elevated third

DrupalCon Seattle 2019

What's for Dinner?

Using Predictive UX to Help Users Decide

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About Us

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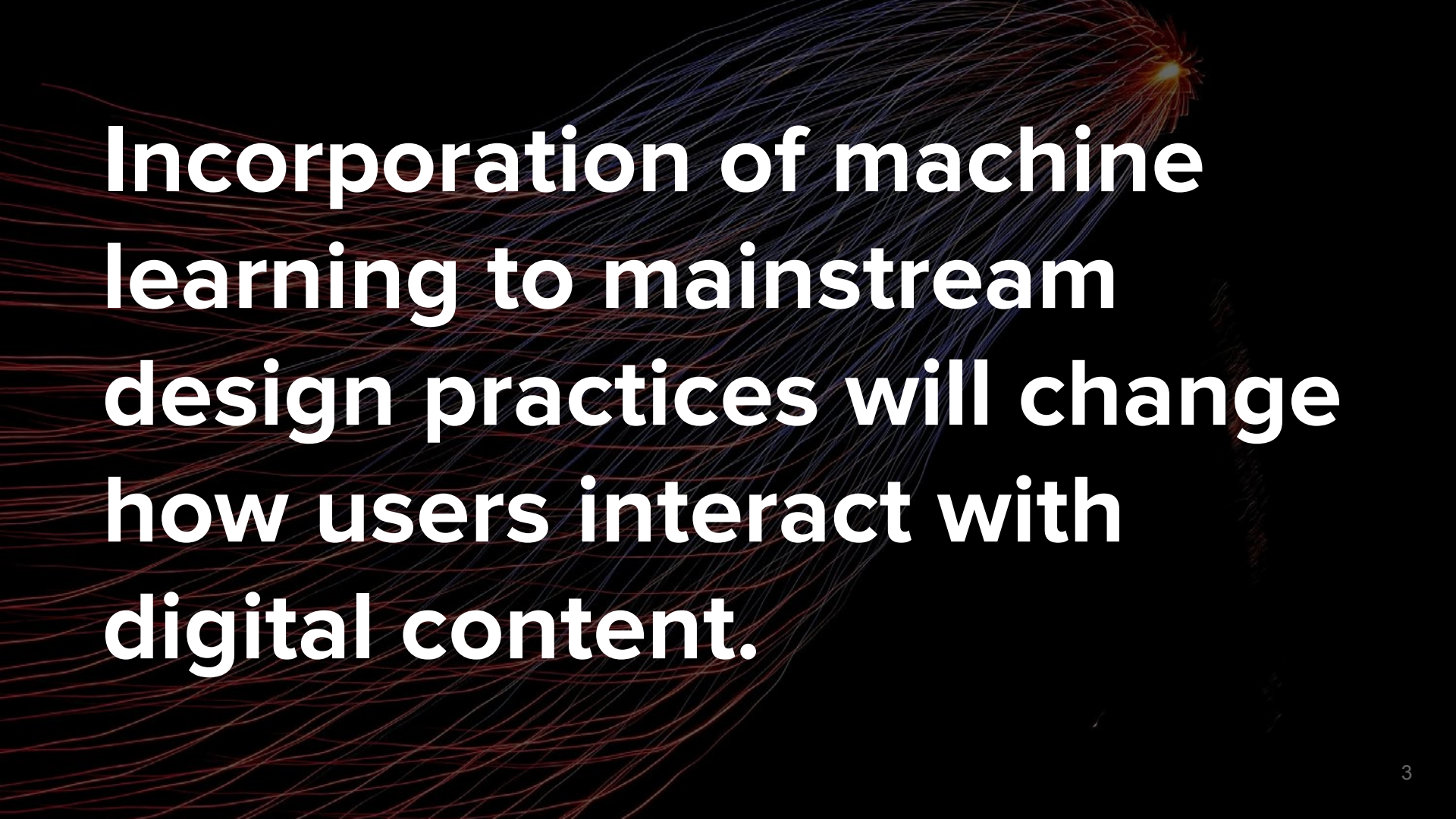
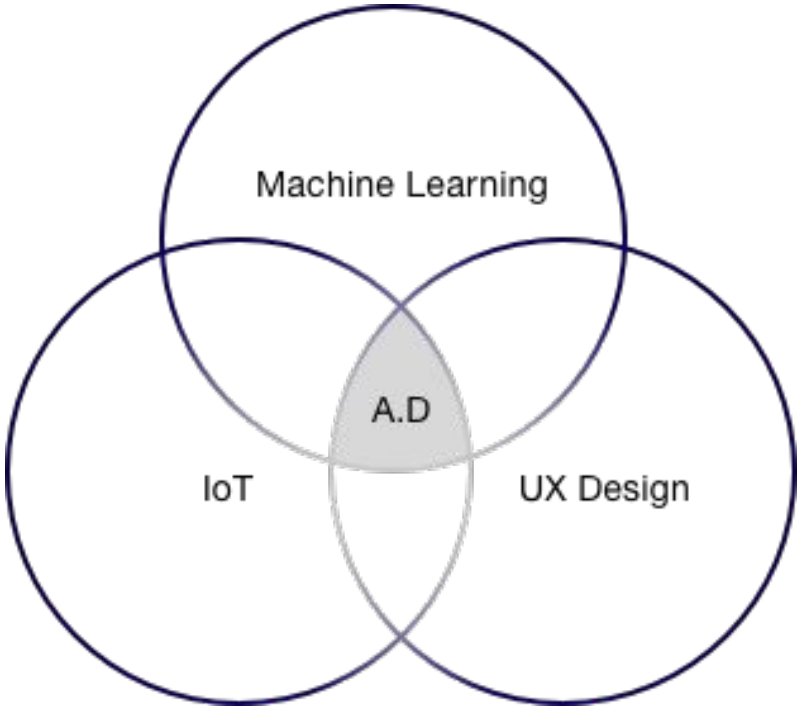

Incorporation of machine learning to mainstream design practices will change how users interact with digital content.

Basic Concept

“... A design pattern that moves around learning, predicting and anticipating.”

— Joël van Bodegraven



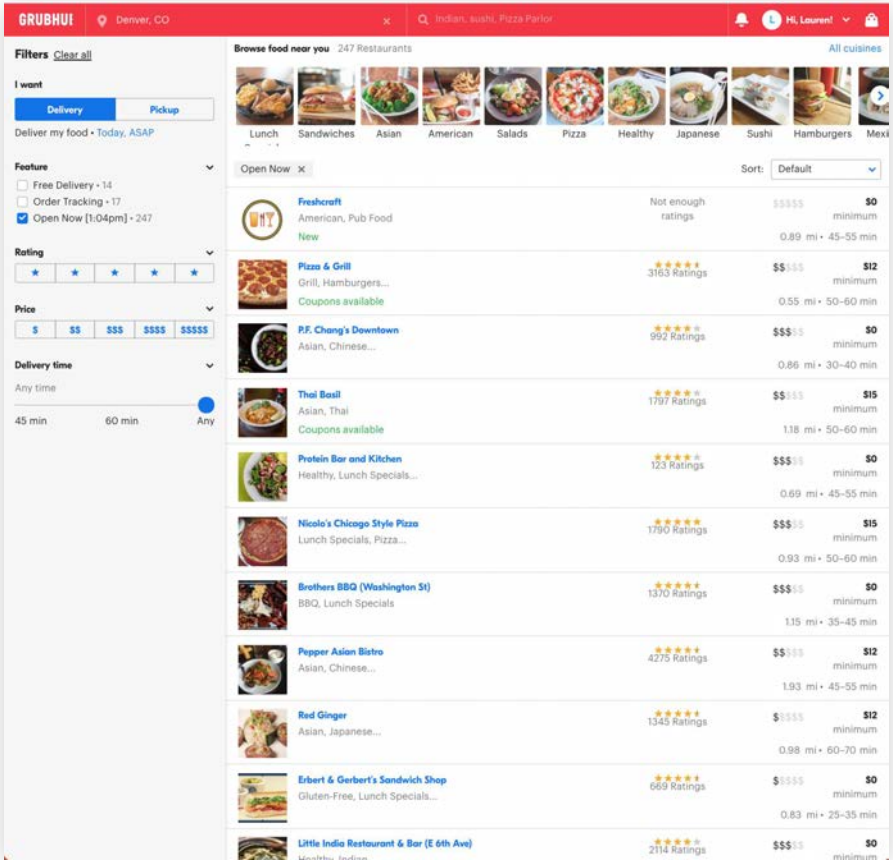
Essentially ...

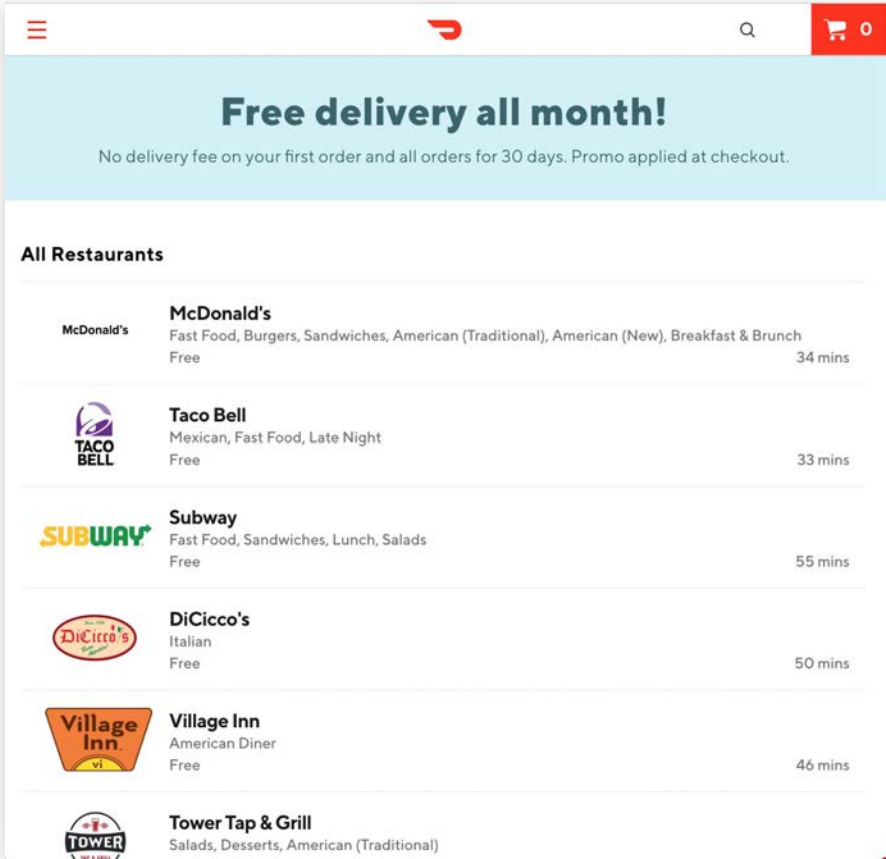
“Personalization is done by the system being used. Developers set up the system to identify users and deliver ... the content, experience, or functionality that matches their role.”

— Amy Schade, Nielsen Norman Group

What is Predictive UX?

What is Predictive UX?





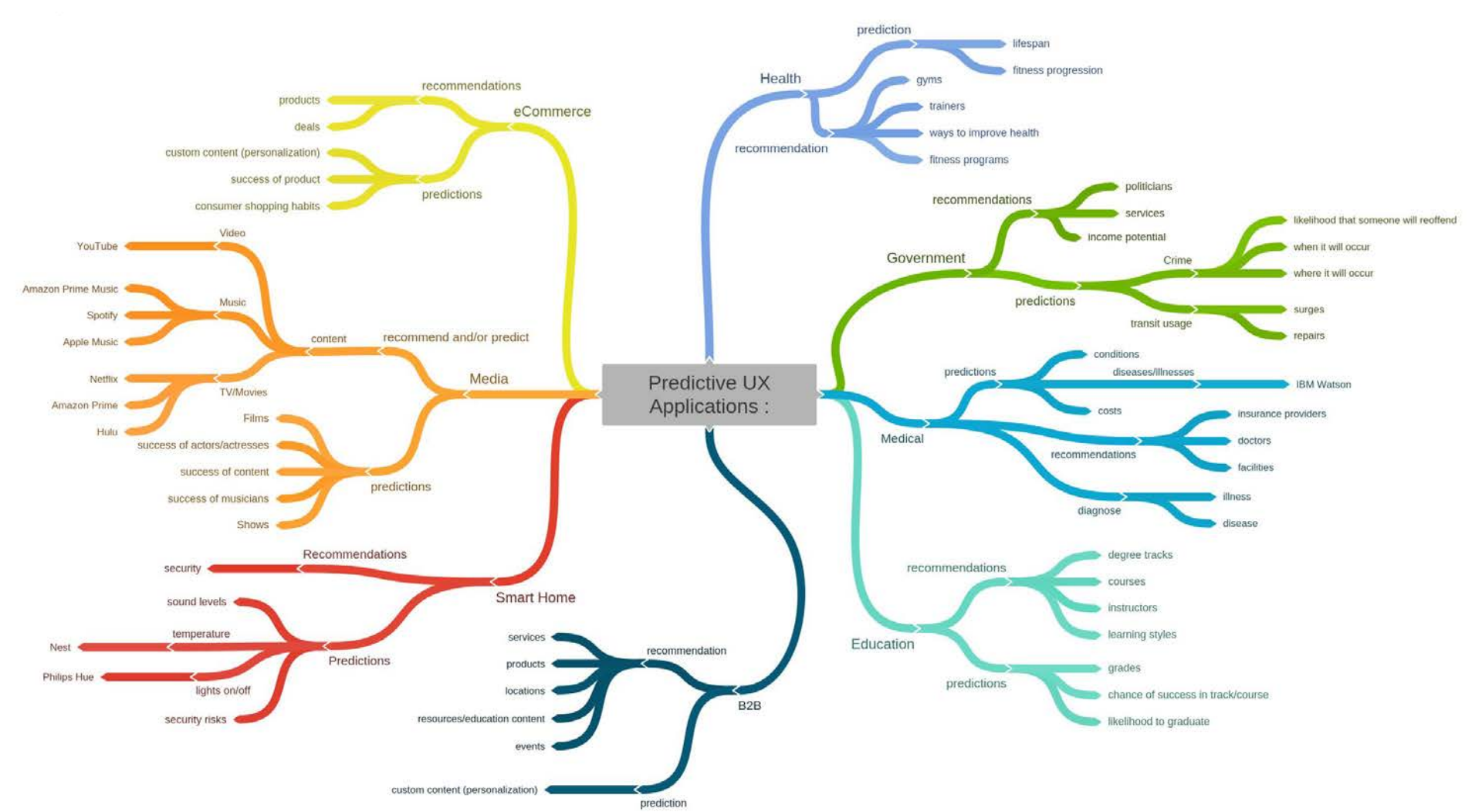
Cognitive Load Exercise

WO UIB MES LUS A

Write down the sequence of letters as you remember it

How did you do?

Cognitive Load Theory


Predictive UX Applications :
Health
prediction
lifespan
fitness progression
recommendation
gyms
trainers
ways to improve health
fitness programs
Government
recommendations
politicians
services
income potential
predictions
Crime
likelihood that someone will reoffend
when it will occur
where it will occur
transit usage
surges
repairs
Medical
predictions
conditions
diseases/illnesses
IBM Watson
costs
recommendations
insurance providers
doctors
facilities
diagnose
illness
disease
Education
recommendations
degree tracks
courses
instructors
learning styles
predictions
grades
chance of success in track/course
likelihood to graduate
B2B
recommendation
services
products
locations
resources/education content
events
prediction
custom content (personalization)
Smart Home
Recommendations
security
Predictions
sound levels
temperature
Nest
Philips Hue
lights on/off
security risks
Media
recommend and/or predict
content
Video
YouTube
Music
Amazon Prime Music
Spotify
Apple Music
TV/Movies
Netflix
Amazon Prime
Hulu
predictions
Films
success of actors/actresses
success of content
success of musicians
Shows
eCommerce
recommendations
products
deals
predictions
custom content (personalization)
success of product
consumer shopping habits

Machine Learning Powers the End User Experience

Machine learning is the science of getting computers to do things (and learn and improve) without being explicitly programmed.

Who’s doing It?

1

Define your problem in machine learning terms

2

Collect training data in a suitable format

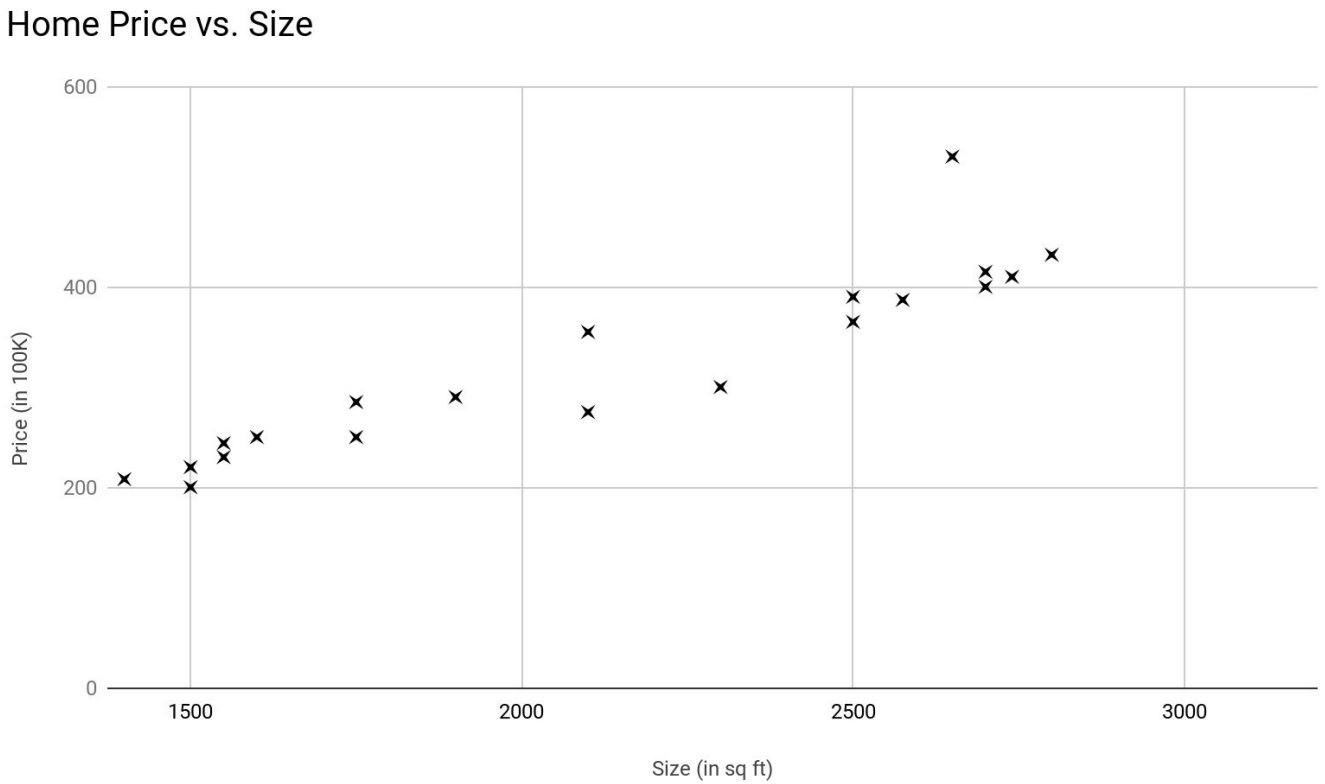
3

Build a model (or a set of models)

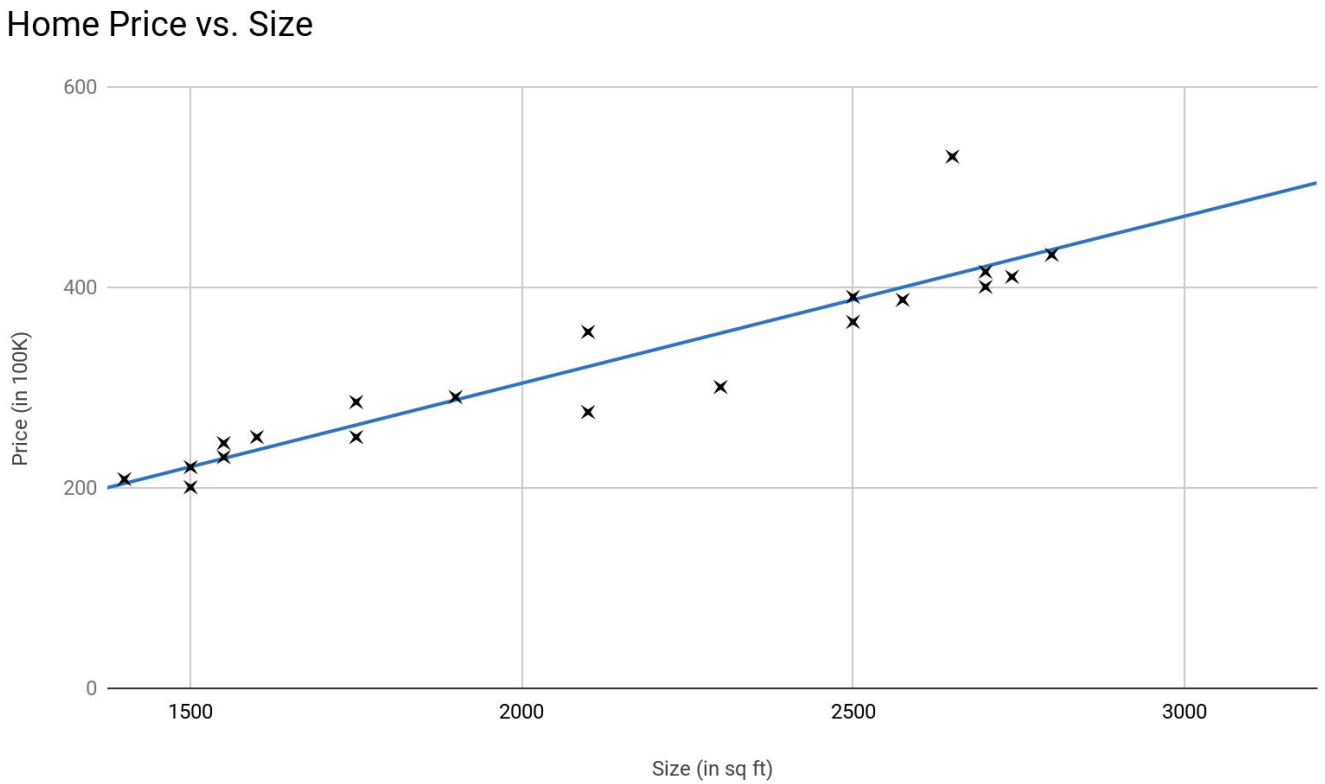
Example

Predicting the price of a house, given its square footage.

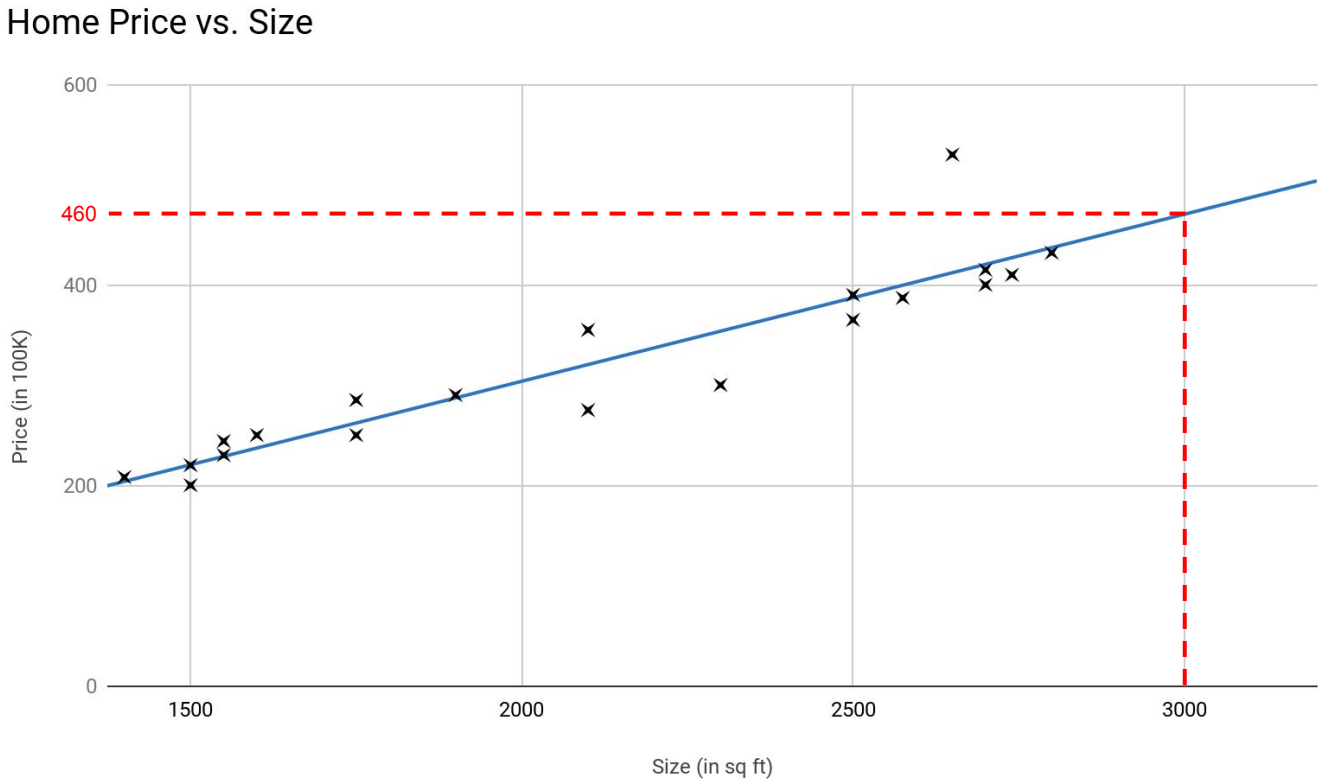
Machine Learning



Machine Learning

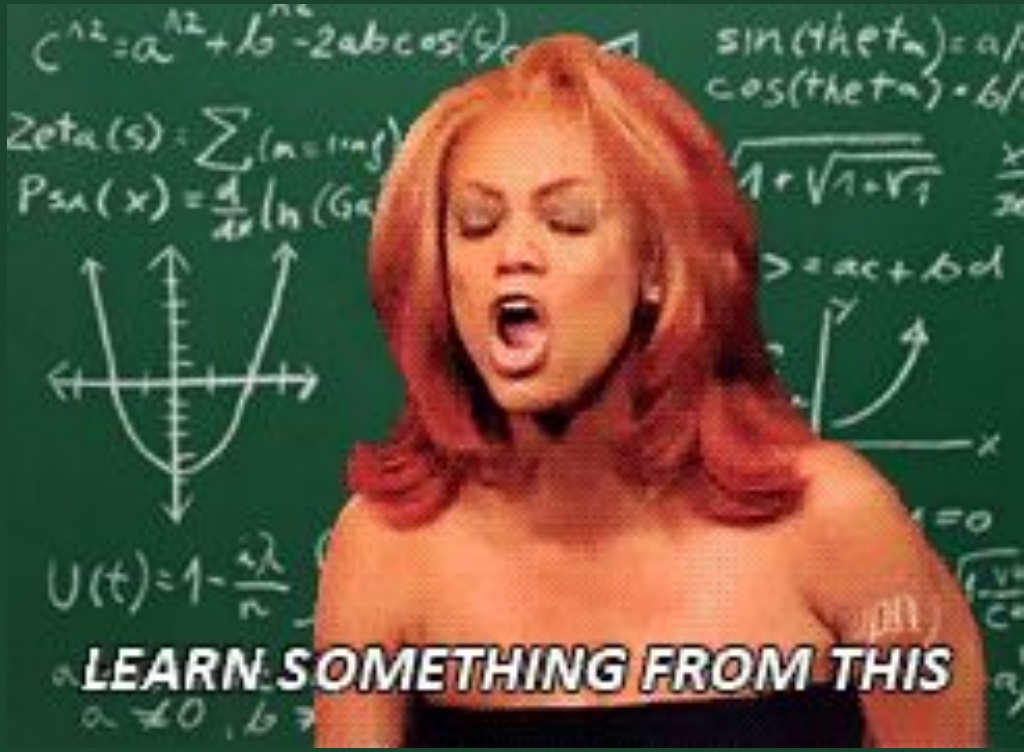


Machine Learning



Congrats!

You just learned Linear Regression



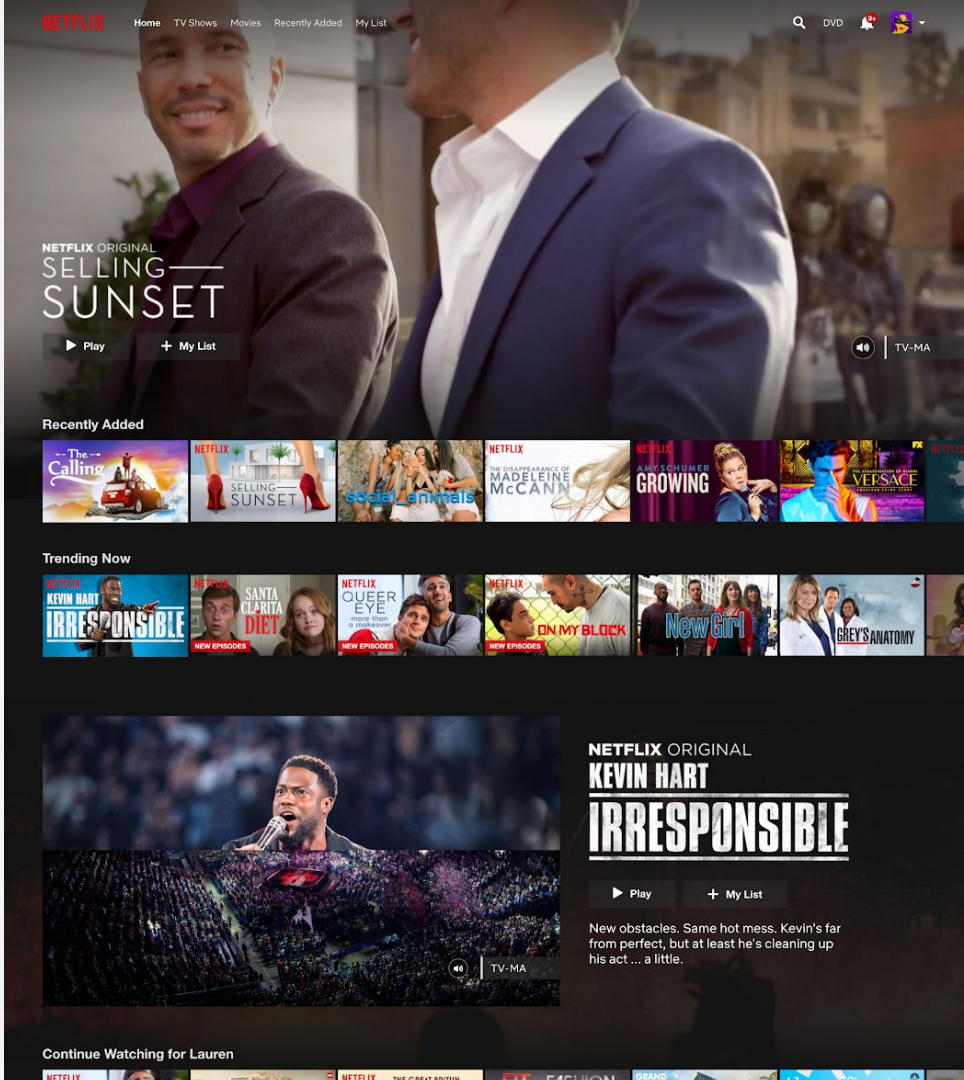
For our use case, it is clear that we need a recommendation system.

Recommenders are a subclass of machine learning techniques that aim to predict a user's preference.

Example

Content-Based Recommendation

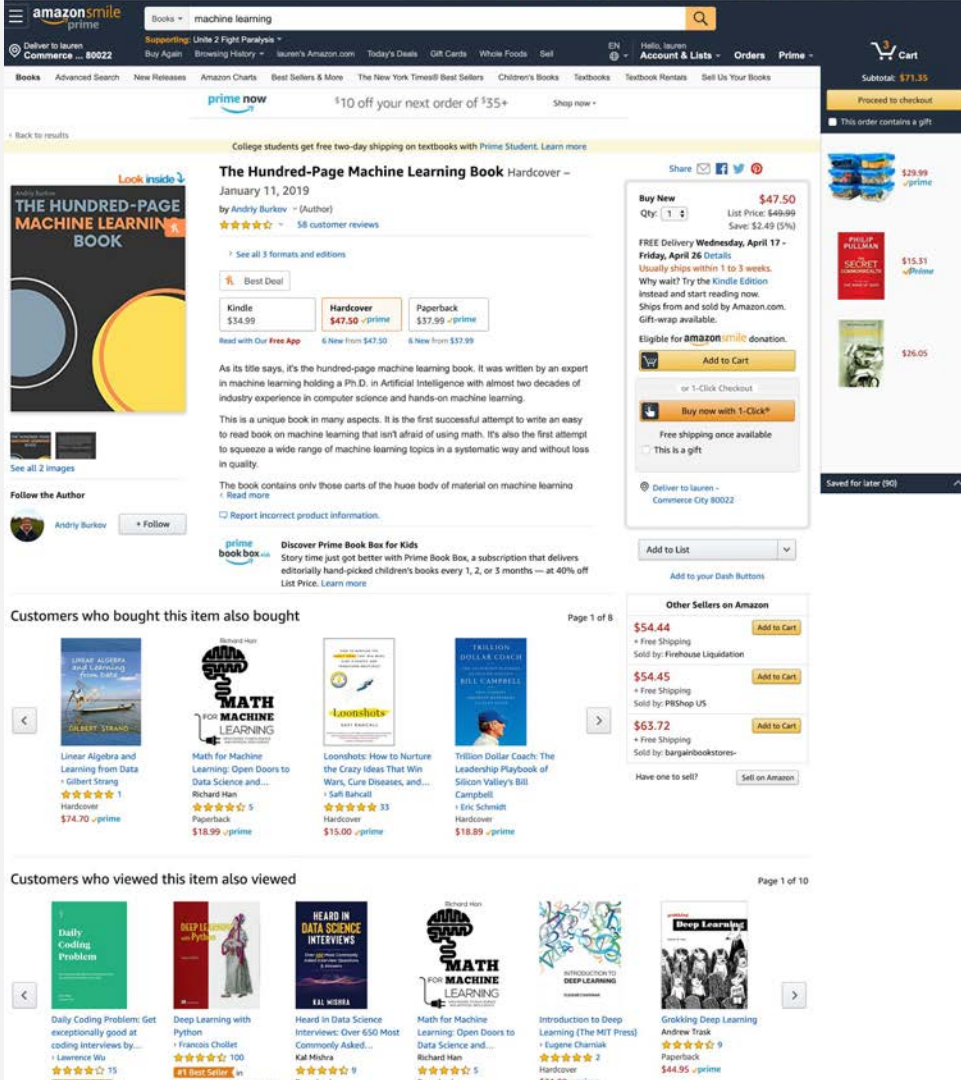
- You have features that can capture the characteristics of an item (eg. the genre of a song).
- Recommend other items with similar characteristics.



Example

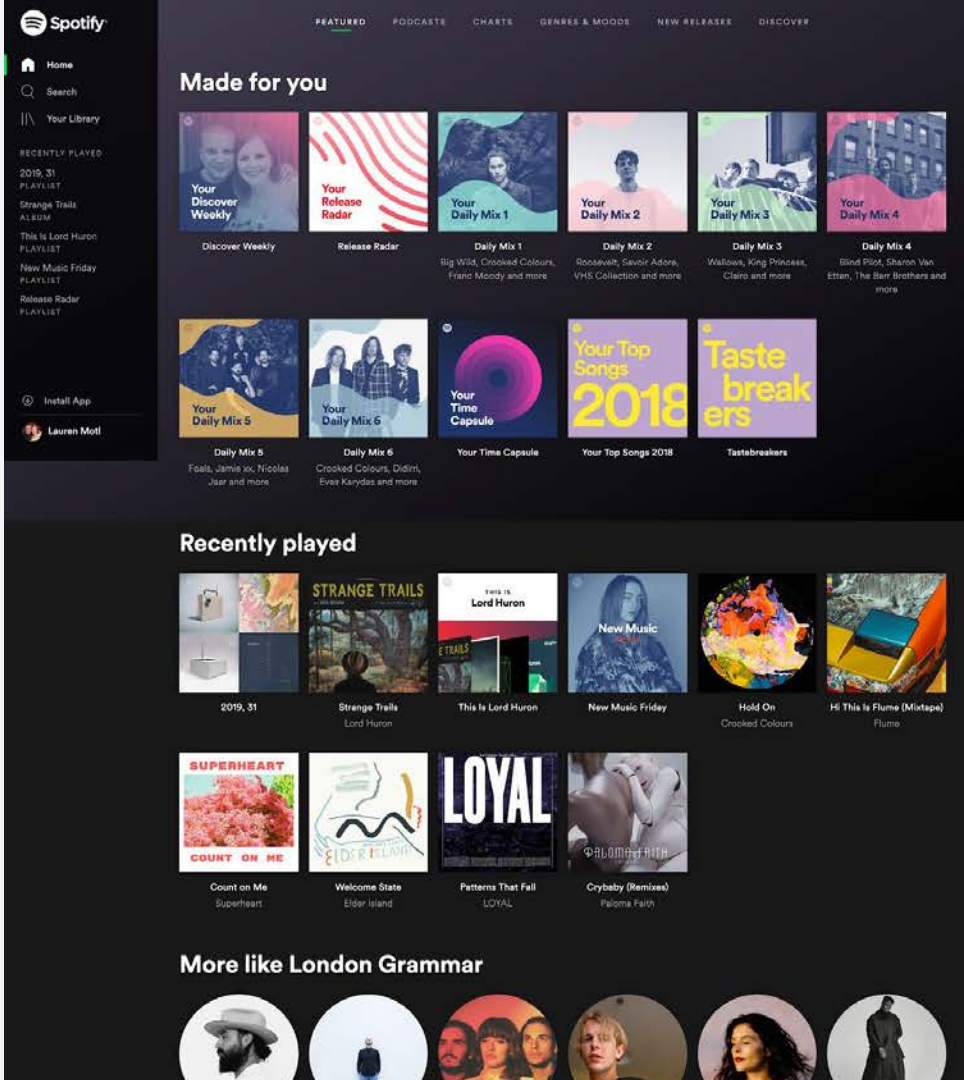
Collaborative Filtering

- Make recommendations based on preferences of other users with similar tastes (collaboration).
- The features of items themselves are not important.



Example

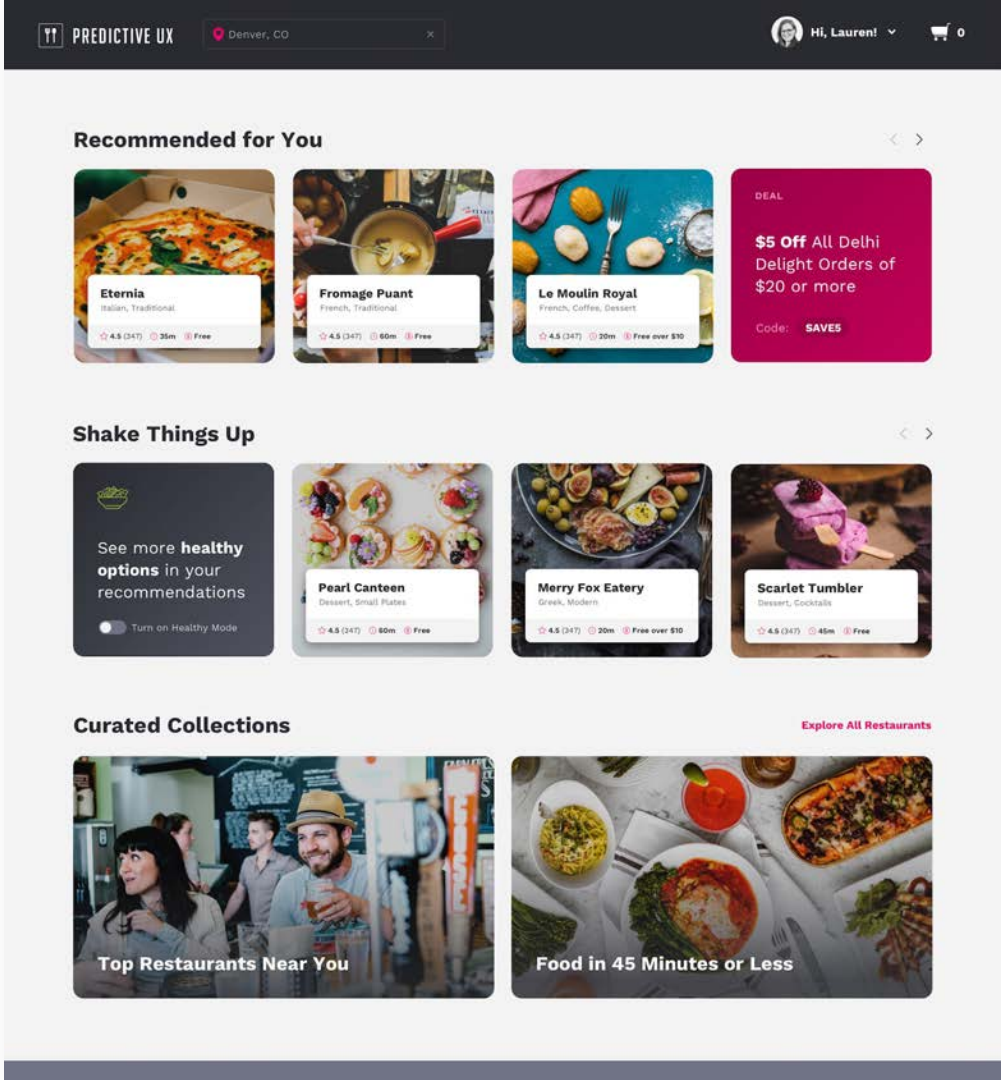
It is very common to have hybrid recommender systems, using a combo of both content-based and collaborative filtering.



UX Principles of
Predictive UX

Keep It Simple

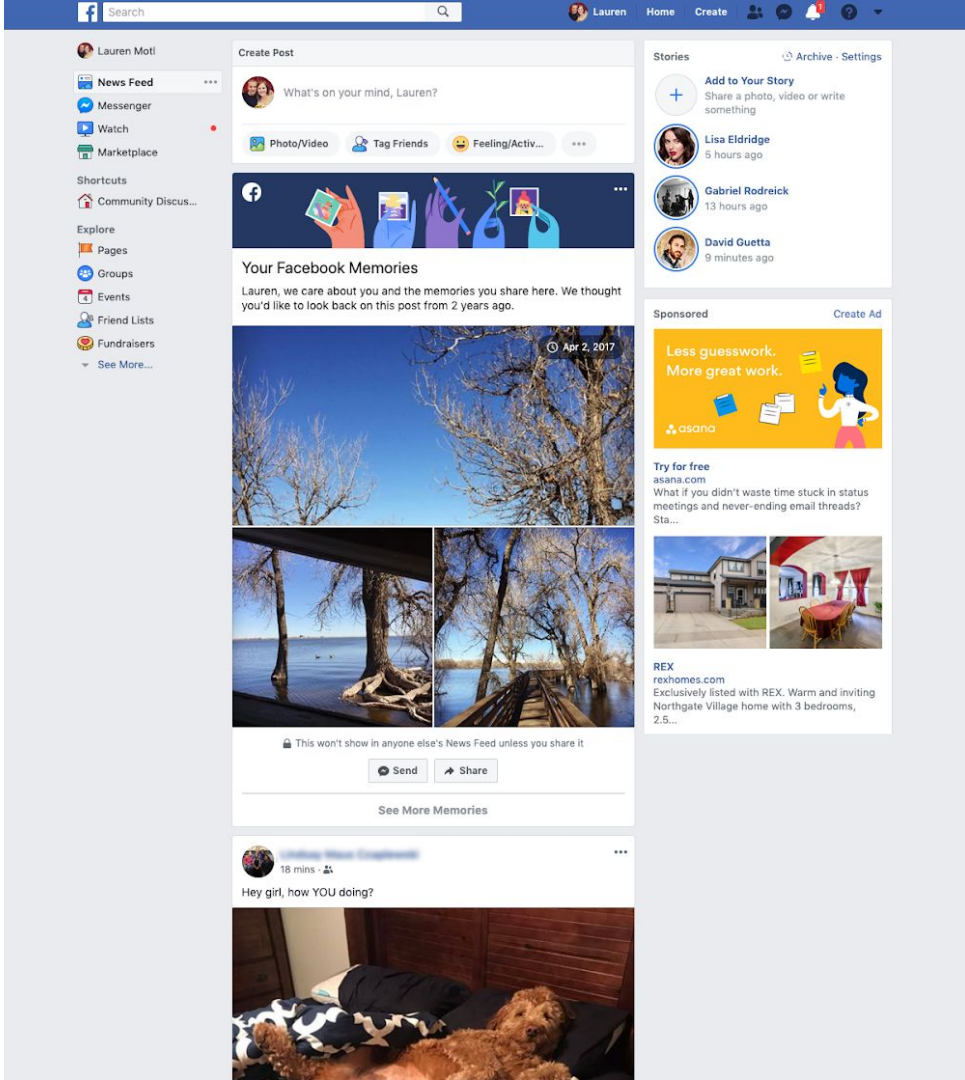
Create minimal interfaces with just enough content + design elements for the user's needs



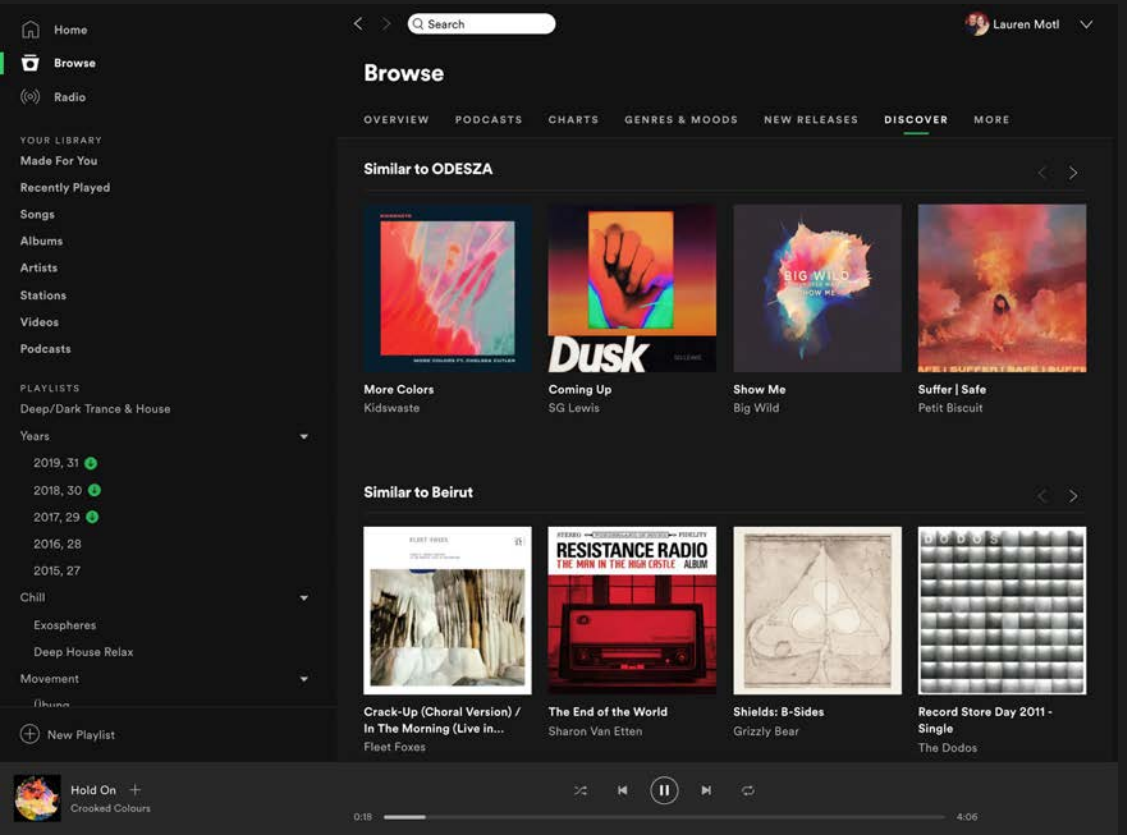
Resist the Filter Bubble

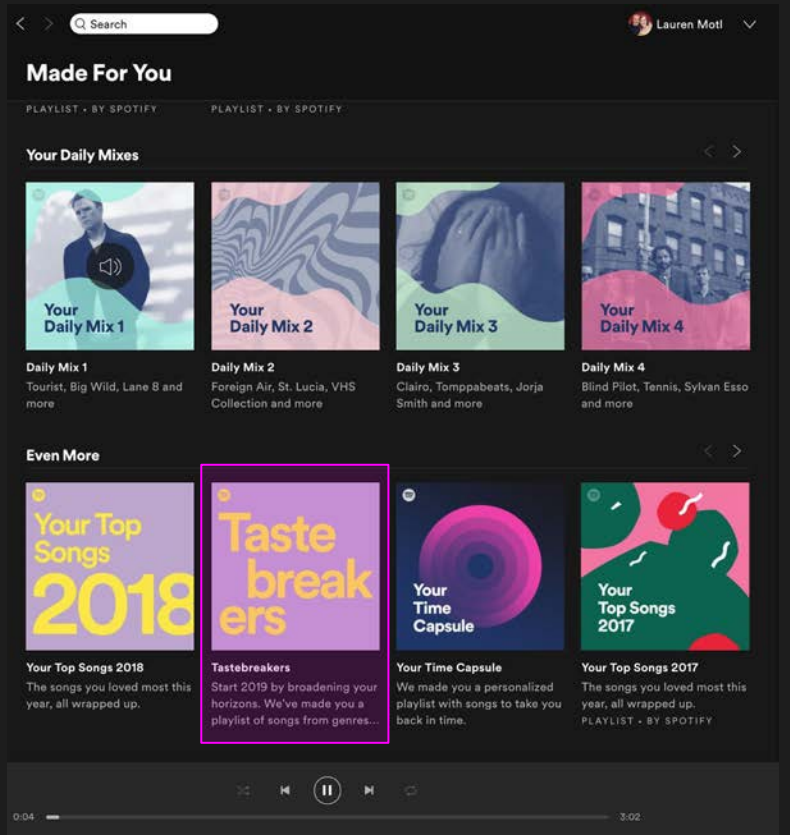
“We increasingly live in a “filter bubble”: The information we take in is so personalized that we’re blind to other perspectives.”

— Drake Baer, The Cut • Nov 9, 2016



Resist the Experience Bubble



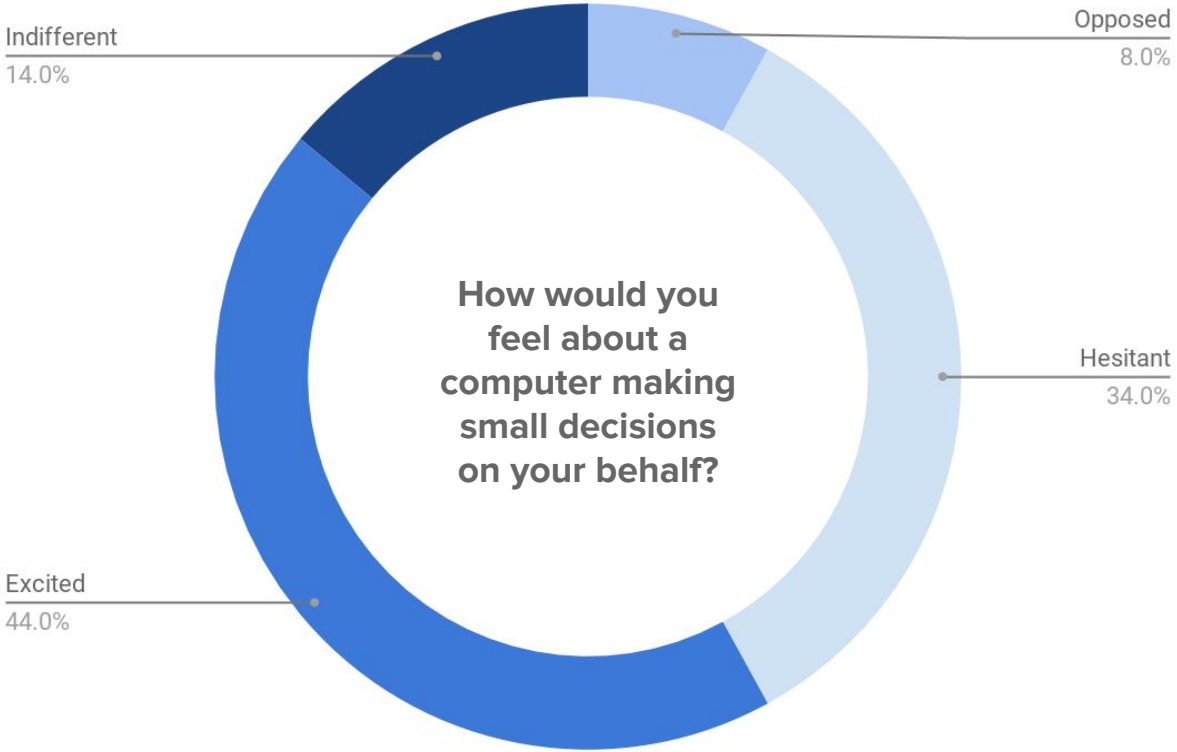


Predictive != Control

“Predictive” does not mean the same thing as“Control.”

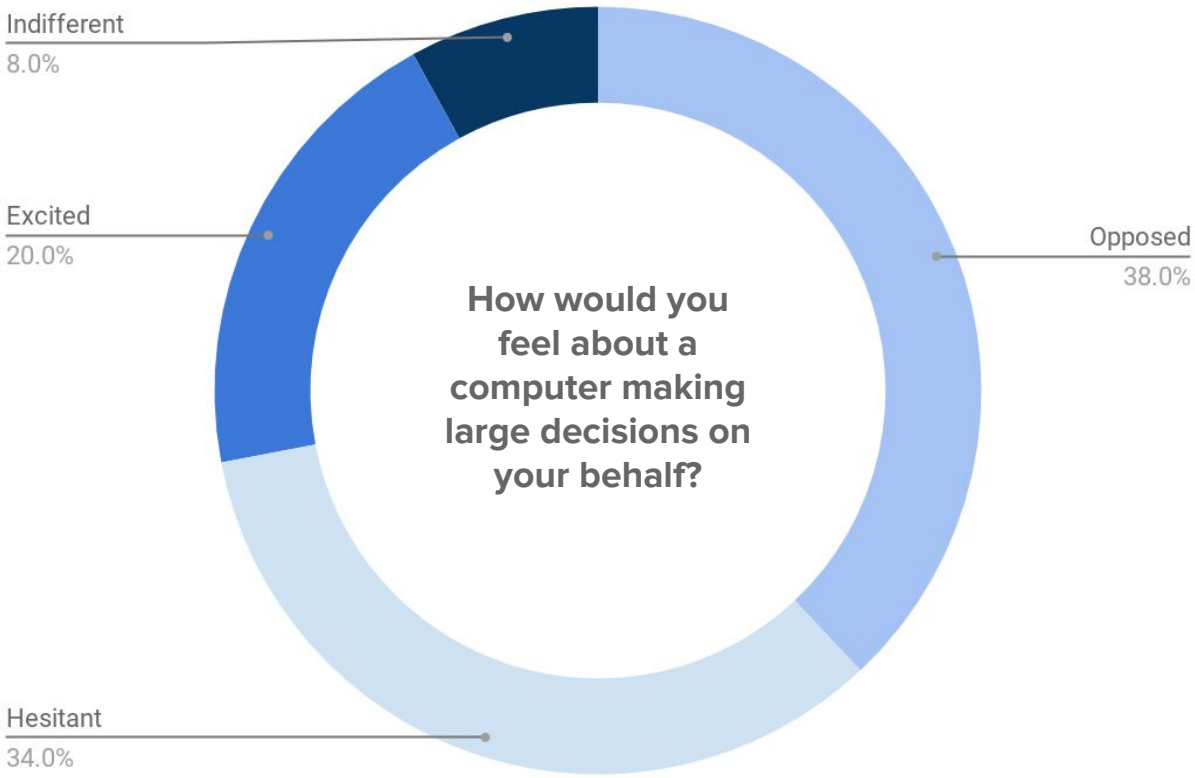
Predictive != Control

44% said they were excited by this idea



Predictive != Control

20% said they were excited by this idea



Questions?

What We've Covered

- What is Predictive UX + how does it benefit users?
- How Machine Learning Powers Predictive UX
- UX principles

What's Next

- How we implemented Machine Learning in Drupal
- Things to Consider/Challenges

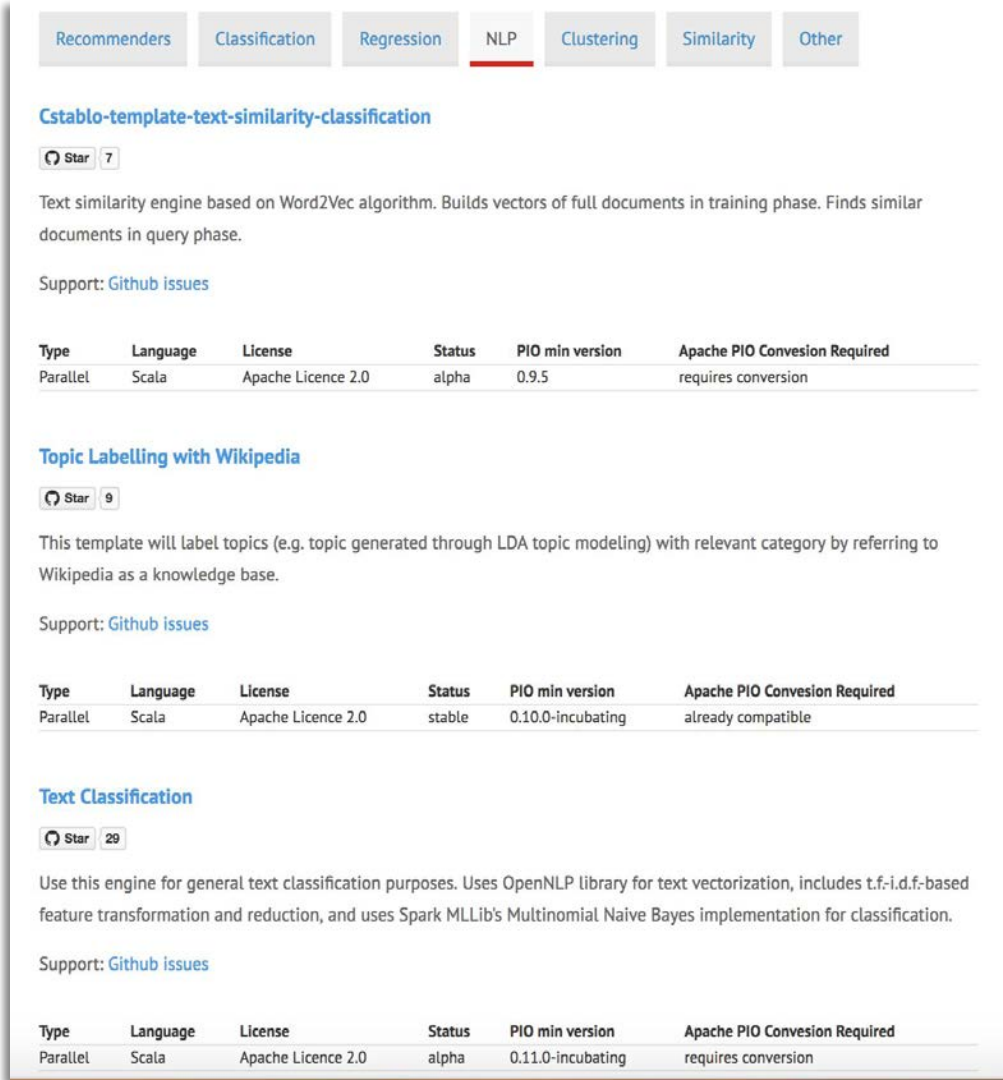
Can This Be
Built in Drupal?

Can This Be Built in Drupal?

Apache PredictionIO

- Open-source
- Full machine learning stack
- Customizable templates
- Easily deploy as web service

PredictionIO



Recommenders | Classification | Regression | NLP | Clustering | Similarity | Other

Cstablo-template-text-similarity-classification

Star 7

Text similarity engine based on Word2Vec algorithm. Builds vectors of full documents in training phase. Finds similar documents in query phase.

Support: Github issues

Type	Language	License	Status	PIO min version	Apache PIO Convesion Required
Parallel	Scala	Apache Licence 2.0	alpha	0.9.5	requires conversion

Topic Labelling with Wikipedia

Star 9

This template will label topics (e.g. topic generated through LDA topic modeling) with relevant category by referring to Wikipedia as a knowledge base.

Support: Github issues

Type	Language	License	Status	PIO min version	Apache PIO Convesion Required
Parallel	Scala	Apache Licence 2.0	stable	0.10.0-incubating	already compatible

Text Classification

Star 29

Use this engine for general text classification purposes. Uses OpenNLP library for text vectorization, includes t.f.-i.d.f.-based feature transformation and reduction, and uses Spark MLLib's Multinomial Naive Bayes implementation for classification.

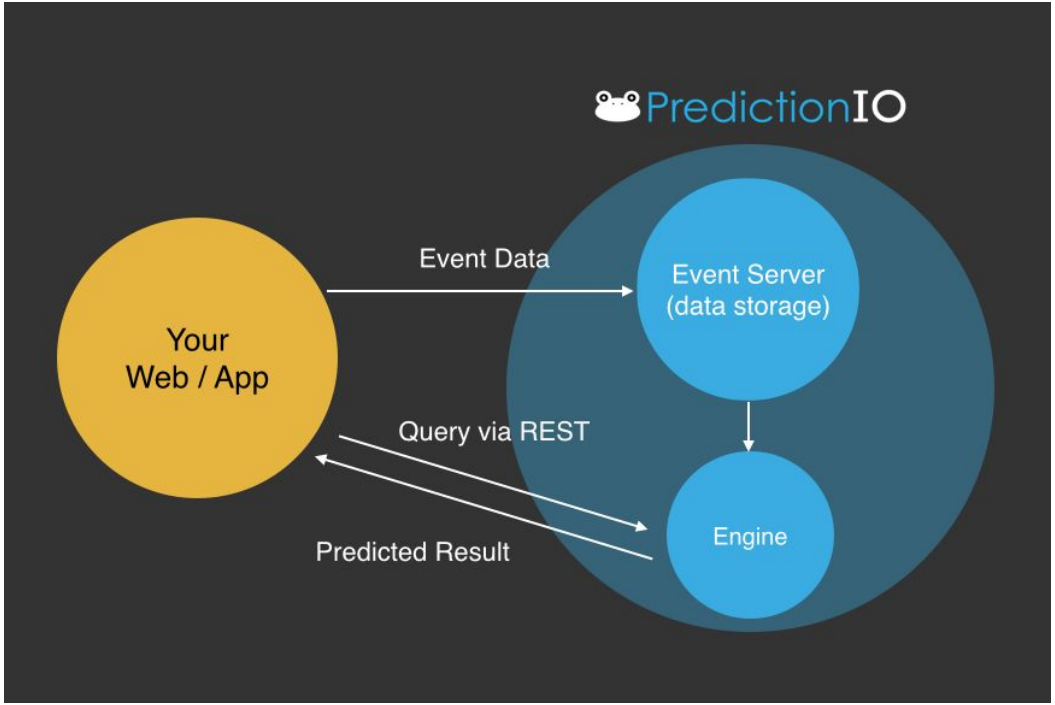
Support: Github issues

Type	Language	License	Status	PIO min version	Apache PIO Convesion Required
Parallel	Scala	Apache Licence 2.0	alpha	0.11.0-incubating	requires conversion

Can This Be Built in Drupal?

Event Server
Collects data from app and provides it to the engine.

Engine
Reads training data and builds a predictive model using machine learning algorithms.



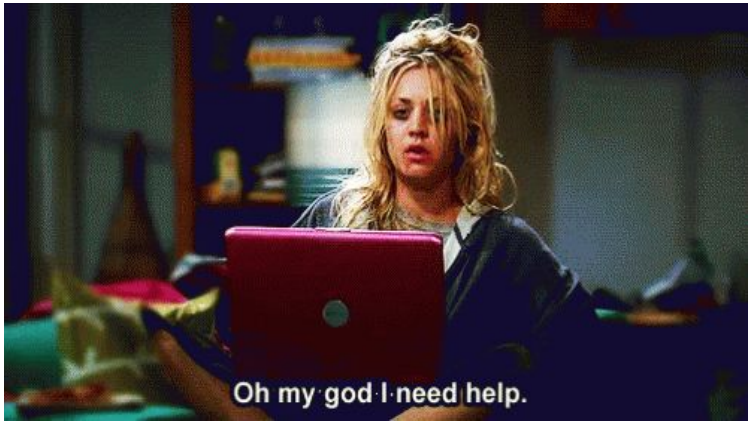
Can This Be Built in Drupal?

Explicit Data

- User explicitly provides information, like rating or buying an item

Implicit Data

- No explicit feedback; use information already available, like binge watching a show



Demo

Questions?

What We've Covered

- What is Predictive UX + how does it benefit users?
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- How we implemented Machine Learning in Drupal

What's Next

- Things to Consider/Challenges

Things to Consider

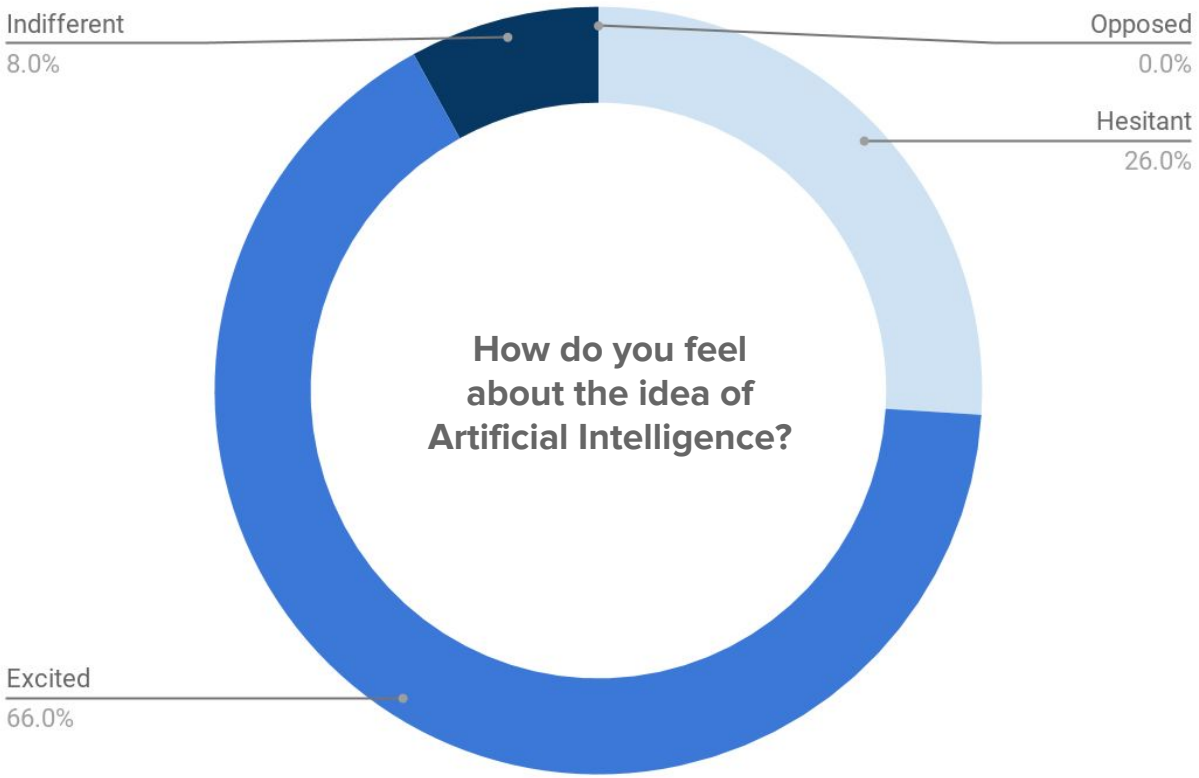
Willingness to Adopt

Willingness to Adopt

The technology is feasible. And UX is critical to the successful adoption of artificial intelligence and machine learning into society.

Willingness to Adopt

66% of people are excited by the idea of artificial intelligence



Things to Consider

Hardware

The Hardware Problem

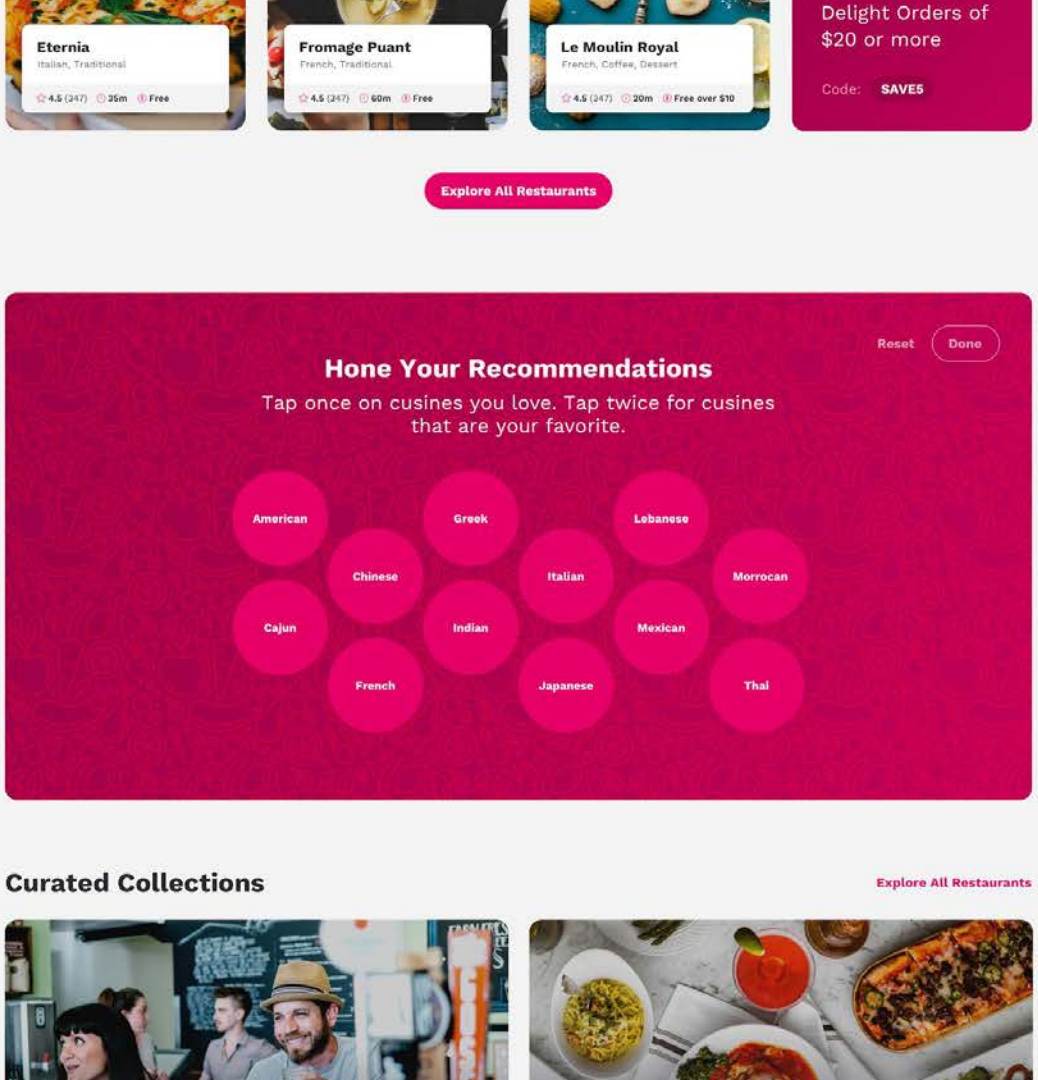
Crunching data takes up a lot of memory and server space. The options are to buy more server space, leverage APIs that come with it, or crunch less data to save space.

Things to Consider

Data is Fuel

Cold Start Problem

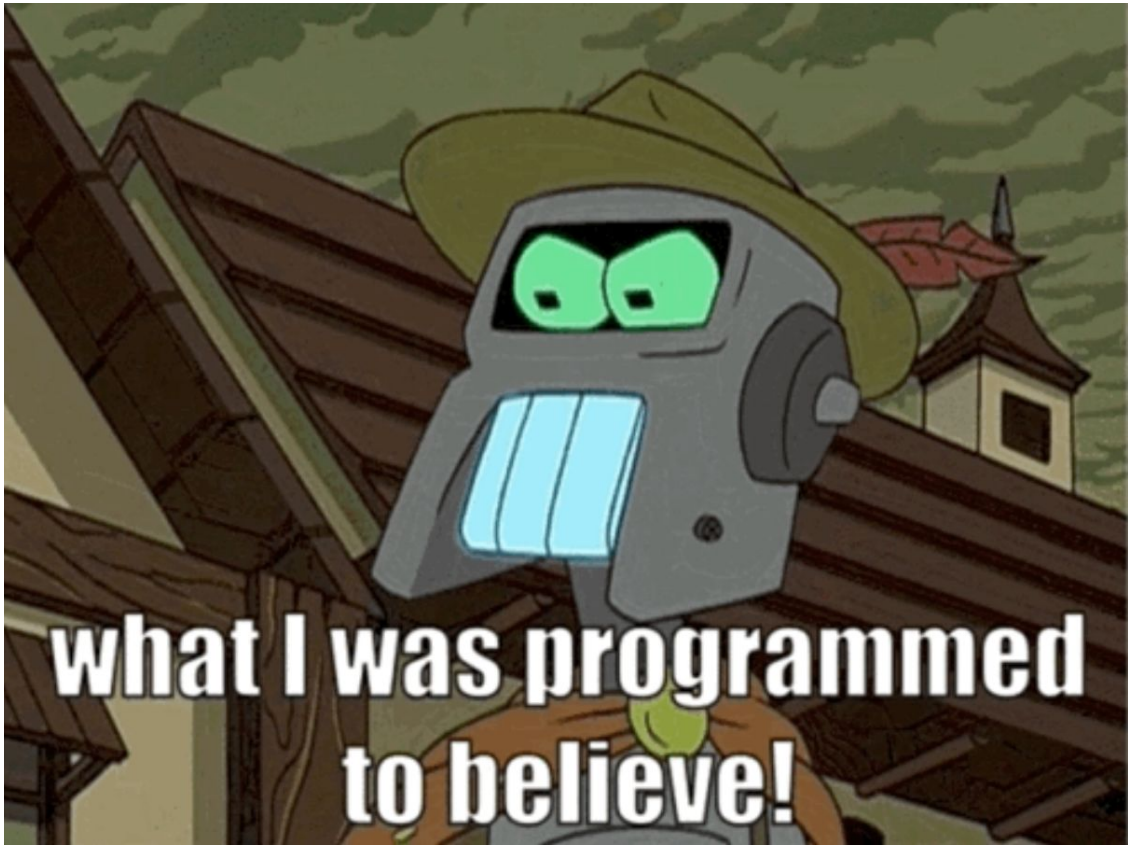
Machine Learning systems need data, a lot of it



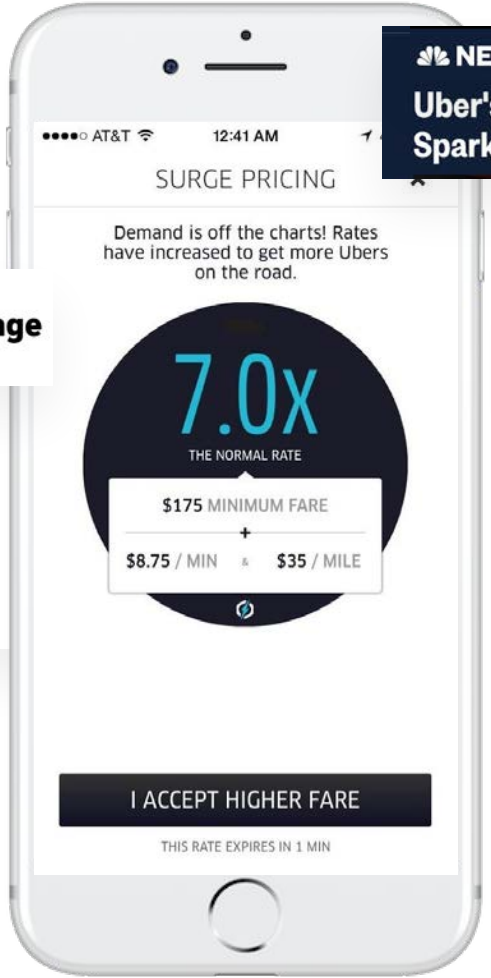
Things to Consider
Machines Don’t Have Values

Value Alignment Problem

Algorithms are binary and can’t make judgement calls. To a computer, all things are 1 or 0, black or white.



Value Alignment Problem



NEWS

Uber's Surge Pricing Near Siege in Sydney Sparks Outrage

TECH 12/15/2014 01:42 am ET | Updated Dec 15, 2014

Uber Raises Fares During Sydney Hostage Crisis, Then Offers Free Rides

ISSIE LAPOWSKY BUSINESS 12.15.14 12:30 PM

WHAT UBER'S SYDNEY SURGE PRICING DEBACLE SAYS ABOUT ITS PUBLIC IMAGE

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Technology

Uber 'truly sorry' for price rise during Sydney siege

Joel @MonocleMoose Follow

@Uber_Sydney @joshgnosis Absolutely disgraceful. You should be capping the prices much lower rather than taking advantage! Shockingly bad

2:38 AM - 15 Dec 2014

8 RETWEETS 6 FAVORITES

Uber Sydney @Uber_Sydney Follow

We are all concerned with events in CBD. Fares have increased to encourage more drivers to come online & pick up passengers in the area.

RETWEETS 682 FAVORITES 184

2:35 AM - 15 Dec 2014

Tyson Armstrong @tysonarmstrong · 13h

@uber_sydney What a shameful disgrace.

10 32

Rob @NotSureIGetIt2 · 13h

@Uber_Sydney Uber paying their drivers to get people out of the CBD safely free to the customer would have been better than $100.

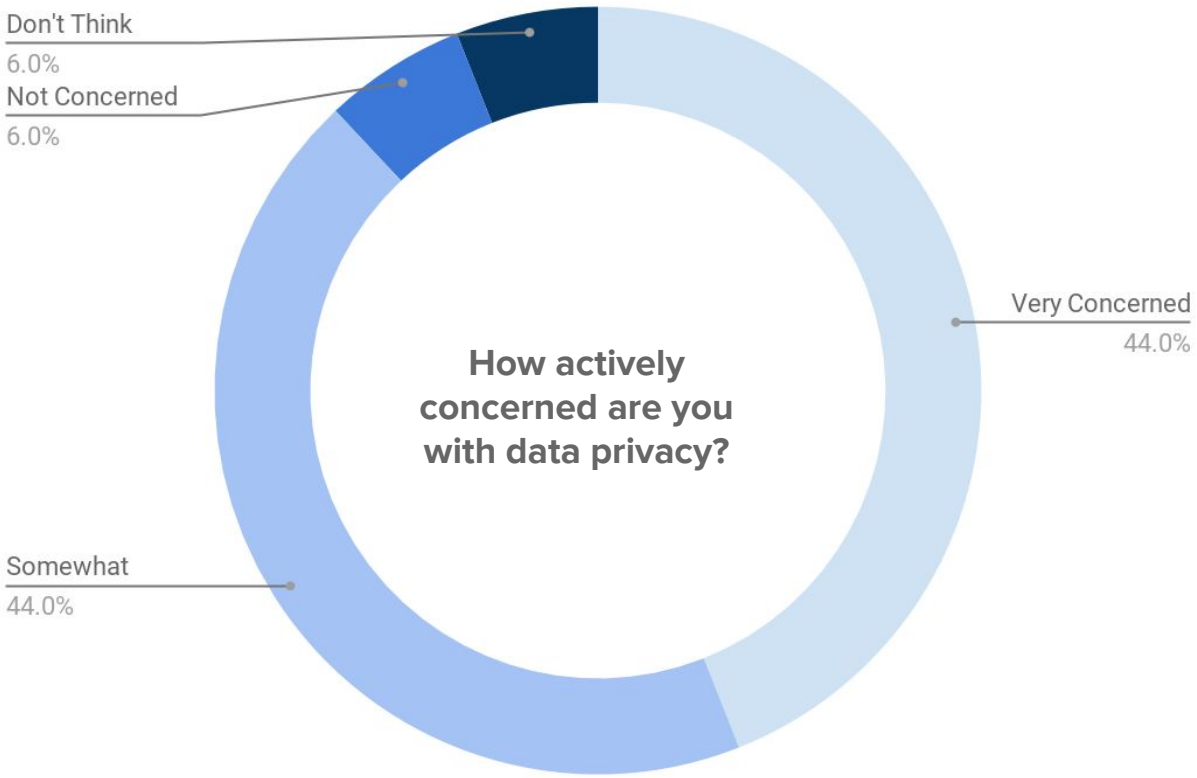
14 23

Things to Consider

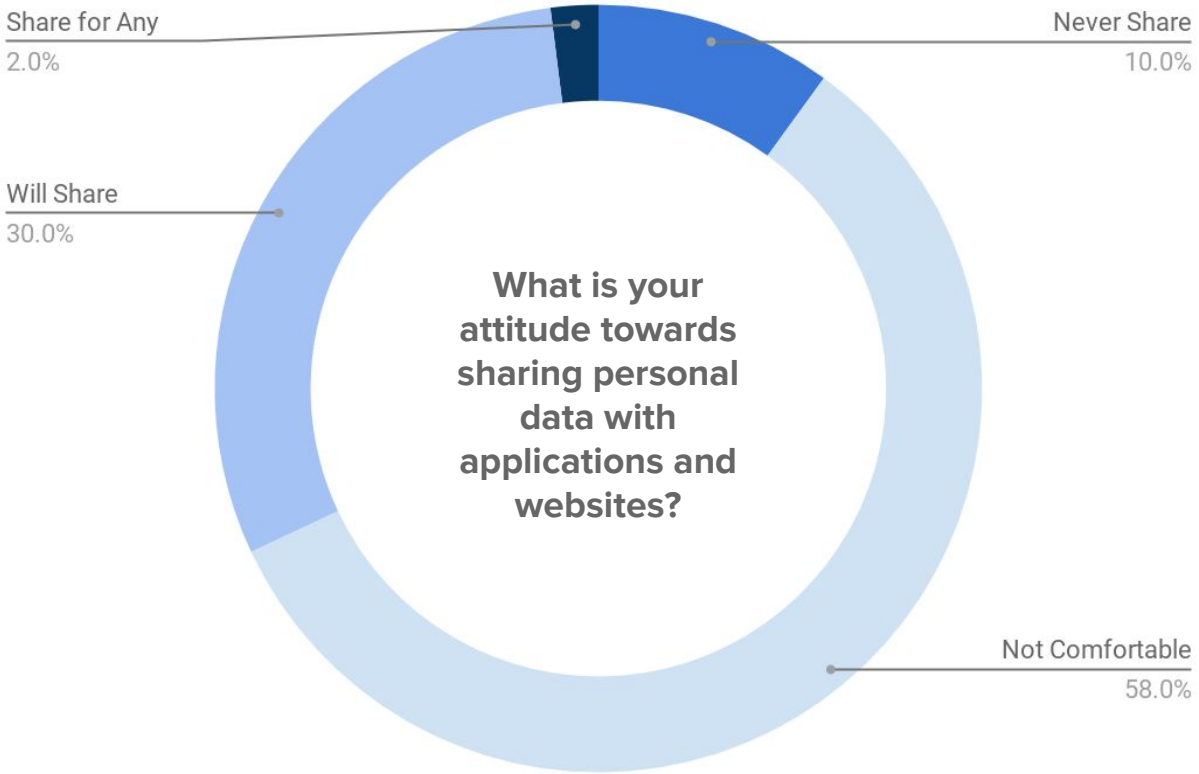
Data Privacy + Ethics

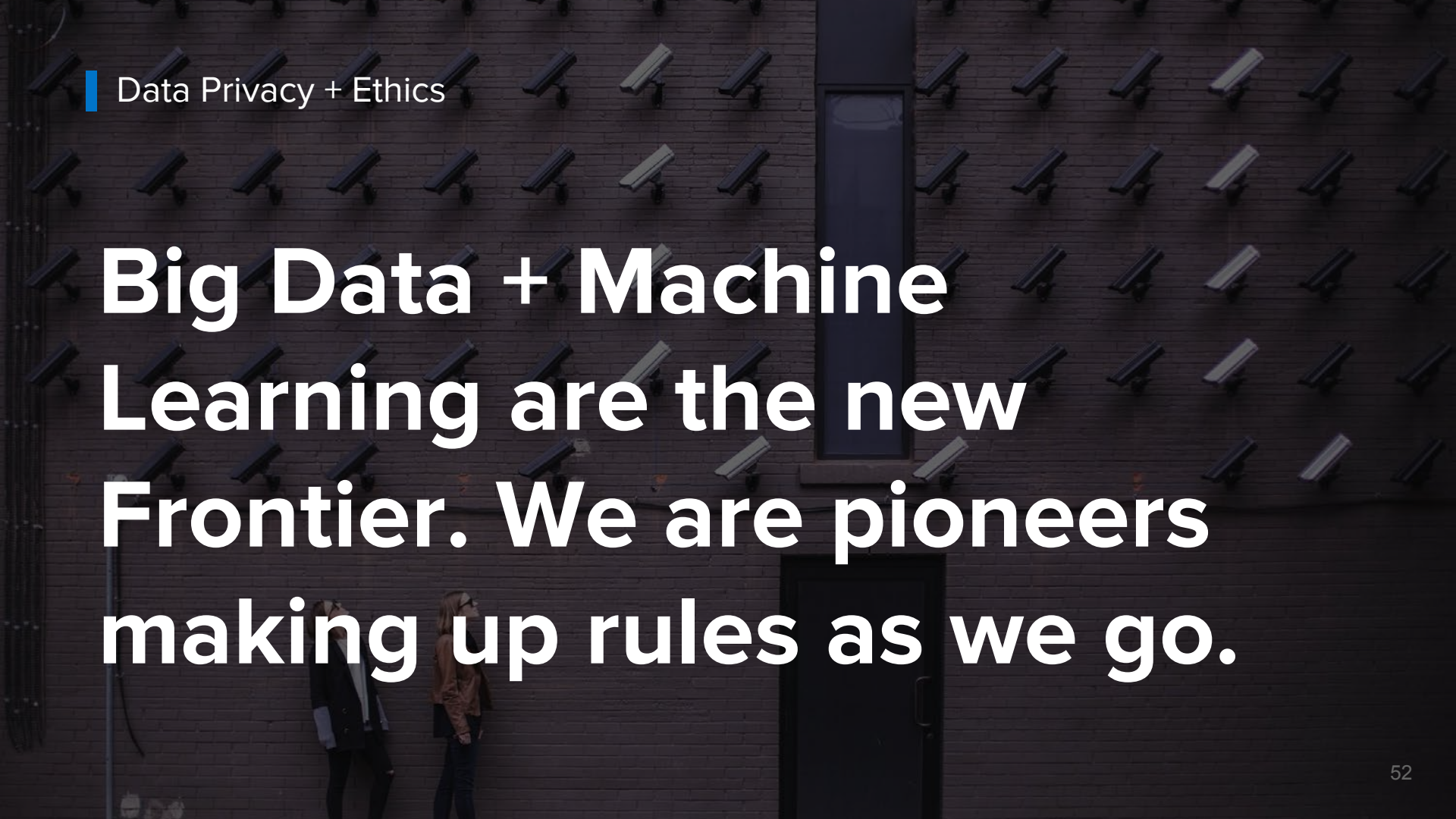
Data Privacy + Ethics

Majority are actively concerned about data privacy



Majority would share data to get something they want, regardless of comfort level





Big Data + Machine Learning are the new Frontier. We are pioneers making up rules as we go.

Acknowledgements

Introduction to Anticipatory Design eBook

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https://www.joelvanbodegraven.nl/

DrupalCon Housekeeping

Locate this session at the DrupalCon Seattle website
https://events.drupal.org/seattle2019/sessions/whats-dinner-using-predictive-ux-help-users-decide

Take the DrupalCon survey
https://www.surveymonkey.com/r/DrupalConSeattle

Appendix

Development Tools

- Apache PredictionIO: https://predictionio.apache.org
- PredictionIO engine template gallery: https://predictionio.apache.org/gallery/template-gallery
- Creating custom Drupal modules: https://www.drupal.org/docs/8/creating-custom-modules
- REST API documentation: https://restfulapi.net

References

- Anticipatory Design
- https://www.nngroup.com/articles/customization-personalization/
- PUX Data Privacy Results
- Why Scientists Are Upset About The Facebook Filter Bubble Study (link to research study done by Facebook in article)

Appendix

Interesting Reads

- “Instagram has a drug problem. Its algorithms are making it worse.” https://www.washingtonpost.com/business/economy/instagram-has-a-drug-problem-its-algorithms-make-it-worse/2018/09/25/c45bf730-bdbf-11e8-b7d2-0773aa1e33da_story.html

- “Why artificial intelligence is learning emotional intelligence” https://www.weforum.org/agenda/2018/09/why-artificial-intelligence-is-learning-emotional-intelligence

- Measuring the Filter Bubble: How Google is Influencing What You Click

Appendix

Interesting Reads

- “Building Ethically Aligned AI”
  https://www.ibm.com/blogs/research/2019/01/ethically-aligned-ai

- “Why Amazon’s Anticipatory Shipping Is Pure Genius”
  https://www.forbes.com/sites/onmarketing/2014/01/28/why-amazons-anticipatory-shipping-is-pure-genius/#3987b2d54605

- “How Does Spotify Know You So Well?”
  https://medium.com/s/story/spotifys-discover-weekly-how-machine-learning-finds-your-new-music-19a41ab76efe