Intro to
Machine Learning

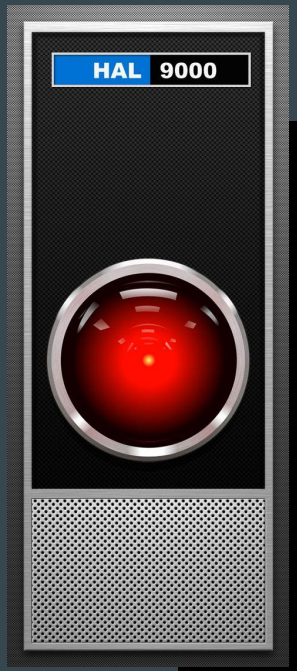
Fair Warning

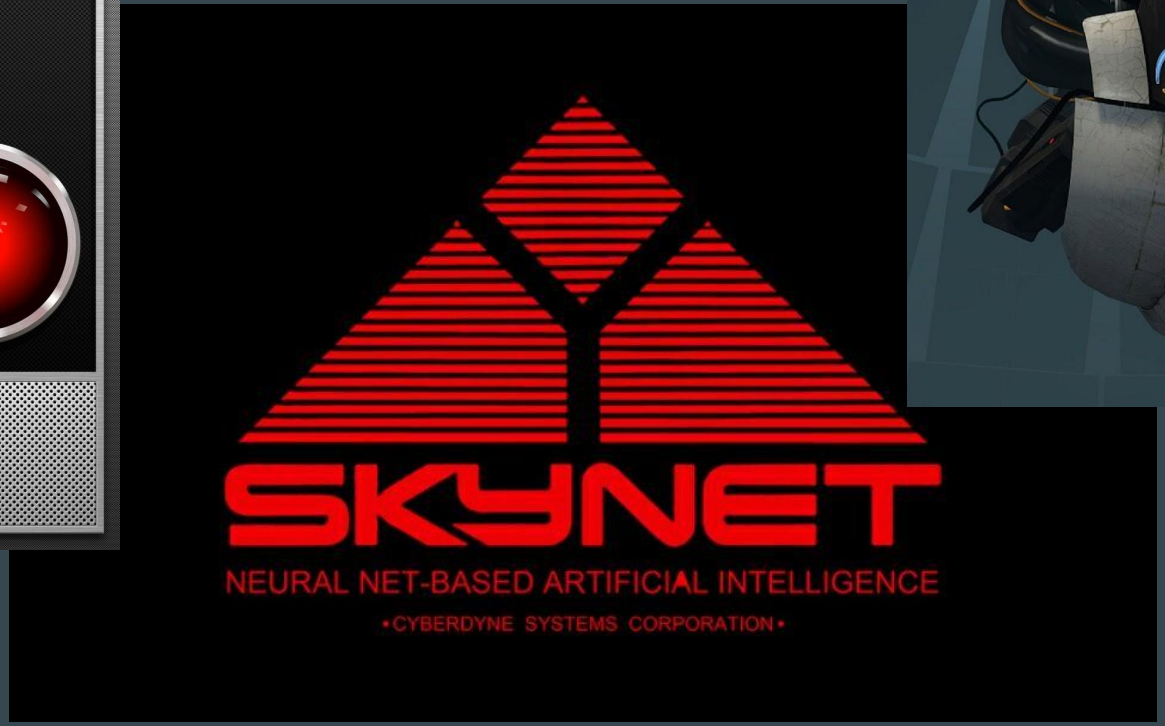
Fair Warning(s)

- Mathematical storms lie ahead! Interrupt if you have questions about math terms or ideas
- There is a lot of nuance and tons of edge cases throughout machine learning. I'm *planning* to skip all of it, 'cause 30 minutes... but I'd rather spend the time discussing your questions if you want to explore nuances and edge cases.
- I'm still learning so everything I'm about to say could be (and probably is) wrong. Please ask questions if something looks weird or suspicious!

Why learn machine learning?

Because they can’t write themselves...





…yet

Broad strokes, what is ML?

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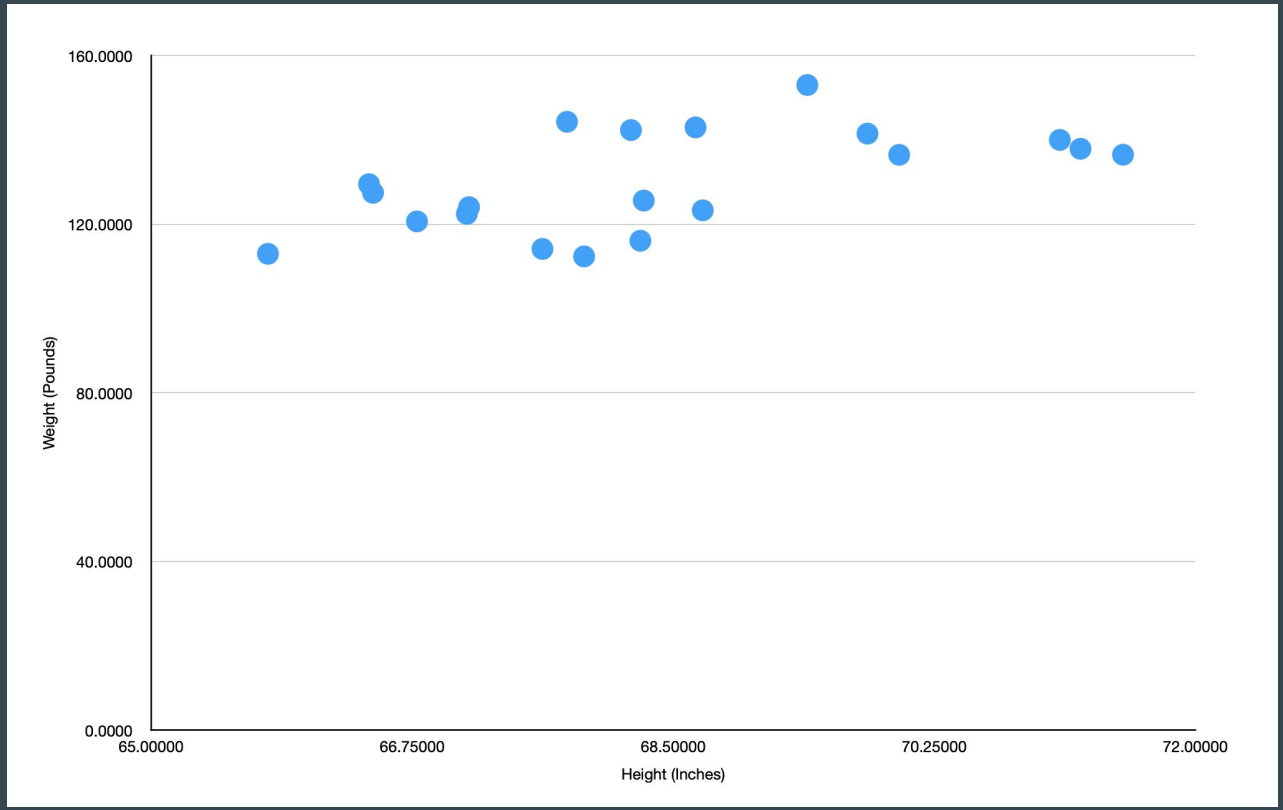
Algorithms, based on mathematical models, which use sample data to generate software models that make pretty good predictions or classifications when handed input that looks like the samples.

A prediction example



Mathy bit

Find a mathematical model for your system

y=mx+b

→

Find a **minimizable** loss function for your model

Residual sum of squares

Software-y bit

Pick an arbitrary concrete model as a starting point

y=3x+500

→

Use gradient descent with your loss function to get better params

y=7x+180

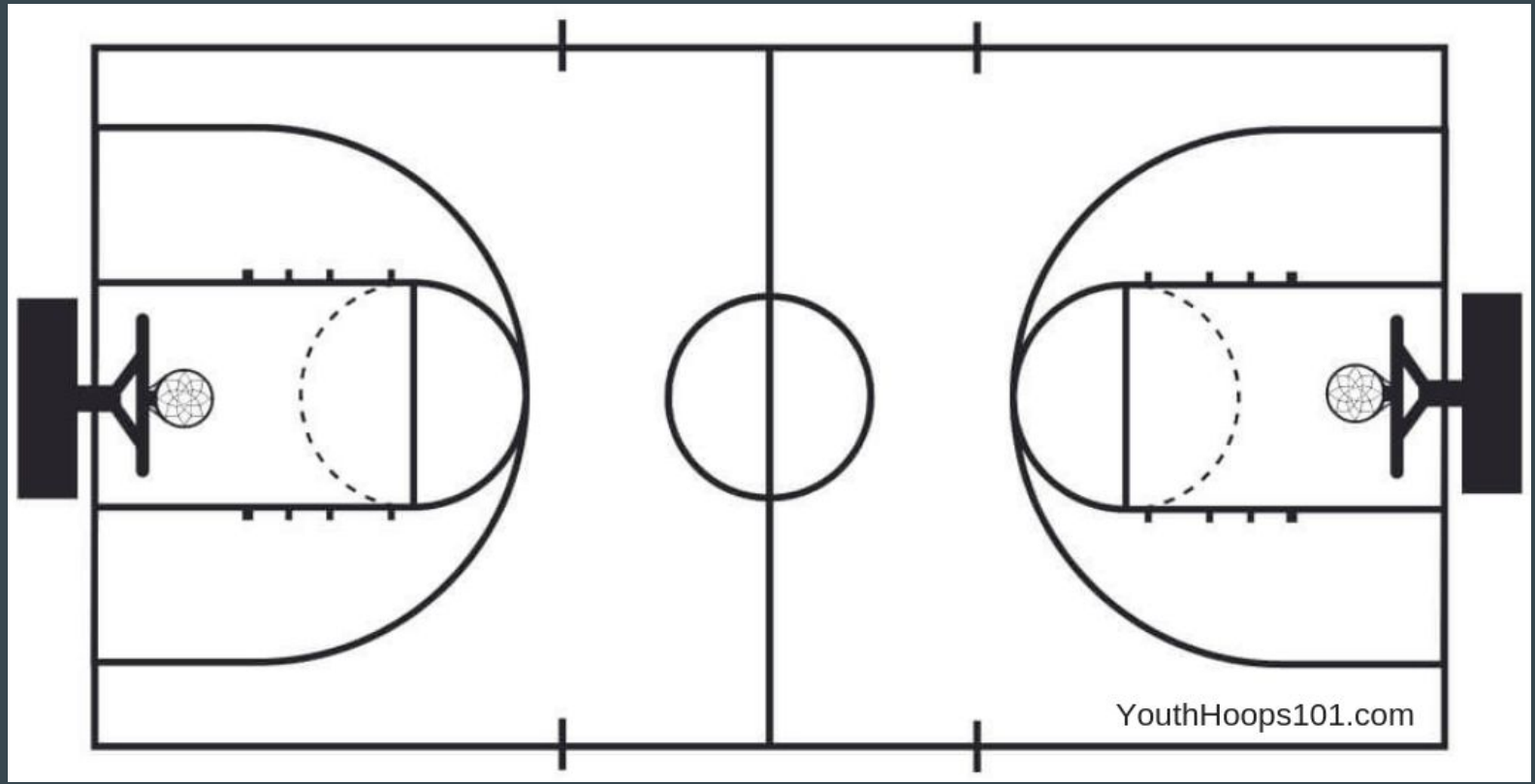
→

Lather, rinse, repeat until the concrete model is good enough

Cold, hard reality bit

See how your good enough concrete model does against samples that it hasn't seen before

A classification example



Oh the places you can go!

Online

- https://www.freecodecamp.org/learn/machine-learning-with-python/ (free, self-paced)
- https://www.deeplearning.ai/courses/ (not free, but not crazy expensive, live instruction mostly)
- https://developers.google.com/machine-learning/crash-course (highly Google-oriented, but good content)
- https://www.udemy.com/courses/search/?q=machine+learning+python&src=sac&kw=machine+learning (tons of content, cheap when there's a sale, quality varies)

Electronic dead trees

- (Programmer focused) Aurélien Géron (2017), Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly.
- (Math focused, but free) Hastie, Tibshirani and Friedman (2009), The Elements of Statistical Learning, Springer. Textbook available online at: http://statweb.stanford.edu/~tibs/ElemStatLearn/printings/ESLII_print10.pdf
- (Fun walkthrough of a DIY neural network) Rashid, Tariq (2016) Make Your Own Neural Network. https://www.amazon.com/Make-Your-Own-Neural-Network-ebook/dp/B01EER4Z4G/ref=sr_1_1?keywords=build+your+own+neural+network&qid=1656597202&sprefix=build+your+own+neural+%2Caps%2C210&sr=8-1