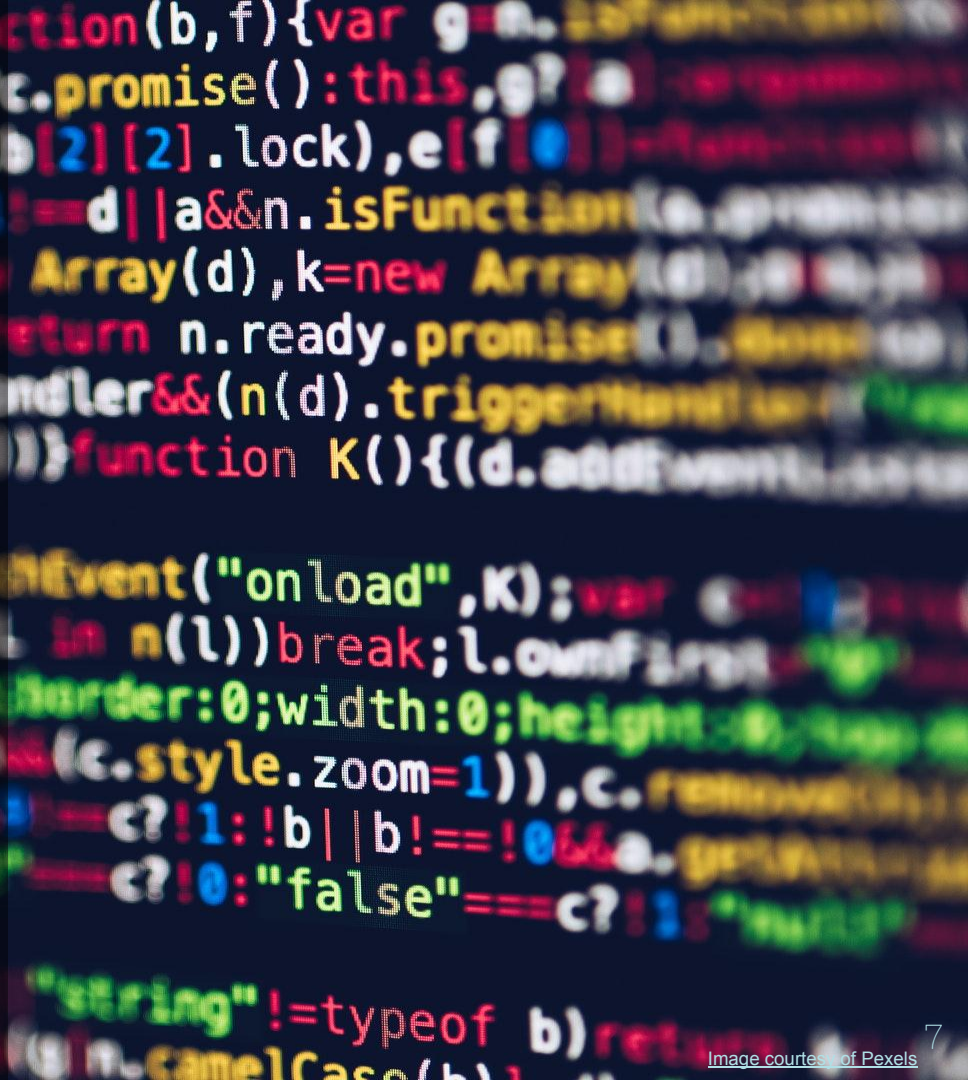


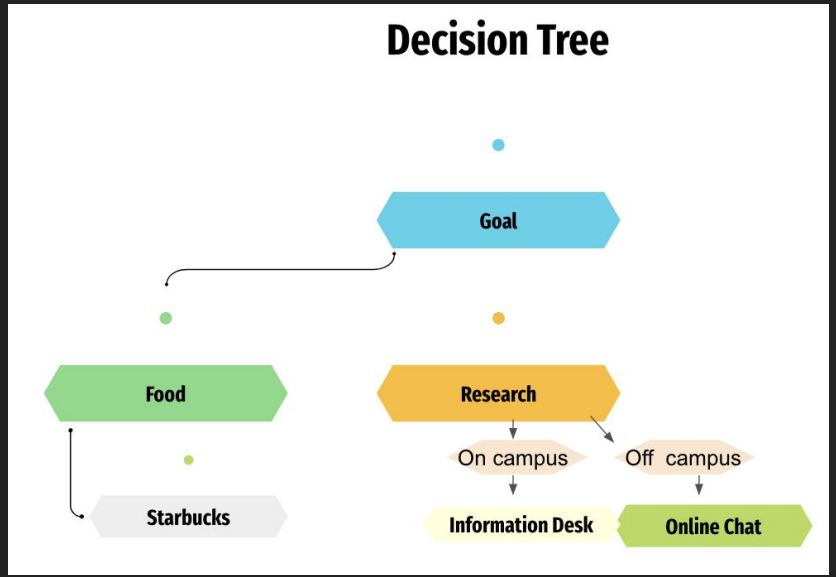
Image courtesy of Pexels

Example Algorithm

```
# in this program, we are encoding a person's options navigating the library

goals = ['coffee', 'research']
locations = ['on campus', 'off campus']

def navigate_library(goals, locations=0):
    if goals == 'coffee' and actions == 0:
        location = 'Starbucks'
            message = "Have some Starbucks coffee!"
    elif goals == 'research':
        if locations == 'on campus':
            message = "Visit us at the Information Desk!"
        elif locations == 'off campus':
            message = "Use our ask-a-librarian chat service."
```



Adapted Clark, J. A. (2018). jasonclark/algorithmic-awareness [Rich Text Format]. https://github.com/jasonclark/algorithmic-awareness

What tasks can algorithms perform?

Prioritization 

making an ordered list

Association 

finding links

Classification 

picking a category

Filtering 

isolating what's important

(Fry, 2018)

Algorithm Infrastructure- Examples

Data Input		Algorithm	Output
Security Camera		Classifier (uses dataset of pictures of faces)	Alarm (produces noise if face detected)

Data Input		Algorithm	Output
search history, geography, server speed,	other people's clicks, popularity, word freq.	Ranking Algorithm (google)	Search results Google

Types of algorithms

Rule-based algorithms

Instructions are constructed by a human and are direct & unambiguous. (Fry, 2018)

Machine-learning algorithms

Fits under the broad umbrella of artificial intelligence. You give the machine data, a goal and feedback when it's on the right track -- and leave it to work out the best way of achieving the end. (Fry, 2018)

Algorithmic Bias

Image courtesy of Unsplash

Algorithmic Bias

Occurs when a computer system reflects the implicit values of the humans who are involved in collecting, selecting, or using data. (Wikipedia)

Poll

What causes bias in algorithms?

a) Historical human biases in training datasets
b) Incomplete or unrepresentative training data
c) Proxies for sensitive attributes become feedback loops
d) Algorithmic objectives

Image courtesy of Unsplash

Causes of Bias

Historical Biases

Human biases included in training datasets

Unrepresentative Training Data

Incomplete or unrepresentative data

Proxies & Feedback Loops

Proxies for sensitive attributes become loops

Algorithmic Objectives

Minimize prediction errors and benefit majority groups

Example- Historical Bias

Microsoft's Tay Twitter Chatbot

- Trained on anonymized public data from Internet
- After 1 day, Tay had to be shut down for a series of lewd and racist tweets

Image credit: Vincent, J. (2016, March 24) Twitter taught Microsoft's AI chatbot to be a racist asshole in less than a day. *The Verge*. https://www.theverge.com/2016/3/24/11297050/tay-microsoft-chatbot-racist

Example–Unrepresentative Training Data

Facial Recognition Software

- Training set mostly lighter-skinned faces
- Darker-skinned females were the most misclassified group (error rates of up to 34.7%)
- Maximum error rate for lighter-skinned males at 0.8%.

Buolamwini, J., & Gebru, T. (2018). Gender shades: intersectional accuracy disparities in commercial gender classification. *Proceedings of Machine Learning Research*, 81, 77-91.

Image credit: Buolamwini, J. (2016, Dec. 14). T*he Algorithmic Justice League*. MIT Media Lab. https://medium.com/mit-media-lab/the-algorithmic-justice-league-3cc4131c5148.

Example–Proxies and Feedback Loops

COMPAS Recidivism Algorithm

- Brisha, a black teenager with a previous misdemeanor who stole a kid's bike, was assigned a "high" risk
- Vernon, a white man who shoplifted goods equivalent to the value of the bike but had a previous criminal record, was a "low" risk

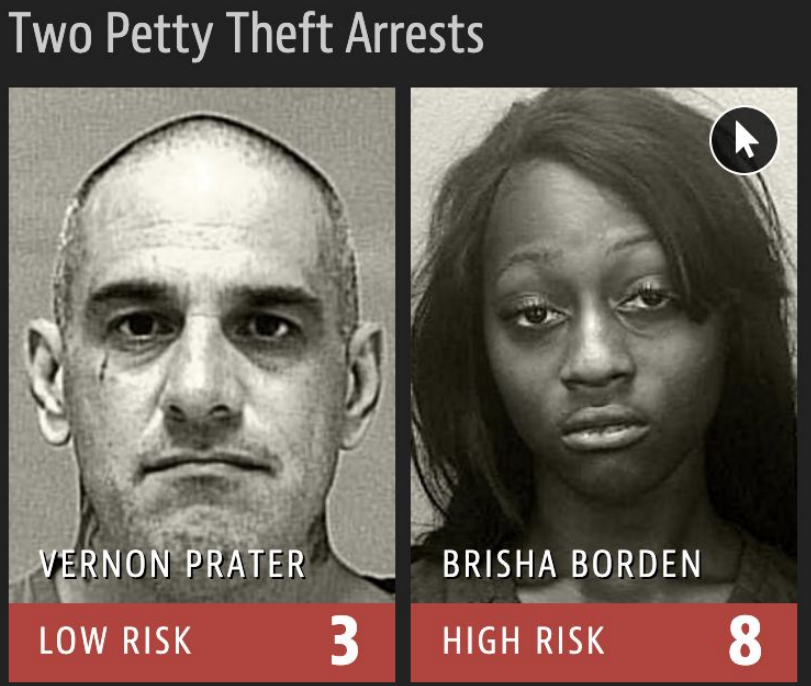


Image Credit: Angwin, J., Larson, J., Mattu, S., & Kirchner, L. (2016, May 23). Machine bias. *ProPublica.* https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing?token=aGn0cAzF1vcRrdeL0ElVR2hgvgtEPpJo

Example–Algorithmic Objectives

Healthcare Algorithm

- Used to diagnose patients with bipolar disorder
- Uses strict DSM-5 criteria
- Prioritizes accuracy over context
- Would not intentionally misdiagnose, even if better for the patient

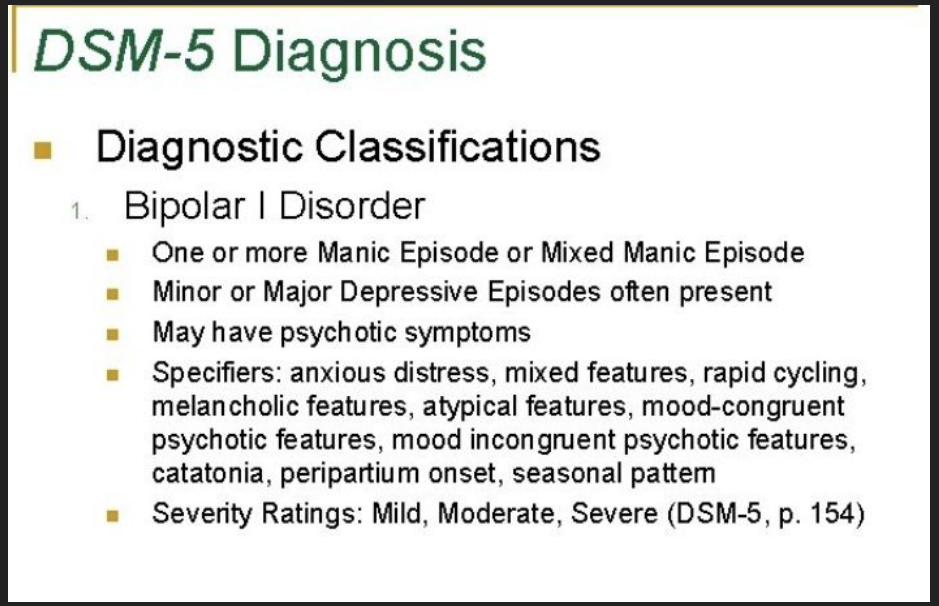


Image credit: American Psychiatric Association (Ed.). (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). American Psychiatric Association Pub.

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Play the Survival of the Best Fit Game

https://www.survivalofthebestfit.com/

Play individually over the next 10 min

Image courtesy of Unsplash

Discussion Questions

1. Was the decision-making of the algorithm straightforward and transparent?
2. Are any of the criteria biased or could they be? Why were fewer blue applicants hired?
3. What were the strengths of this machine learning algorithm?
4. Who should be held accountable for the hiring decisions made by an algorithm?
5. How could this algorithm be modified to increase fairness?

Image courtesy of Unsplash

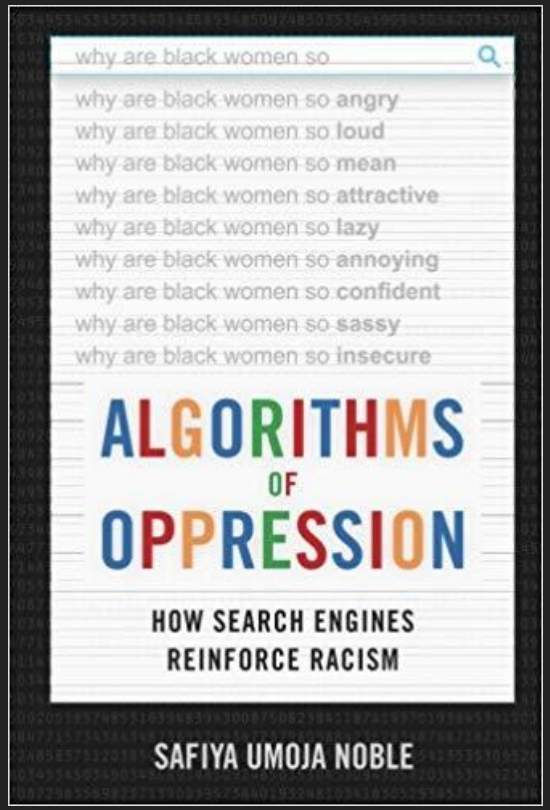
Authority Skepticism

Google

Google is viewed as an authoritative source for finding information, but algorithm bias exists within Google's searches because they are designed by humans and reflect the assumptions and biases of the designers. This doesn't mean that Google isn't useful, but it helps to know it's limitations and biases.

Dr. Safiya Noble

- Dr. Noble talked about racism and pornification of women

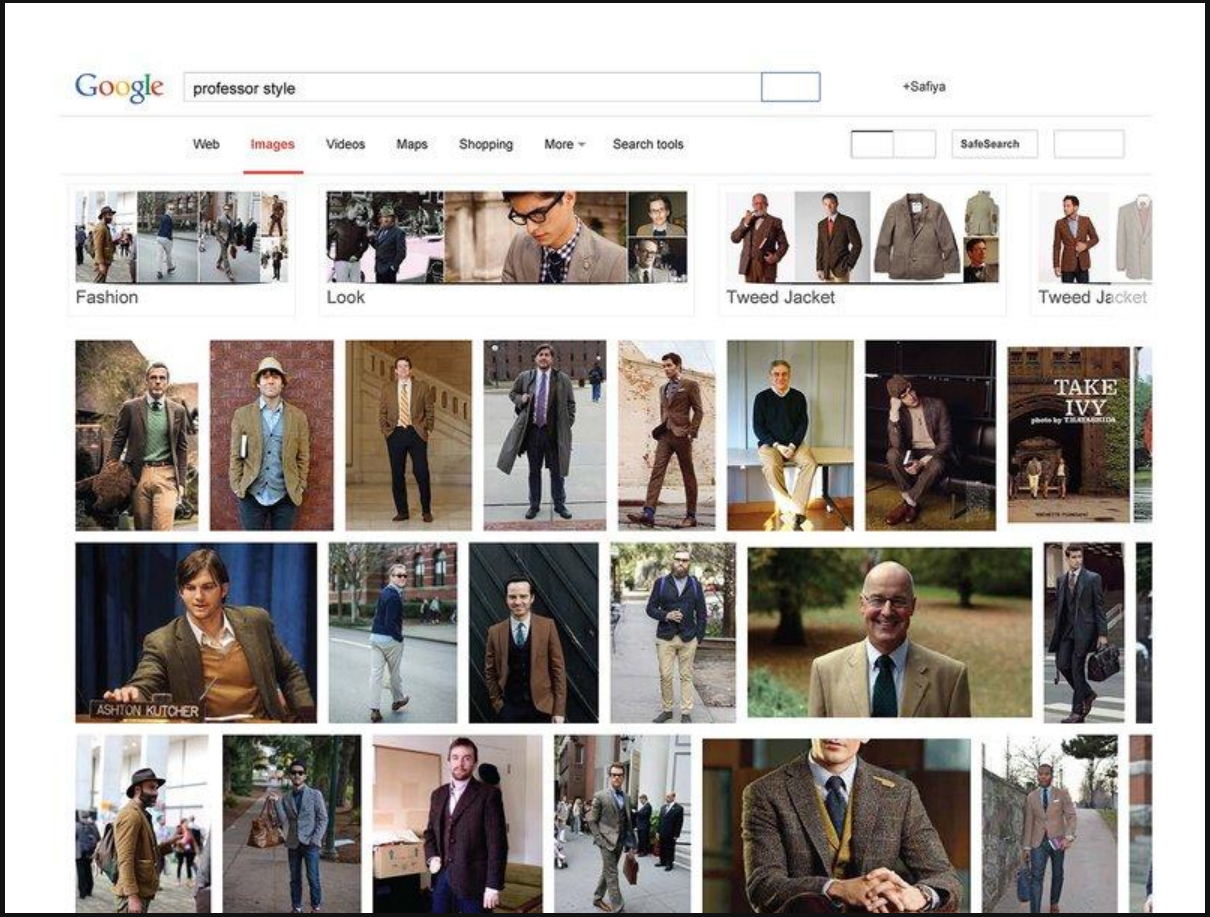


Google faulted for racial bias in image search results for black teenagers

https://www.washingtonpost.com/news/morning-mix/wp/2016/06/10/google-faulted-for-racial-bias-in-image-search-results-for-black-teenagers/

Google Images

https://images.google.com/



"Professor style" Google Image Search

Reflect on your results

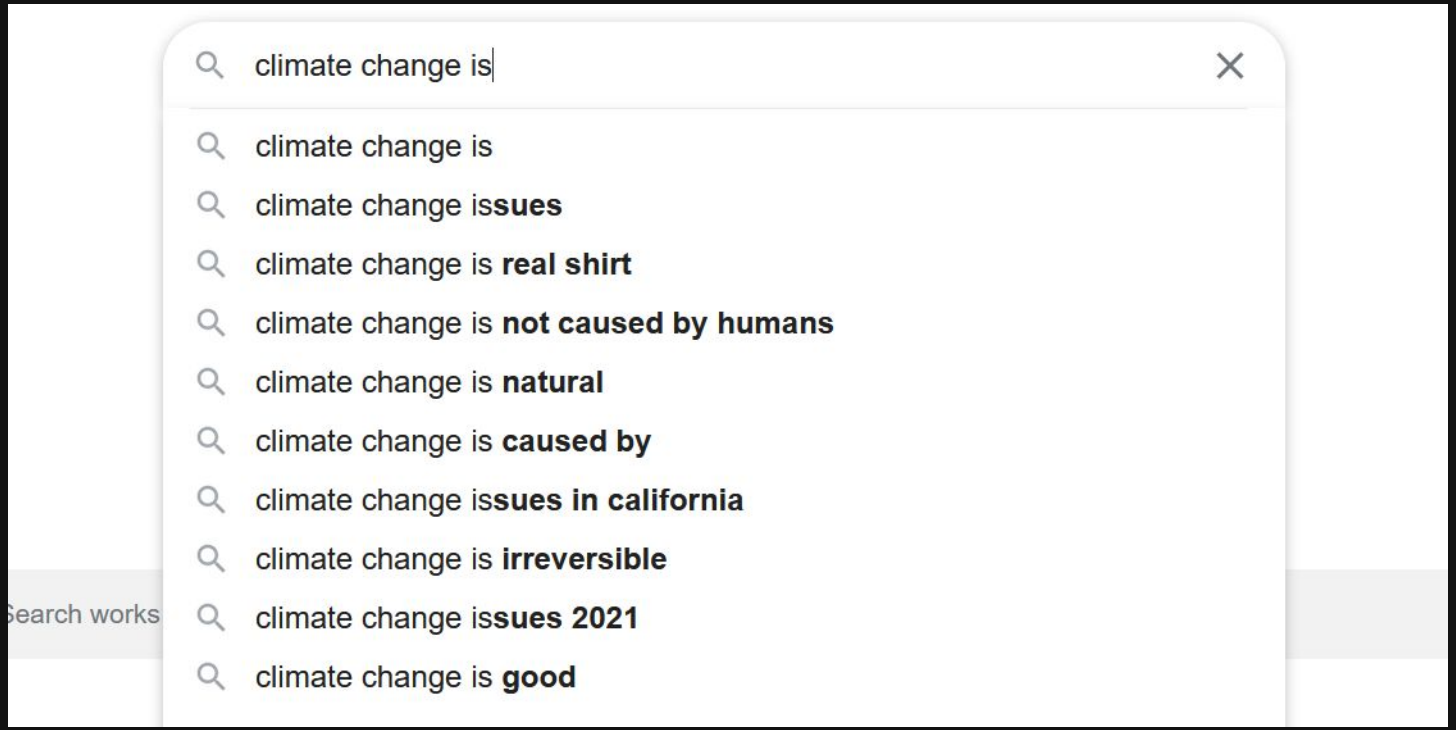
1. What do you see?
2. Who do you see?
3. Who do you expect to see? / Who is missing?
4. How does the information provided by these images influence you?
5. Does this tell us anything about how this population is represented or misrepresented?

Lead Singer Search

A search in Google for “lead singer” returned these images.

Who is not represented in these results?

Autocomplete

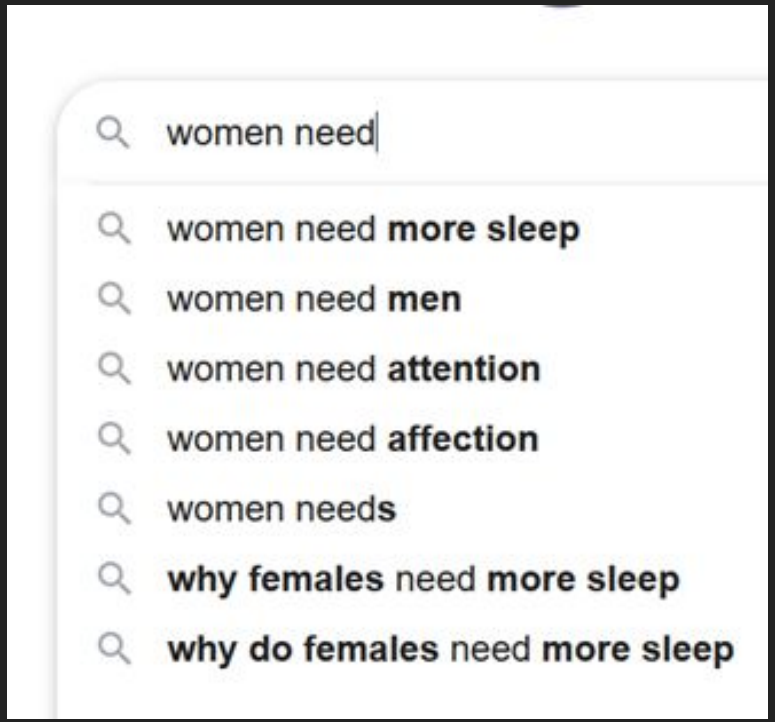


UN ad series reveals widespread sexism

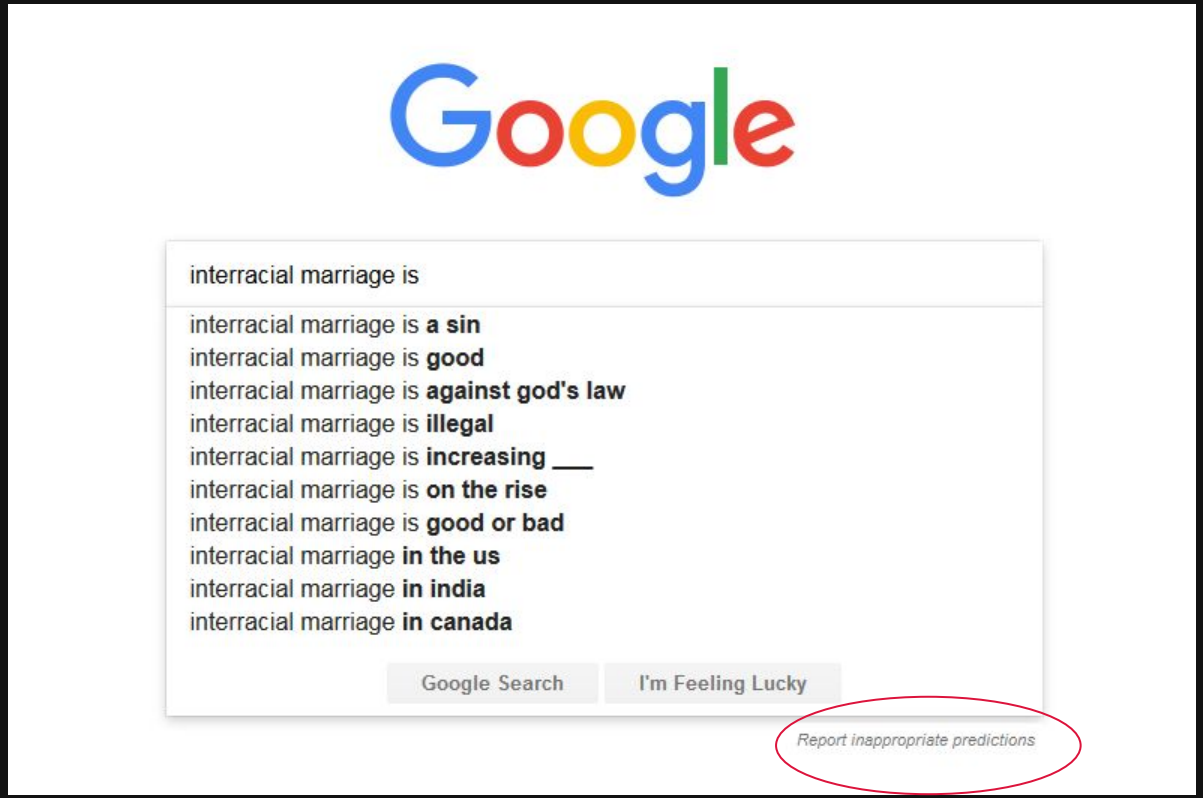
Based on Google searches dated 9 March, 2013 the ads expose negative sentiments ranging from stereotyping as well as outright denial of women's rights.

http://www.unwomen.org/en/news/stories/2013/10/women-should-ads

Updating the Search

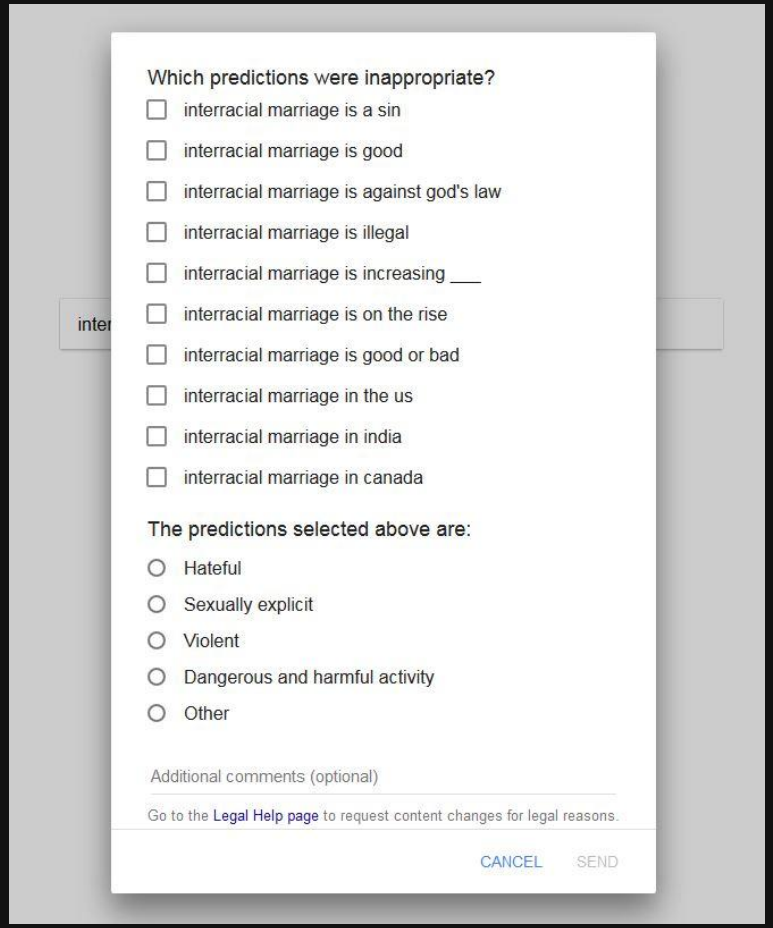


Reporting Search Predictions



Screenshot 8/6/2018

Reporting Search Predictions



Recommendation engines

"The essential function of recommender systems is mathematically predicting personal preference." (Schrage, 2020)

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Predictive text reporting:

-Why do/are… (gay, lesbian, Asian, Mexican, men, etc.)

a. Try reporting some problems to Google
b. Try the same searches on DuckDuckGo

Image courtesy of Unsplash

Looking Forward

Image courtesy of Unsplash

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Assigning algorithms to a spectrum of human intervention versus automated

https://bit.ly/3mXS1Ft

Image courtesy of Unsplash

What strategies can build algorithmic awareness?

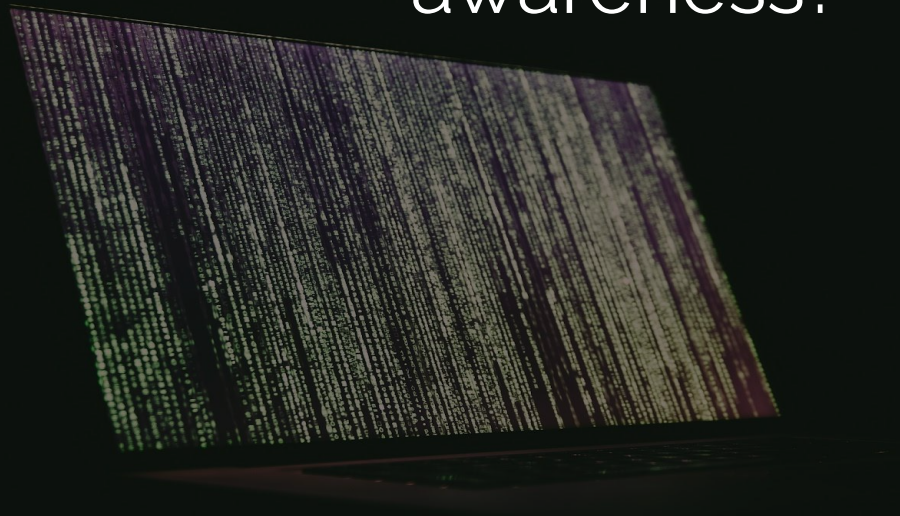


Image courtesy of Unsplash

Our Takeaways

Think Twice 

Before downloading free apps - you are paying with your data!

Request Transparency 

From corporations

Provide Feedback 

Biased or inappropriate search results? Provide search feedback

Get involved 

Advocacy and educational groups

Get Involved!

- Our Data Bodies
  - https://www.odbproject.org/
- Electronic Frontier Foundation
  - https://www.eff.org/
- Carceral Tech Resistance Network
  - https://www.carceral.tech/
- Detroit Community Technology Project
  - https://detroitcommunitytech.org/
- Data & Society
  - https://datasociety.net/
- Auditing Algorithms
  - https://auditingalgorithms.science/
- AI Now Institute
  - https://ainowinstitute.org/

Image courtesy of Pexels

Further Reading

Image courtesy of Unsplash

Algorithms of Oppression

eBook

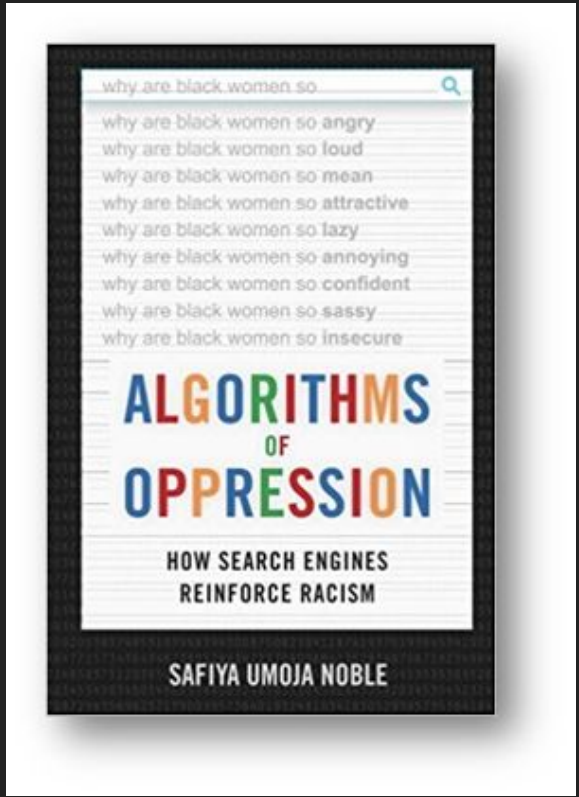
- https://linus.lmu.edu/record=b4091787~S2

Print Book

- Main Stacks ZA4230 .N63 2018
  (Library 3rd floor)

YouTube

- https://youtu.be/iRVZozEEWlE



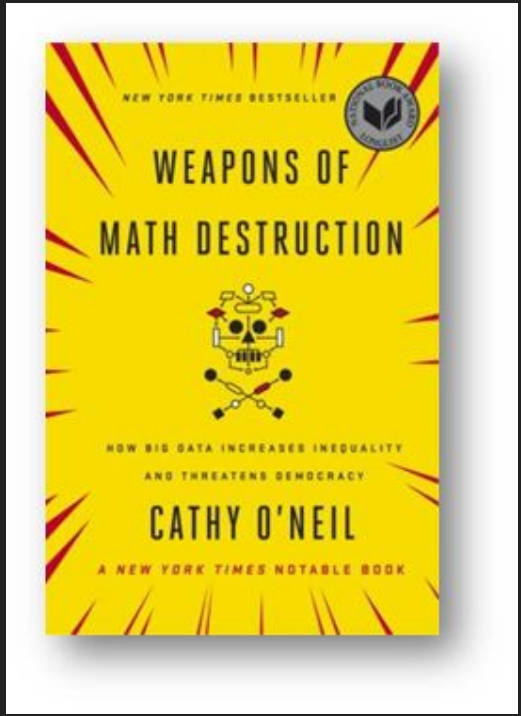
Weapons of Math Destruction

Print Book

- Main Stacks QA76.9.B45 O64 2016 (Library 3rd floor)

TED Talk

- https://www.ted.com/talks/cathy_o_neil_the_era_of_blind_faith_in_big_data_must_end



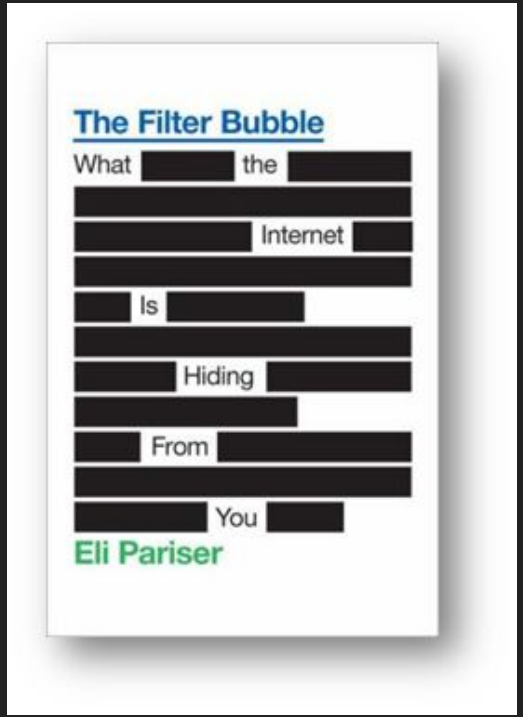
The Filter Bubble

Print Book

- Main Stacks ZA4237 .P37 2011
  (Library 3rd floor)

TED Talk

- https://www.ted.com/talks/eli_pariser_beware_online_filter_bubbles



More LibGuides!

Filter Bubbles

https://libguides.lmu.edu/fakenews/FilterBubble

System and Gender Bias in Wikipedia

https://libguides.lmu.edu/wikipedia

Fake News

https://libguides.lmu.edu/fakenews

What did we cover today?

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- Reflected on the role of algorithms in daily life
- Identified the potential causes of algorithmic bias and some preventive strategies

Workshop LibGuide: https://libguides.lmu.edu/digcitizen/algobias

Thanks!

https://libguides.lmu.edu/digcitizen/feedback

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