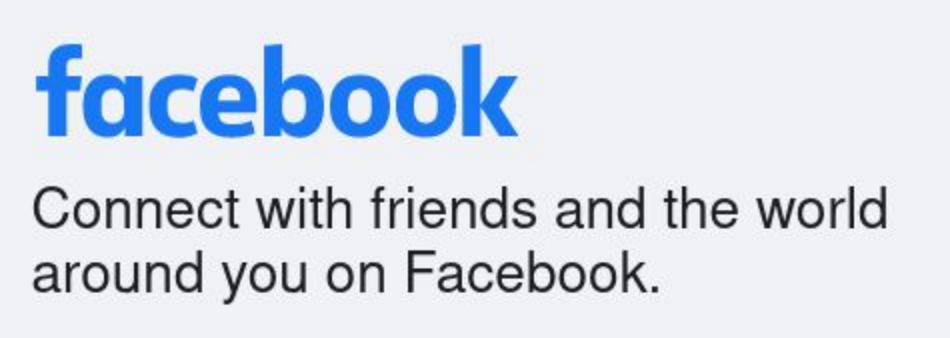
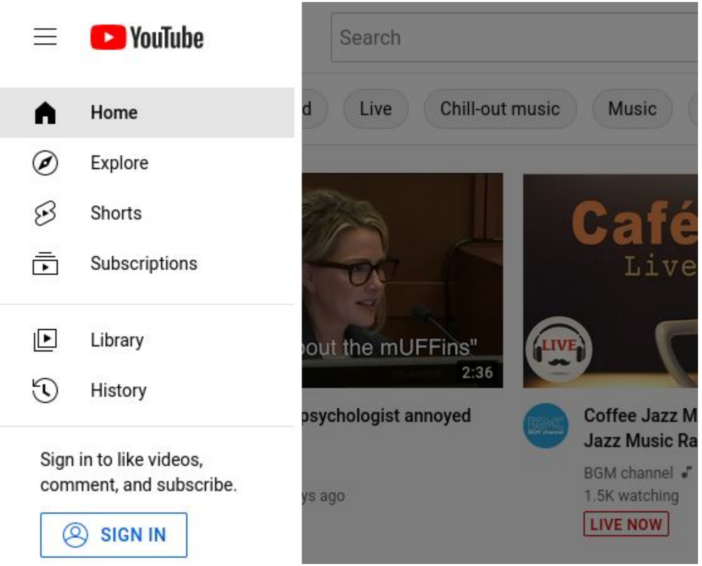
Future of Software User Interfaces

An HCI Perspective

Algorithms and UI


WHAT'S HAPPENING


facebook
Connect with friends and the world around you on Facebook.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History
Sign in to like videos, comment, and subscribe.
SIGN IN
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psychologist annoyed
Coffee Jazz M
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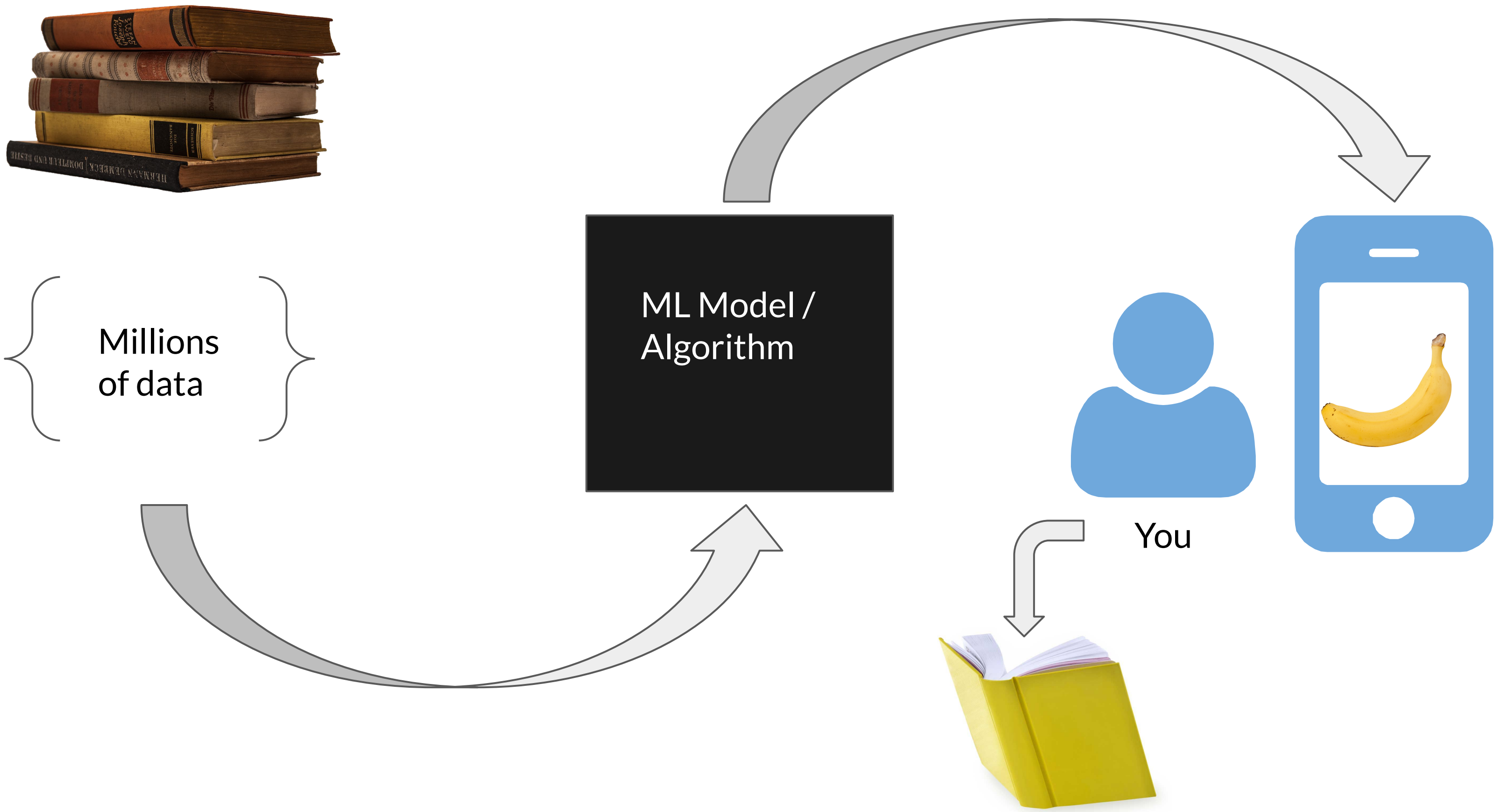
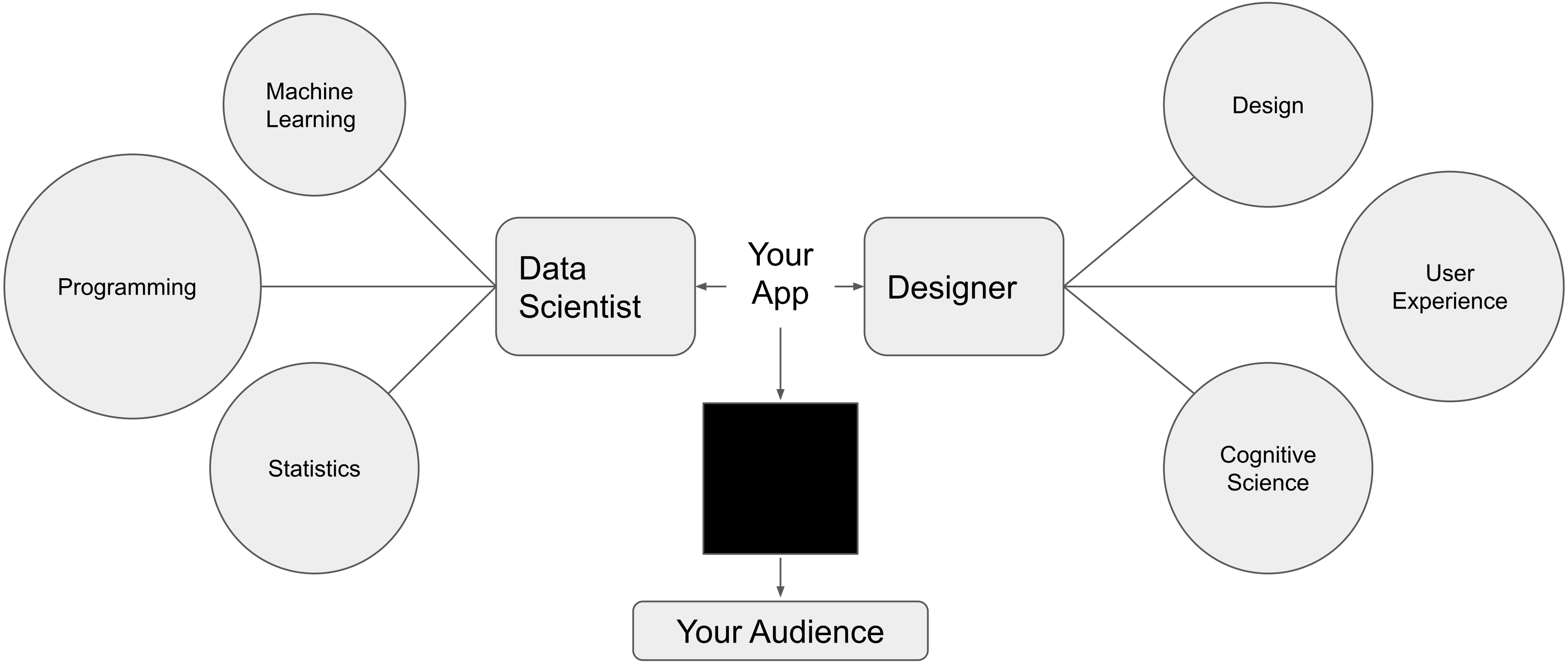
BGM channel
1.5K watching
LIVE NOW

TikTok


Millions
of data
ML Model /
Algorithm
You

Algorithmic Design



Data models + algorithms = increasing complexity

Black Box AI

Users rarely know or understand how an algorithm works or why it returns the results that it does

Results are influenced by:

Quality of inputs
- ➔ Are the images of the books clear, easily identifiable?

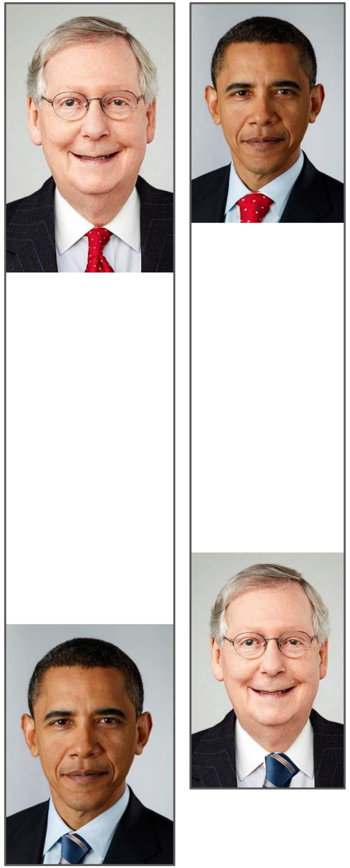
Representational accuracy of inputs
- ➔ Do the images of books include ALL types of books or only hardback?

Accuracy of input classification
- ➔ Did the humans classifying the inputs get it right?

Engineer demographics
- ➔ Do the engineers have familiarity with all types of books or only one?

Case Study: Twitter

Released an image cropping algorithm that emphasized light skinned faces over darker ones



https://twitter.com/bascule/status/1307440596668182528

Case Study: Twitter

Twitter acknowledged the issue, but claimed it was unintentional.

Requested researchers to help test the algorithm to further identify bias

Eventually dropped the algorithm altogether

Twitter apologises for 'racist' image-cropping algorithm

Users highlight examples of feature automatically focusing on white faces over black ones

https://www.theguardian.com/technology/2020/sep/21/twitter-apologises-for-racist-image-cropping-algorithm

Case Study: Twitter

Researchers who accepted Twitter's invitation found even more instances of bias

From the perspective of diversity, equity, and inclusion, how might these findings marginalize or bias certain individuals?

Further findings:

- ➔ Crops out white or gray hair
- ➔ Crops based on height, lower faces in a group are not selected
- ➔ More likely to ignore people wearing head coverings
- ➔ Preference towards slim, young, bright faces

https://www.nbcnews.com/tech/tech-news/twitters-racist-algorithm-also-ageist-ableist-islamaphobic-researchers-rcna1632

Do you think it was intentional?

Is there harm?

Algorithmic Bias

"AI bias will explode. But only the unbiased AI will survive. Within five years, the number of biased AI systems and algorithms will increase. But we will deal with them accordingly—coming up with new solutions to control bias in AI and champion AI systems free of it."

Excerpt from
https://bostonreview.net/articles/annette-zimmermann-algorithmic-political/

Algorithmic Bias

"...even if algorithms themselves achieve some sort of neutrality in themselves, the data that these algorithms learn from is still riddled with prejudice."

Excerpt from
https://bostonreview.net/articles/annette-zimmermann-algorithmic-political/

Algorithmic Bias

Systematic errors that create unfair, unequal, and exclusive outcomes are unavoidable

Far more complex than automated photo cropping

Some other examples…

- ➔ Amazon recruiting algorithm favors men's resumes over women's
- ➔ Courtroom algorithm produced more lenient sentences to white people than to black people
- ➔ Mortgage algorithms biased against Latino borrowers
- ➔ Uber facial recognition suspends accounts of transitioning transgender drivers

Algorithmic Bias

What can be done?

Remove bias from training data

Keep training data up to date

Publicly share training data, support open data sets)

Construct diverse, representative teams to design, deploy, and ethically evaluate AI

Acknowledge that not all systems are suitable for algorithmic assessment and assistance

Increase transparency, or Explainable AI

XAI: Explainable AI

Make Black Box systems more understandable to humans by making the output more transparent

Why explain?

To Justify

➔ Bias, discrimination

To Control

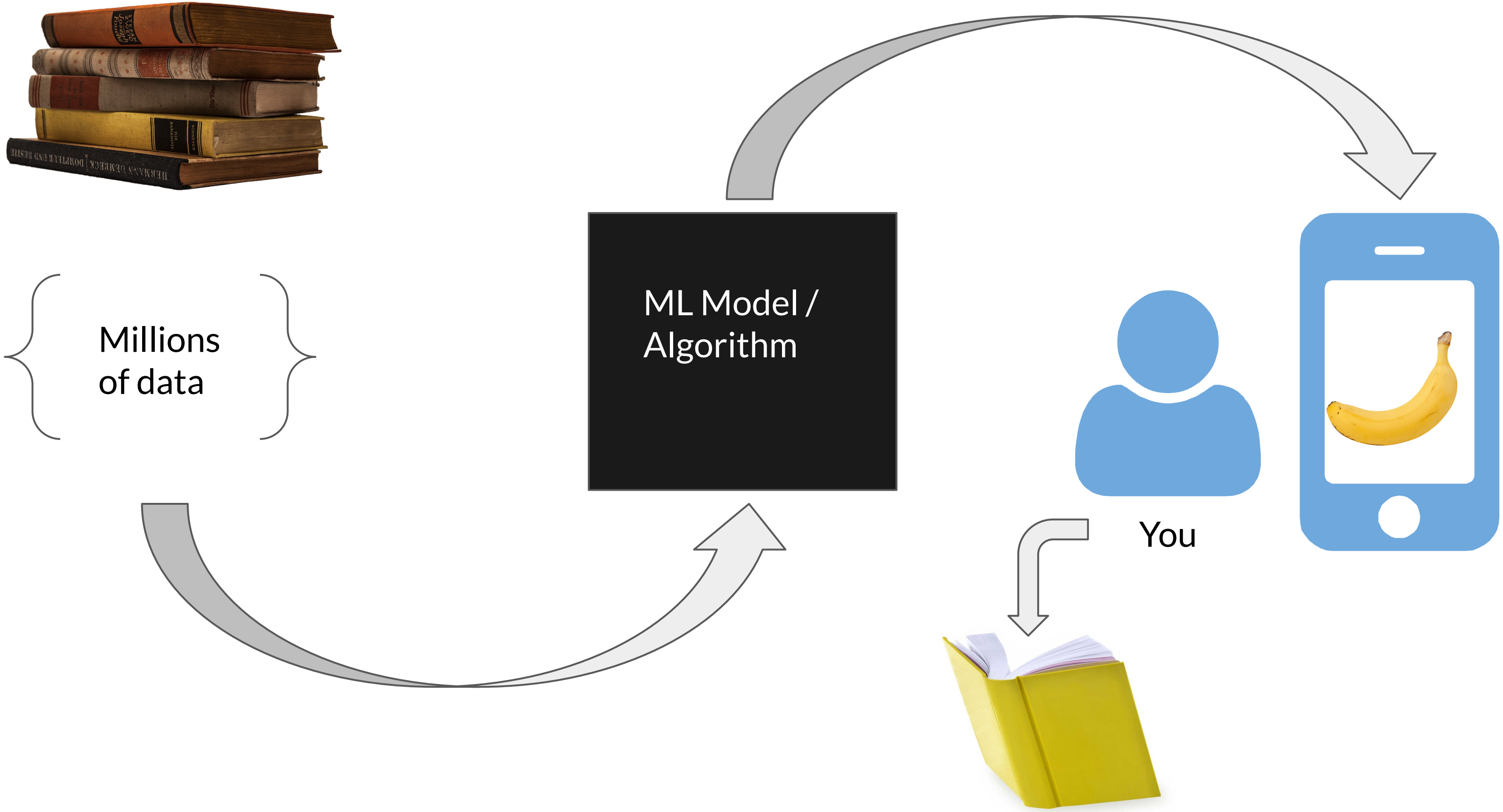
➔ Visibility, identify errors

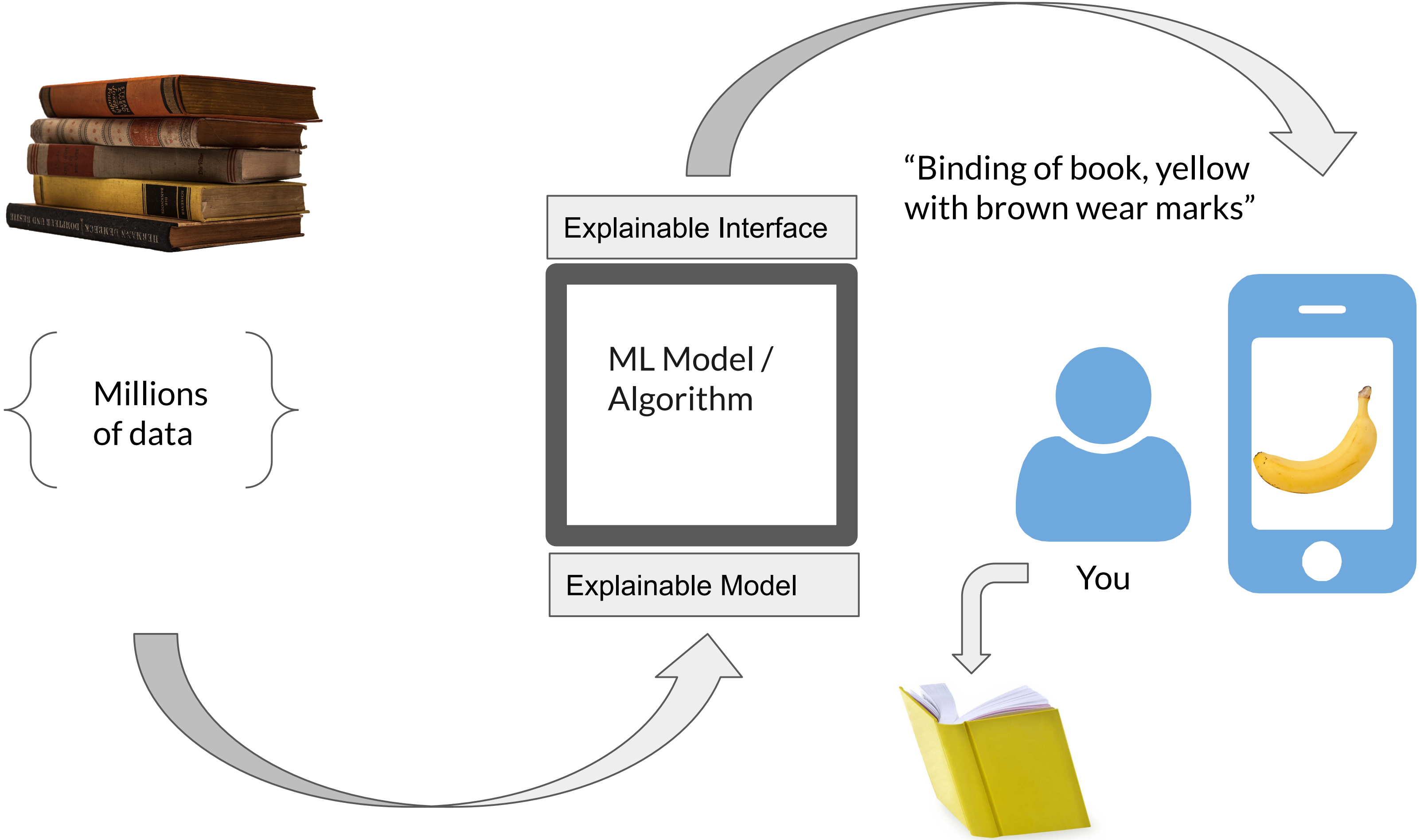
To Improve

To discover

➔ Leads to understanding of how computation can meet human needs and goals

Source


Millions
of data
ML Model /
Algorithm
You



Millions
of data
Explainable Interface
ML Model /
Algorithm
Explainable Model
“Binding of book, yellow
with brown wear marks”
You

Some Examples Relevant to UI

Building Trust

Benevolent Deception

- Metaphors (desktop)
- Skeuomorphs (skype static)
- Placebo controls - deceiving the mental model [1].

Malevolent Deception

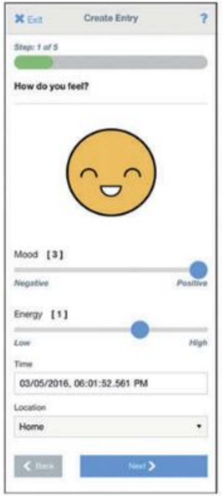
- Malware
- Phishing
- Dark patterns (UX)

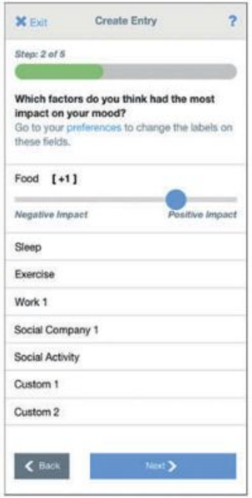
Source 5

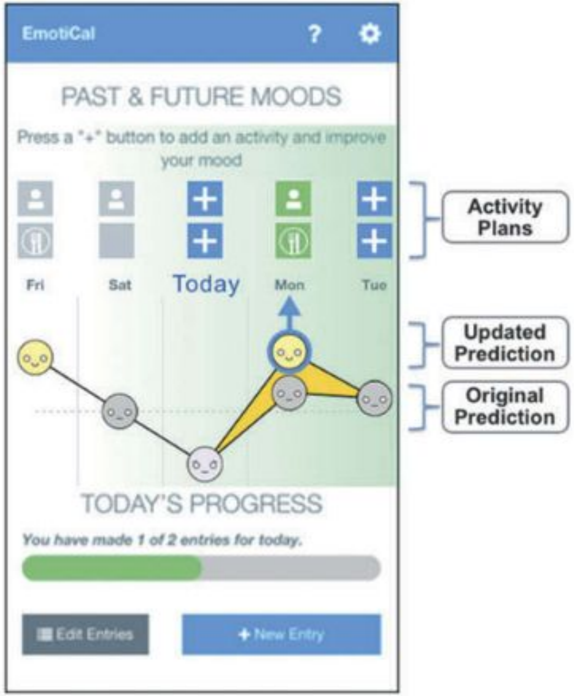
Active Exploration

“Emotional forecasting user interface”

Enable user control to support user understanding



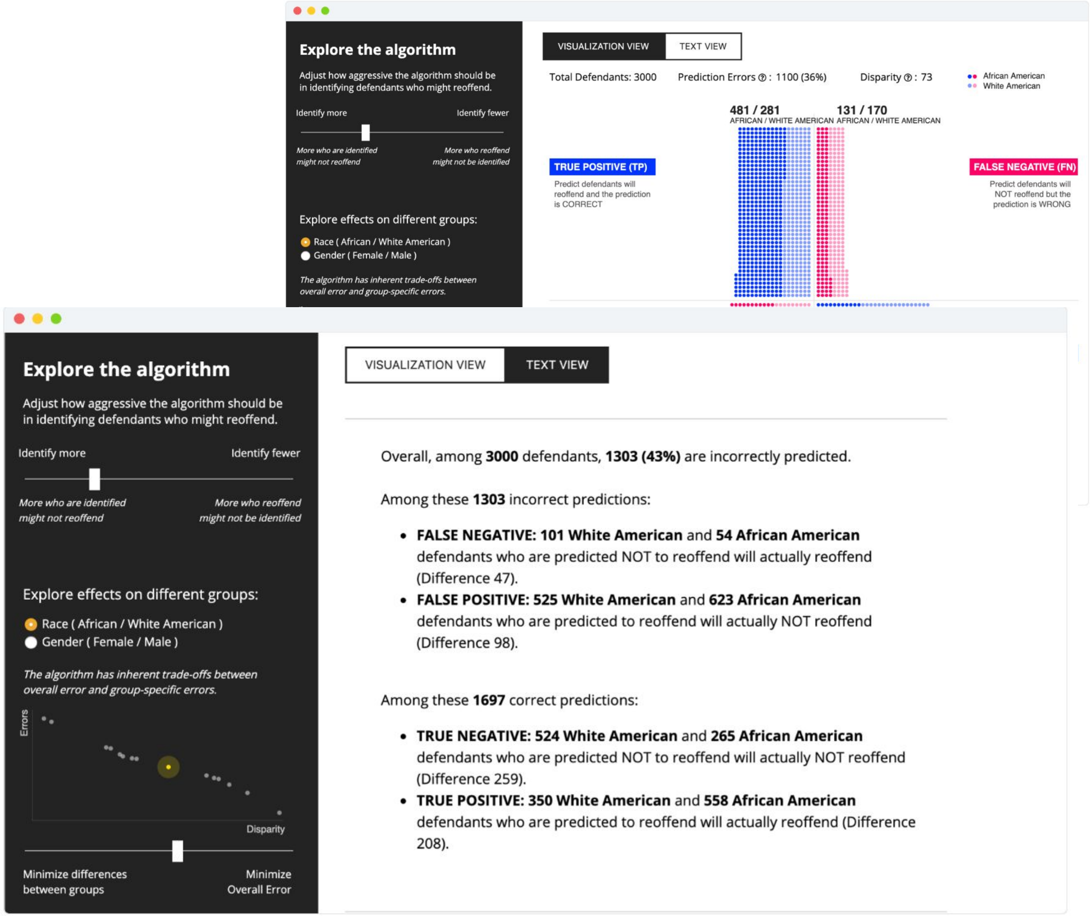




Active Exploration

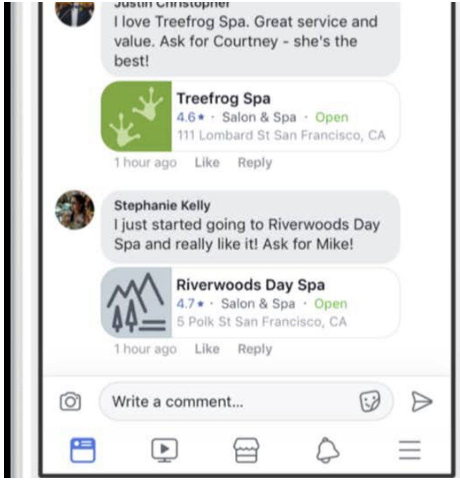
Trade-off thresholds in recidivism prediction models

Supports alignment between AI predictions and individual or organizational values

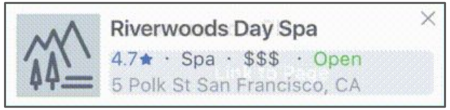


Source

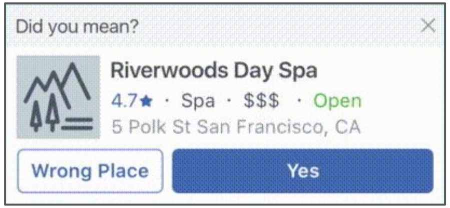
Show and Control



If confidence is high:



Else if confidence is medium:



Else:

[Source](#)

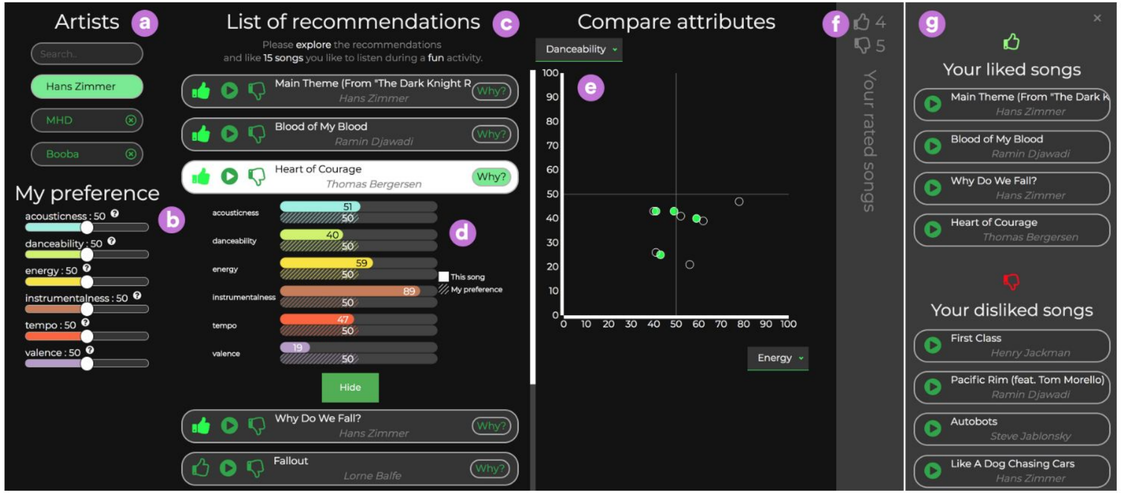
Progressive Disclosure

The “Why?” button

Explaining helps users gain confidence in choices

Faster assessment

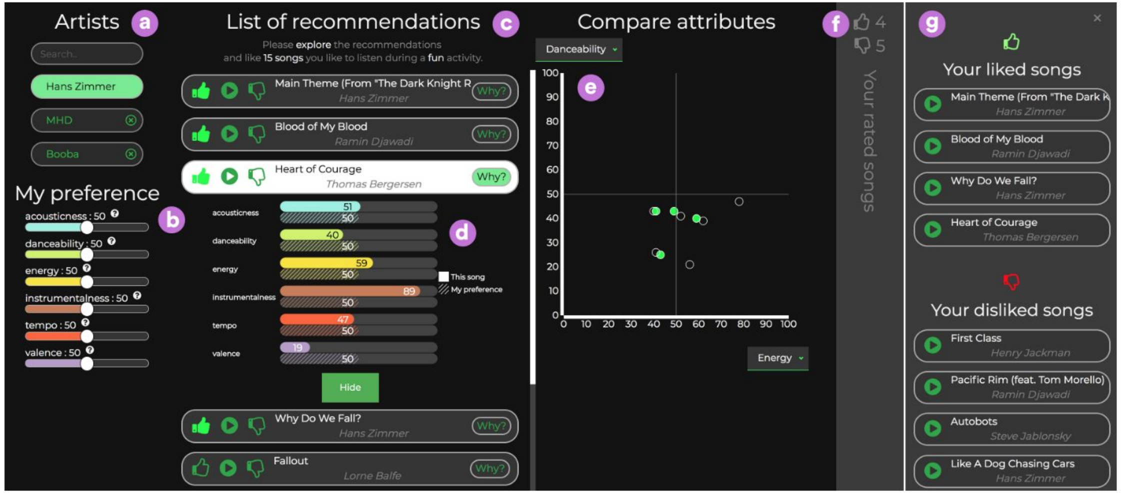
Additional cognitive burden for certain people (unfamiliar with viz, etc.)



Progressive Disclosure

Design Implications:

- Explanations should be personalized to type of user
- Toggle features, optionally present
- Vary detail level to accommodate expertise



XAI: Explainable AI

Users SHOULD be able to understand how and why a decision is made

Users MUST be able to identify whether or not a decision is human or algorithmically derived

Why does it matter?

➔ Regulation
➔ Auditing
➔ Empower Users

Source

Algorithmic Bias: Challenges

Building data sets is HARD.
Companies do not want to share

Imbalance between scientists, policymakers, and end users

Institutions are highly motivated to implement AI systems

Do you want to see the training data?

Vox recode

Students are evacuated following the school shooting at Saugus High School in Santa Clarita, California, November 2019. | Mario Tama/Getty Images

New surveillance AI can tell schools where students are and where they've been

Not all AI being used by schools is facial recognition. That doesn't mean the tech doesn't come with privacy risks.

By Rebecca Heilweil | Jan 25, 2020, 5:00am PST

https://www.vox.com/recode/2020/1/25/21080749/surveillance-school-artificial-intelligence-facial-recognition

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