



2021 Spring

# Machine Learning

Lecturer: Min Lu

Email: [lumin.vis@gmail.com](mailto:lumin.vis@gmail.com)



# Course Overviews

Learn + Have Fun

# Agenda

Week 2 - 17 Lectures

Homework 1

Exam

# Assignments

20% + 20% + 60%

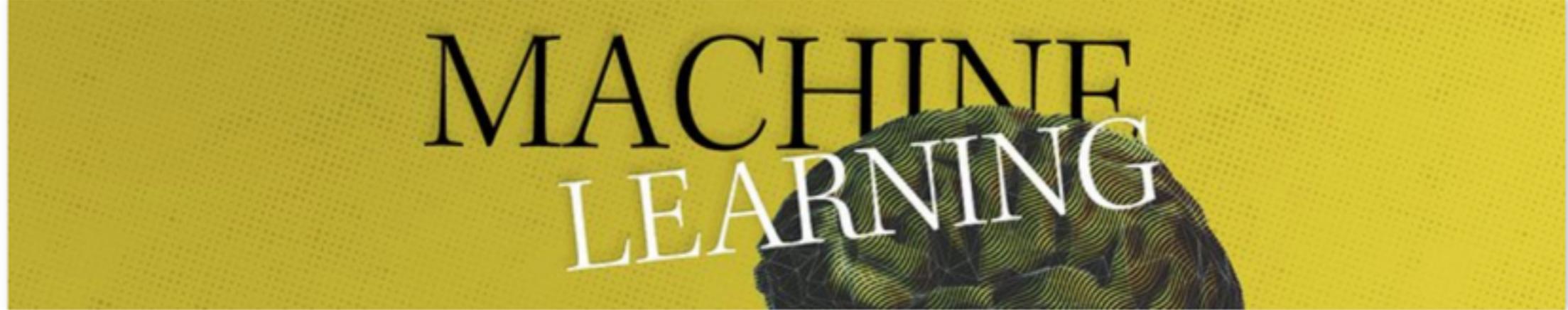
# Assignments (cont.)

- Class Participation (20%)
- Homework 1 (20%)
- Final Exam (60%): - Due June 28-July 9

# Course Homepage

[https://github.com/deardeer/MachineLearning\\_Course](https://github.com/deardeer/MachineLearning_Course)

# MACHINE LEARNING



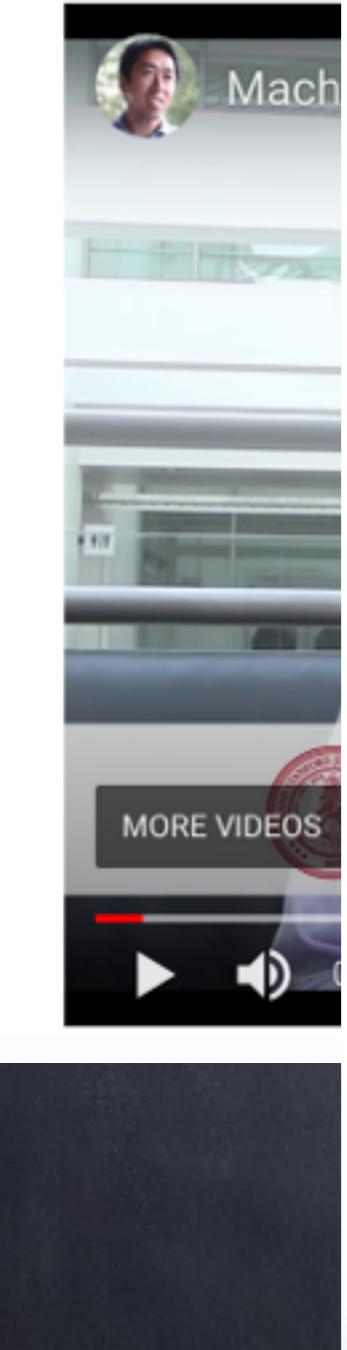
**Author:** [Brendan Martin](#)  
Founder of LearnDataSci

## The 6 Best Machine Learning Courses - 2021 Guide & Reviews

*Learn Machine Learning this year from these top courses.  
Curriculum and learning guide included.*

<https://www.learndatasci.com/best-machine-learning-courses/>

## #1 Machine Learning — Coursera



## #3 Machine Learning with Python — Coursera

## #2 Deep Learning Specialization — Coursera

A screenshot of a video player interface. The title bar says "Deep Learning Specialization on Coursera - Welco...". On the right are "Watch later" and "Share" buttons. The main video frame shows a man in a light blue shirt sitting at a desk. Behind him is a computer monitor displaying the "deeplearning.ai" logo and the text "Introduction to Deep Learning Welcome". In the bottom left corner of the video frame is a large black and white target logo. Below the video frame is the text "deeplearning.ai". At the very bottom left is a "MORE VIDEOS" button.



# Who am I

- 陆旻 Min Lu, Ph.D, visualization, visual analytics
- Homepage: <https://deardeer.github.io/>
- Email: [Lumin.vis@gmail.com](mailto:Lumin.vis@gmail.com)
- Office: ScienceTec-building 1402
- Office Hour: X

Who are you?

27 + 2 + 1 + 2 + 1



Machine Learning!!!



# Why ML?

- Data Mining
  - Large datasets from growth of automation/web.
  - E.g., Web click data, medical records, biology, engineering
- Applications can't program by hand.
  - E.g., Autonomous helicopter, handwriting recognition, most of Natural Language Processing (NLP), Computer Vision.

# Why (cont.)

- Self-customizing programs
  - E.g., Amazon, Taobao product recommendations
- Understanding human learning (brain, real AI).



Machine Learning ???

# Definition

- Arthur Samuel (1959)

"Machine Learning: Field of study that gives computers the ability to learn without being explicitly programmed."

- Tom Mitchell (1998)

"Well-posed Learning Problem: A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E."

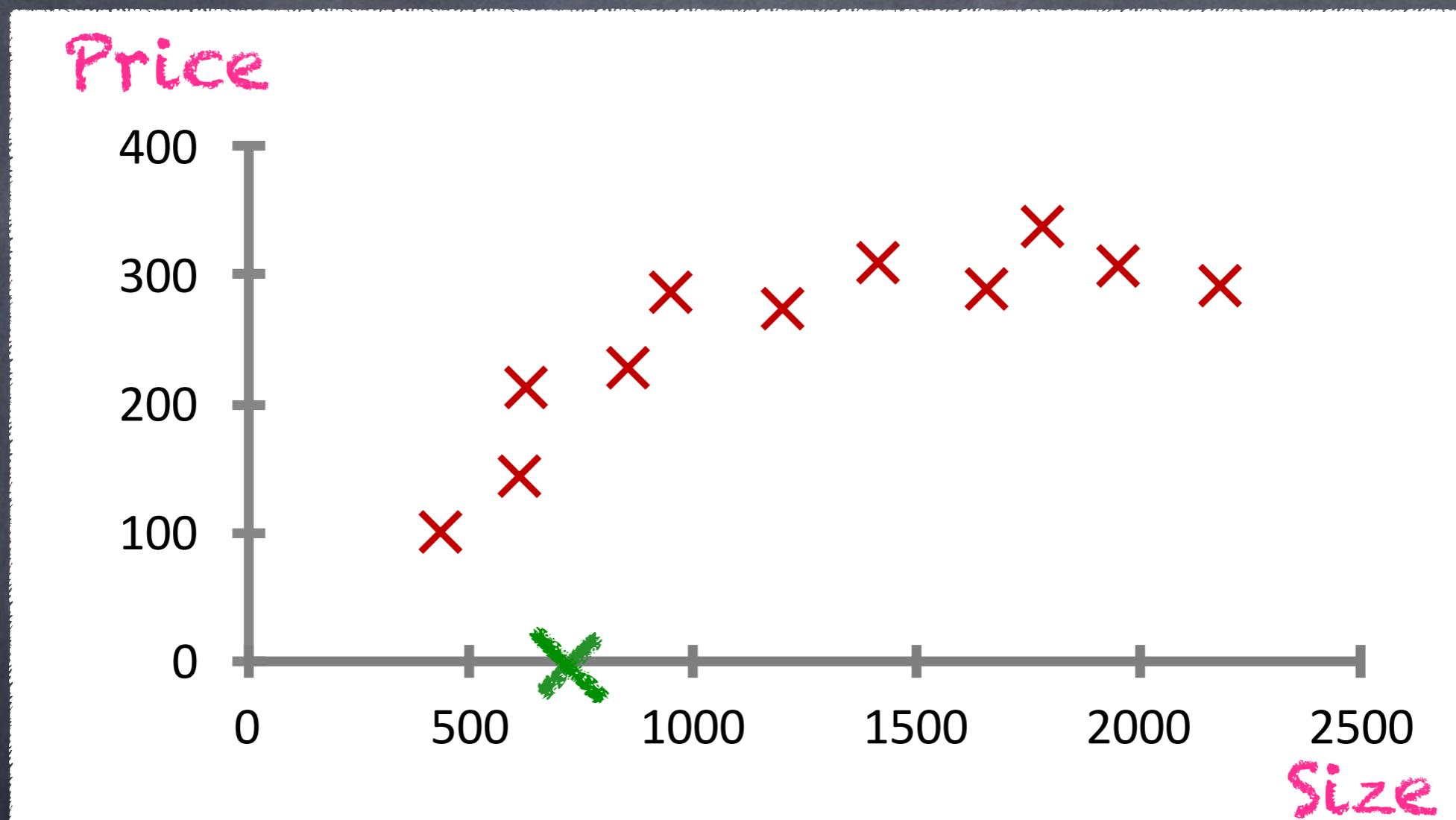
# Algorithms

- Supervised Learning
- Unsupervised Learning
- Others:
  - Reinforcement Learning
  - Recommendation System
- ...



# Supervised Learning

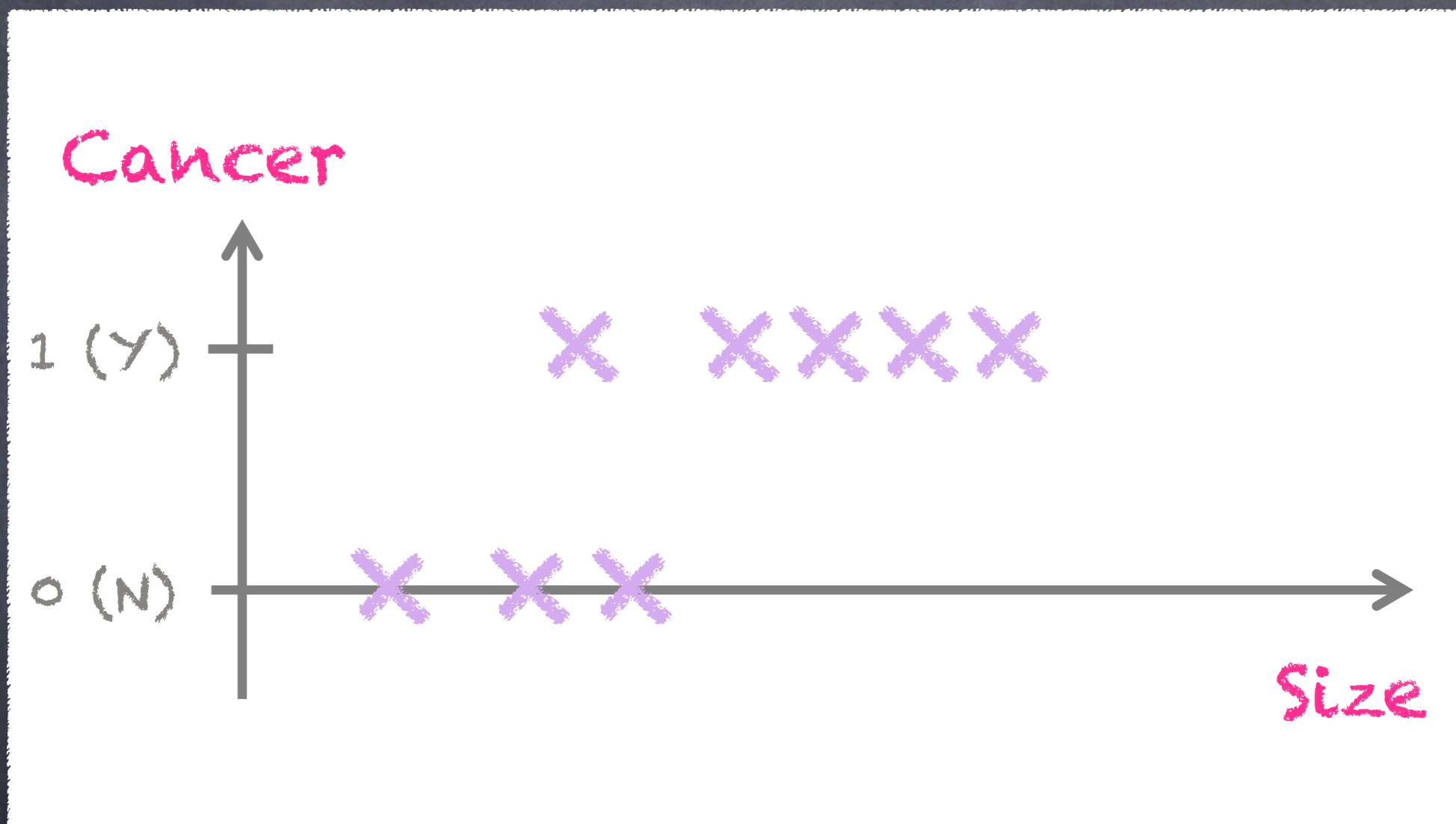
# Example 1



Supervised Learning  
"Right Answers" given

Regression:  
Predict Continuous Value

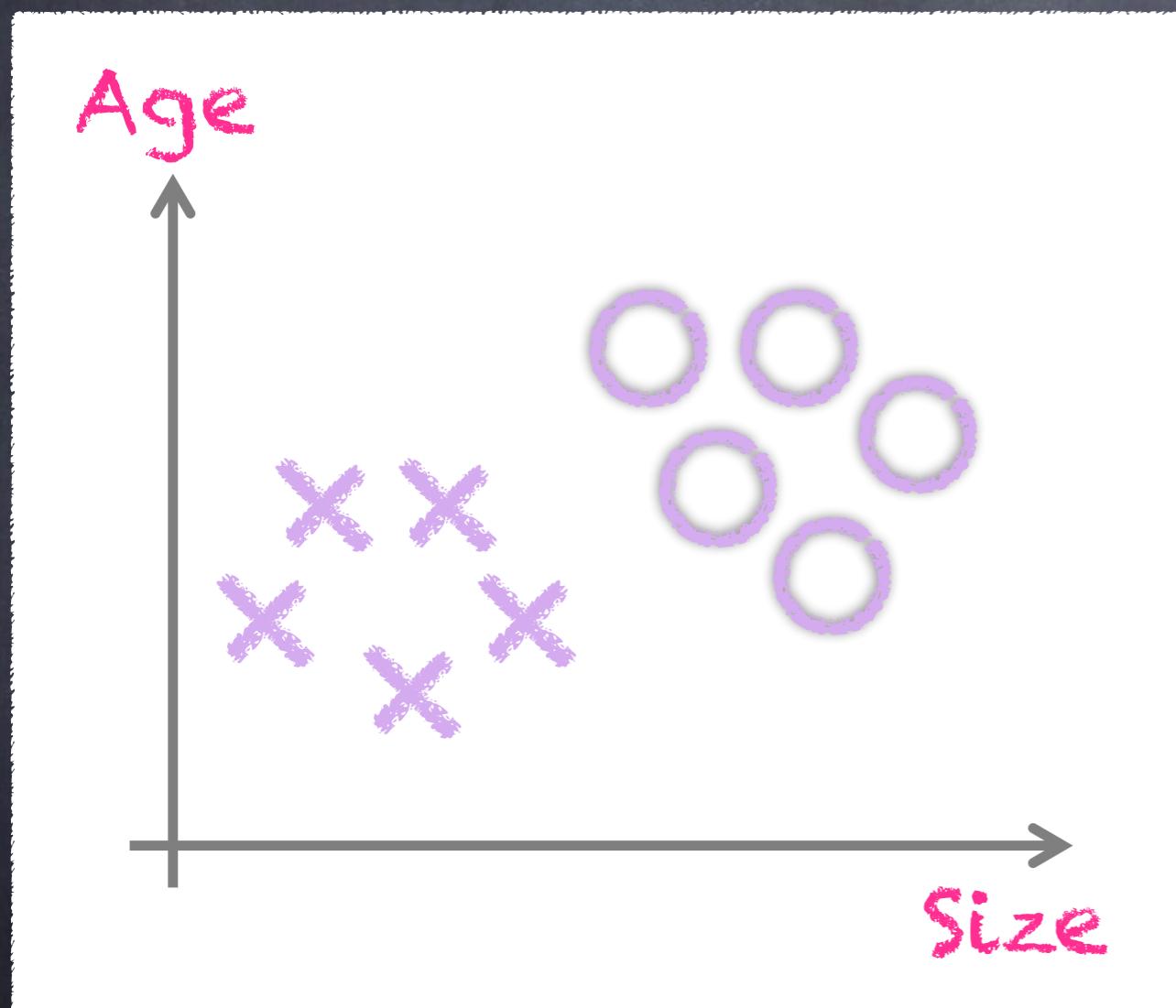
# Example 2



Classification

Discrete Value (0 Or 1)

# Example 3



- Uniformity Of Cell Size
- Uniformity Of Cell Shape
- ...

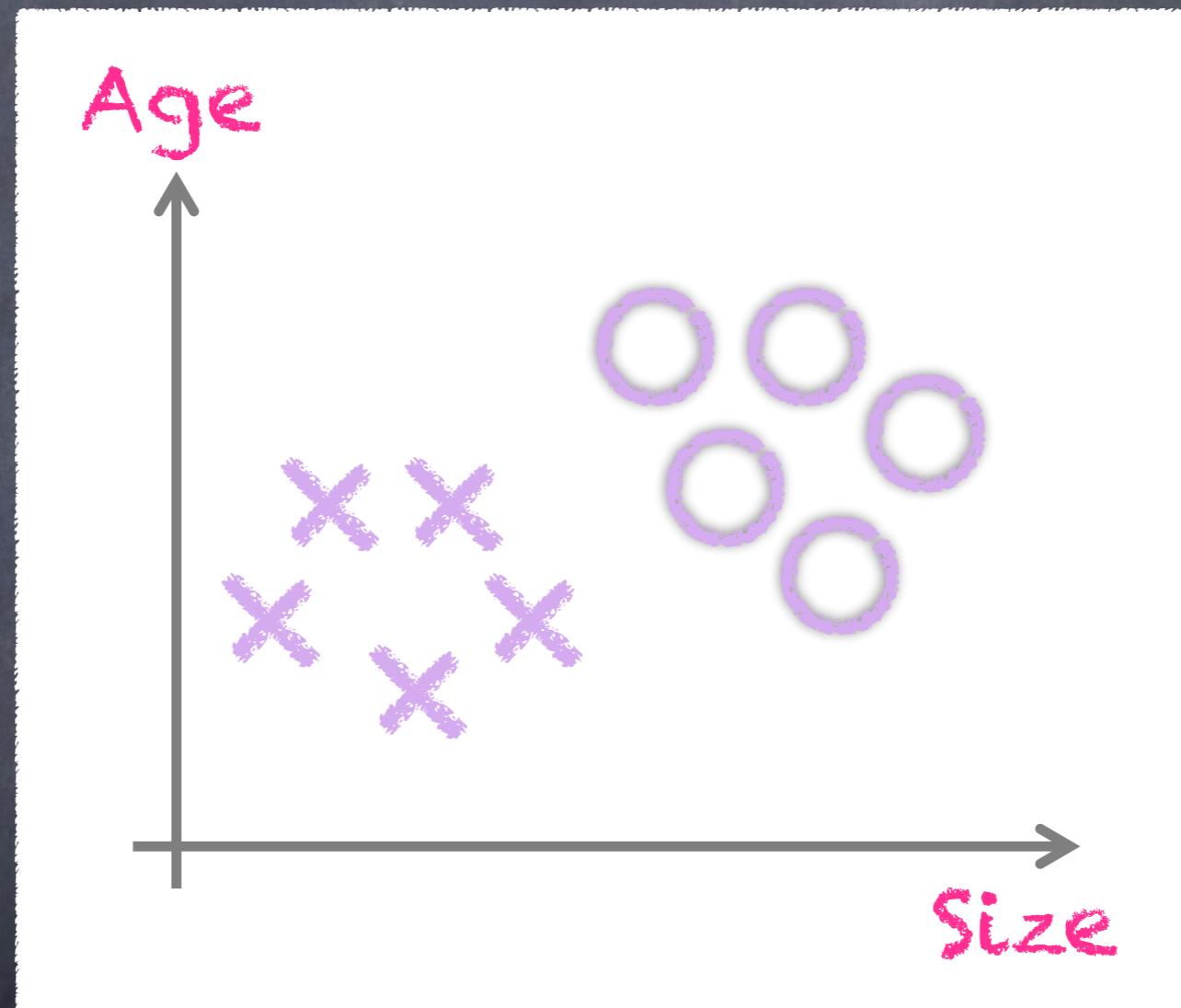
?

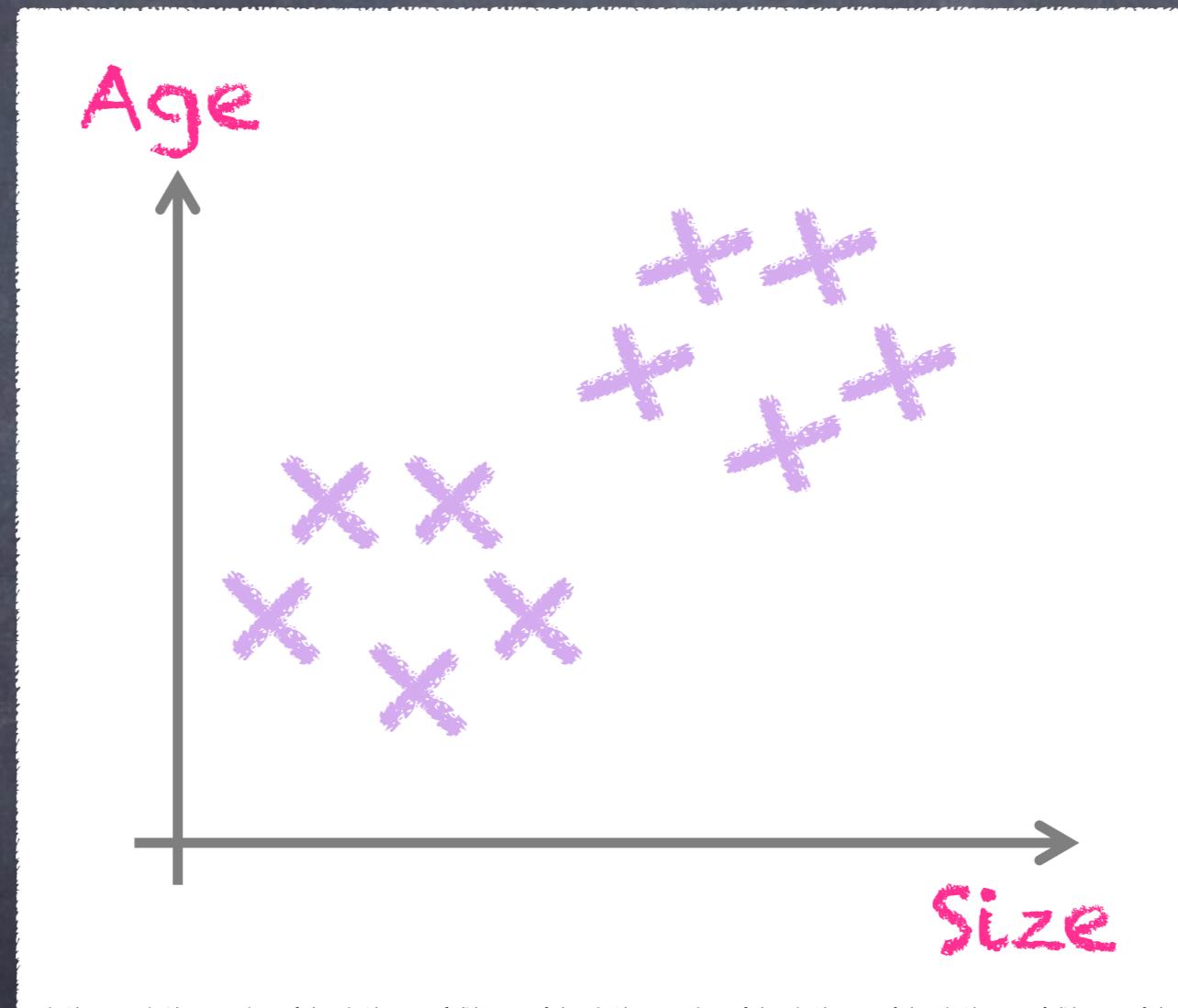
You're running a company, and you want to develop learning algorithms to address each of two problems.

- You have a large inventory of identical items. You want to predict how many of these items will sell over the next 3 months. Regression
- You'd like software to examine individual customer accounts, and for each account decide if it has been hacked/compromised. Classification



# Unsupervised Learning







https://news.google.com/

Google News



Search for topics, locations & sources



Top stories

For you

Following >

Saved searches >

COVID-19

U.S.

World

Your local news

Business

Technology

Entertainment

Sports

## Headlines

More Headlines

[COVID-19 news: See the latest coverage of the coronavirus \(COVID-19\)](#) >

**'Dinner table' politics: Why Joe Biden ditched bipartisan dealmaking to pass his COVID-19 relief bill**

USA TODAY • 4 hours ago



- COVID relief bill offers convicted murderers stimulus checks, Cotton slams

Fox News • 14 hours ago

- Unemployment benefits end next week. It may be too late for Congress to stop it, experts say

CNBC • 18 hours ago

- Biden's historic victory for America -- no thanks to GOP

CNN • 17 hours ago • Opinion

- Today's Gridlock Is Like a 19th-Century Nightmare

New York Magazine • 19 hours ago • Opinion

[View Full Coverage](#)

Your local weather

Partly cloudy

67° F



Today Mon Tue Wed Thu

71°F 66°F	70°F 65°F	72°F 66°F	71°F 66°F	73°F 67°F

C | F | K

[More on weather.com](#)

Fact check

New York nursing homes granted legal protection, but not 'blanket immunity'

PolitiFact



≡ Google News



Search for topics, locations & sources



Top stories

For you

Following

Saved searches

COVID-19

U.S.

World

Your local news

Business

Technology

Entertainment

Sports

## Top news

### Senate Democrats Pass \$1.9 Trillion Covid-19 Relief Plan

The Wall Street Journal • 13 hours ago



### Some children's hospitals see a surge in rare Covid-19 complication MIS-C

CNN • 8 hours ago



### 'Weight isn't always within your control': Why some states are prioritizing obesity patients for the COVID-19 vaccine

USA TODAY • Yesterday



### In France, there's no escape from Covid vaccine sceptics. What would Pasteur think?

The Guardian • 4 hours ago



## Map and stats



Explore the latest data by location

## Daily life

Ask your doctor before getting a coronavirus vaccine if you take this common medicine



BGR • 3 days ago

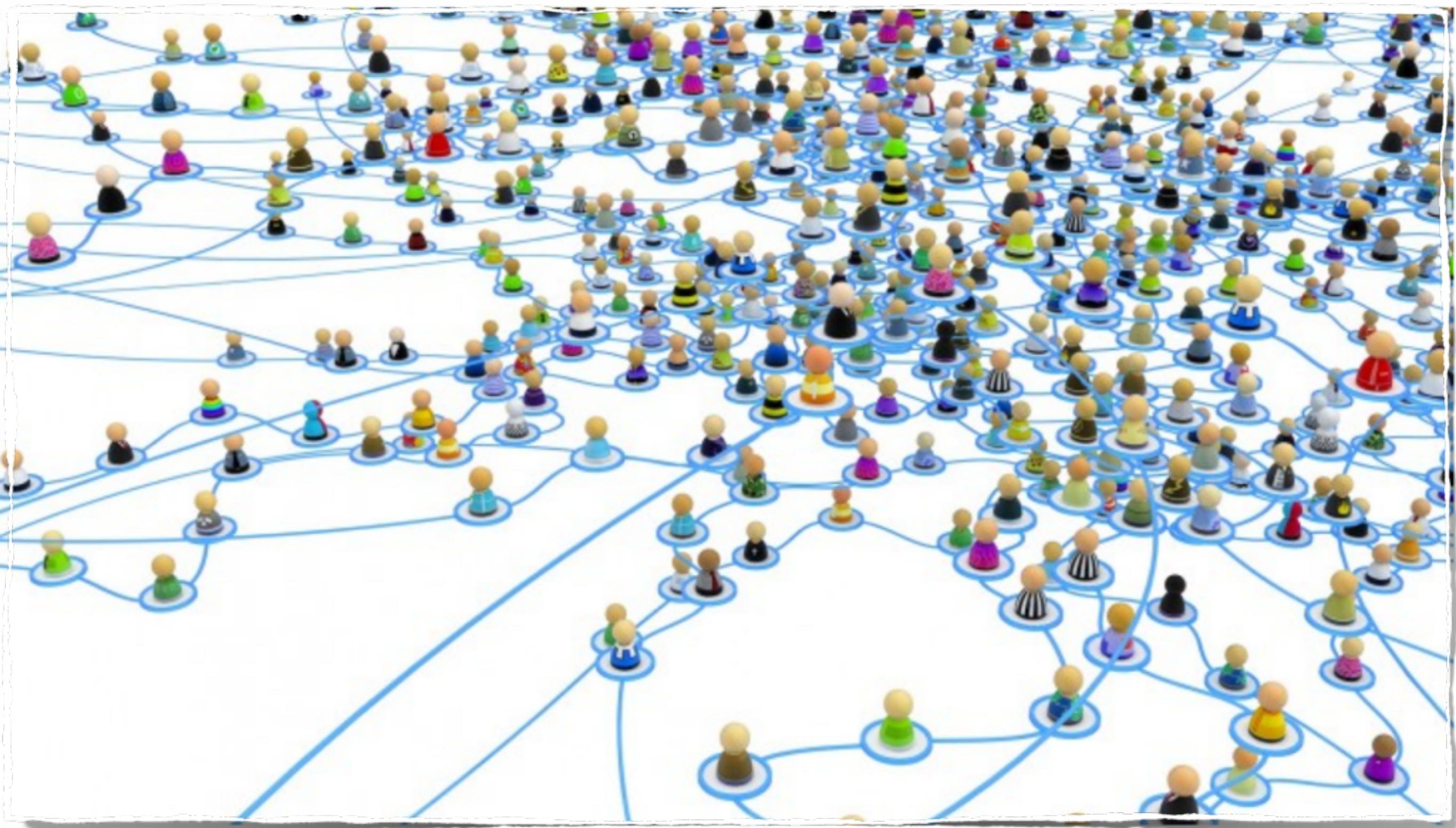
How to be safe when bending CDC coronavirus guidelines: expert advice



Business Insider • 22 hours ago

A guide to what you can expect to get from the \$1.9 trillion Senate







?

- Given email labeled as spam/not spam, learn a spam filter.  
supervised
- Given a set of news articles found on the web, group them into set of articles about the same story.  
unsupervised
- Given a dataset of patients diagnosed as either having diabetes or not, learn to classify new patients as having diabetes or not.  
supervised
- Given a database of customer data, automatically discover market segments and group customers into different market segments.  
unsupervised