Integrating Machine Learning with Product Design

What level of aggregation will you store your data at?
What loss function should you use?
What validation and training sets should you use?

Should you focus on simplicity of implementation, speed of inference, or accuracy of the model? How will your model handle out-of-domain data items? Can it be fine-tuned, or must it be retrained from scratch over time?

These are **not just algorithm questions.** They are **data product design** questions

For instance, two studies found that **Amazon's facial recognition** software produced inaccurate and racially biased results.

There was, presumably, a **big distance** between the **researchers** that developed these algorithms and the **Amazon documentation staff** that wrote the guidelines provided to the police. A lack of tight integration led to serious problems for society at large, the police, and Amazon themselves.

Data scientists need to be part of a cross-disciplinary team. And **researchers** need to work closely with the kinds of **people w**ho will end up using their research. Better still is if the **domain experts** themselves have learned enough to be able to train and debug some models themselves—hopefully there are a few of you reading this book right now!

Everybody tends to have **well-defined jobs** to perform. Especially in **large companies**

Topics in Data Ethics

- The need for recourse and accountability
- Feedback loops
- Bias
- Disinformation

Recourse and Accountability

it is easy for **no one person** to feel responsible for **outcomes**. While this is understandable, it does not lead to good results. In the earlier example of the **Arkansas healthcare system i**n which a **bug led to people** with cerebral palsy losing access to needed care, **the creator** of the algorithm blamed **government official**s, and government officials blamed those who **implemented the software**

A database of suspected gang members maintained by California law enforcement officials was found to be full of errors,

Another example is the US credit report system: in a large-scale study of credit reports by the Federal Trade Commission (FTC) in 2012,

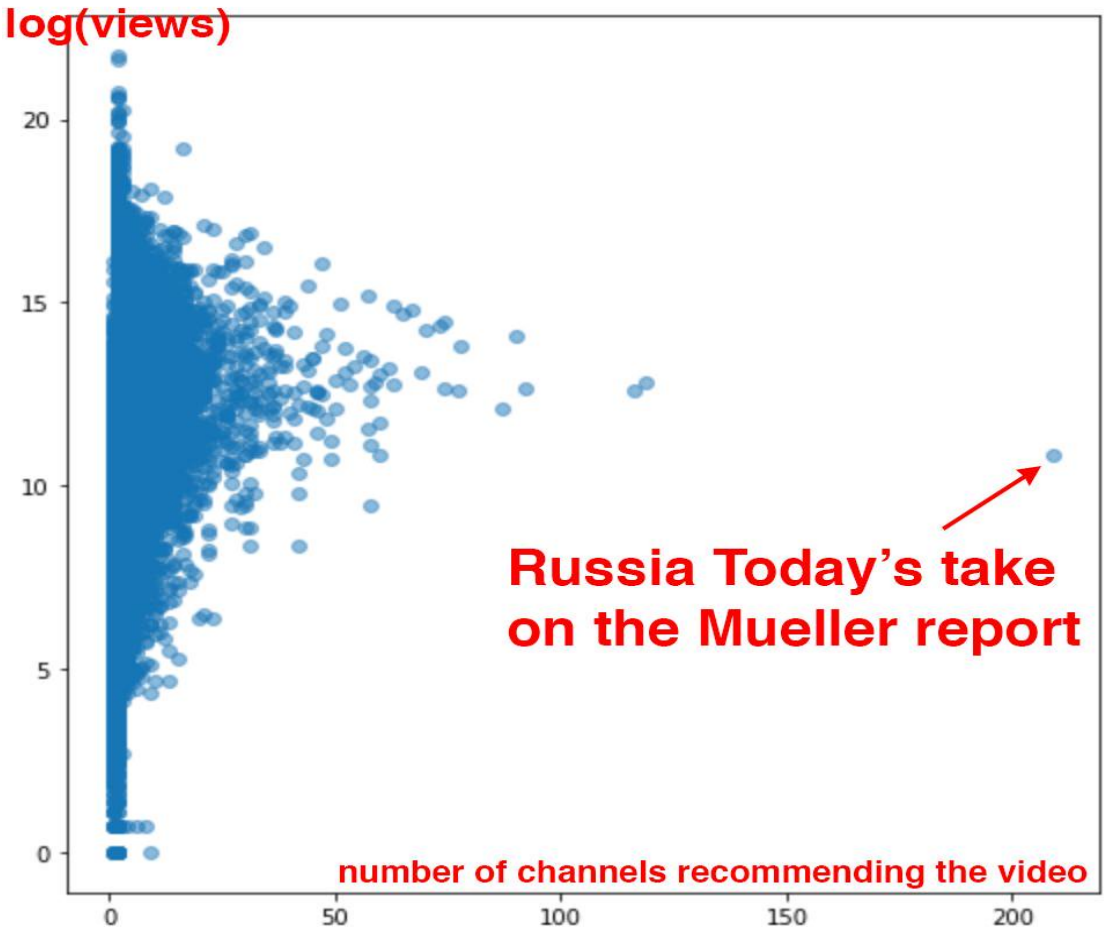
Feedback Loops

This meant that videos about things like conspiracy theories started to get **recommended m**ore and more by the **recommendation system.**

they started to get drawn more and more toward **YouTube.**

YouTube resulted in the algorithm recommending more and more conspiracy theory and other extremist content,

There are signs that this is exactly what has h**appened with YouTube's recommendation** system. *The Guardian* ran an article called "How an ex-YouTube Insider Investigated its Secret Algorithm" about Guillaume Chaslot, an ex-YouTube engineer who created AlgoTransparency, which tracks these issues. Chaslot published the chart in <



This suggests the possibility that Russia Today, a state-owned Russia media outlet, has been successful in gaming **YouTube's recommendation algorithm.**

lack of transparency of systems

Aurélien Géron, led YouTube's video classification team

He pointed out that it's **not just feedback loops** involving humans that are a problem. There can also be feedback loops without humans! He told us about an example from YouTube:

One important signal to classify the main topic of a video is the **channel** it comes from. For example, a video uploaded to a **cooking channel** is very likely to be a cooking video. But how do we know what topic a channel is about?

Evan Estola, lead machine learning engineer at **Meetup**, discussed the example of **men expressing** more interest than women in tech meetups.

Meetup's algorithm to recommend fewer tech meetups to women,

o, Evan and his team made the ethical decision for their recommendation algorithm to **not create such a feedback loop**, by explicitly **not using gender** for that part of their model.

Facebook provides an example of allowing a **runaway feedback loop** to run wild. Like YouTube, it tends to radicalize users interested in one conspiracy theory by introducing them to more.

Join an anti-vaccine group, and your suggestions will include anti-GMO, chemtrail watch, flat Earther (yes, really), and "curing cancer naturally groups