

Taking a Look at the Big Picture

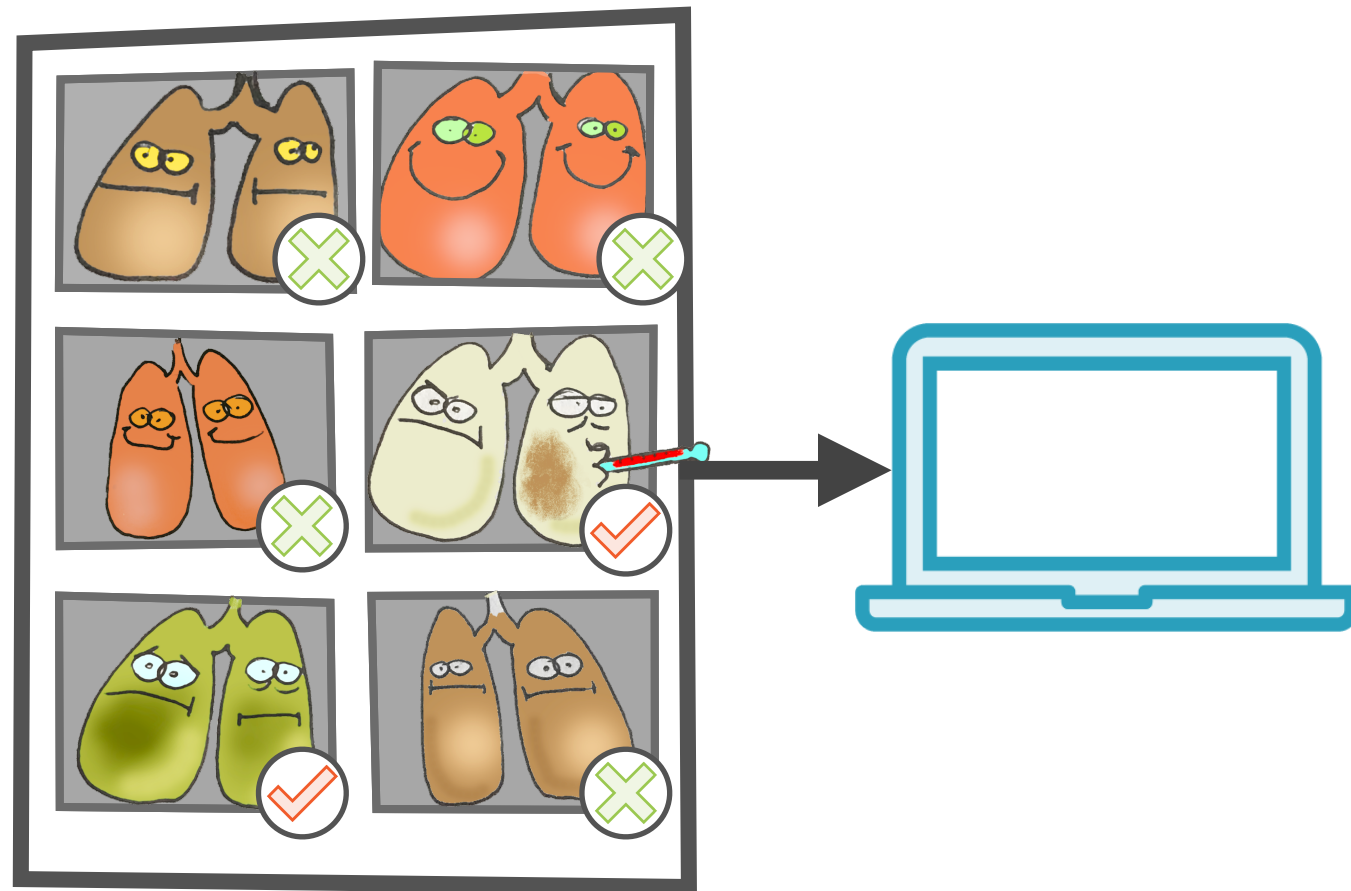


Paolo Perrotta

FREELANCE DEVELOPER

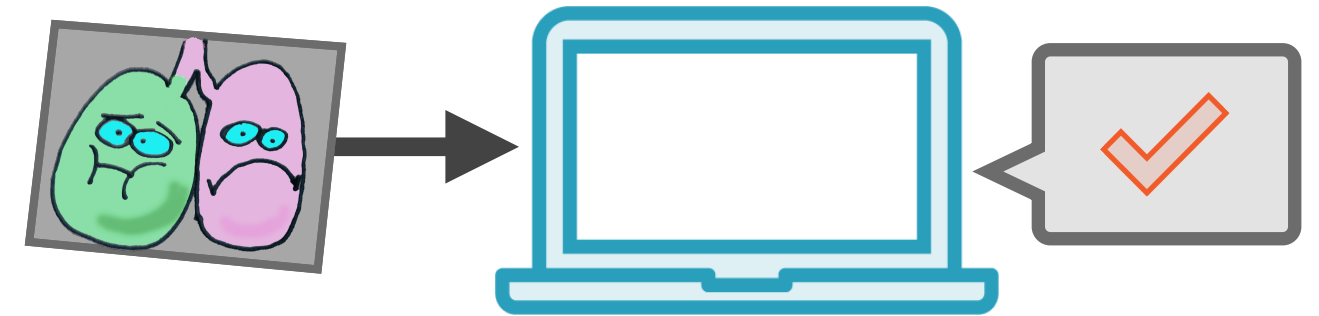
@nusco

Supervised Learning



Training Phase

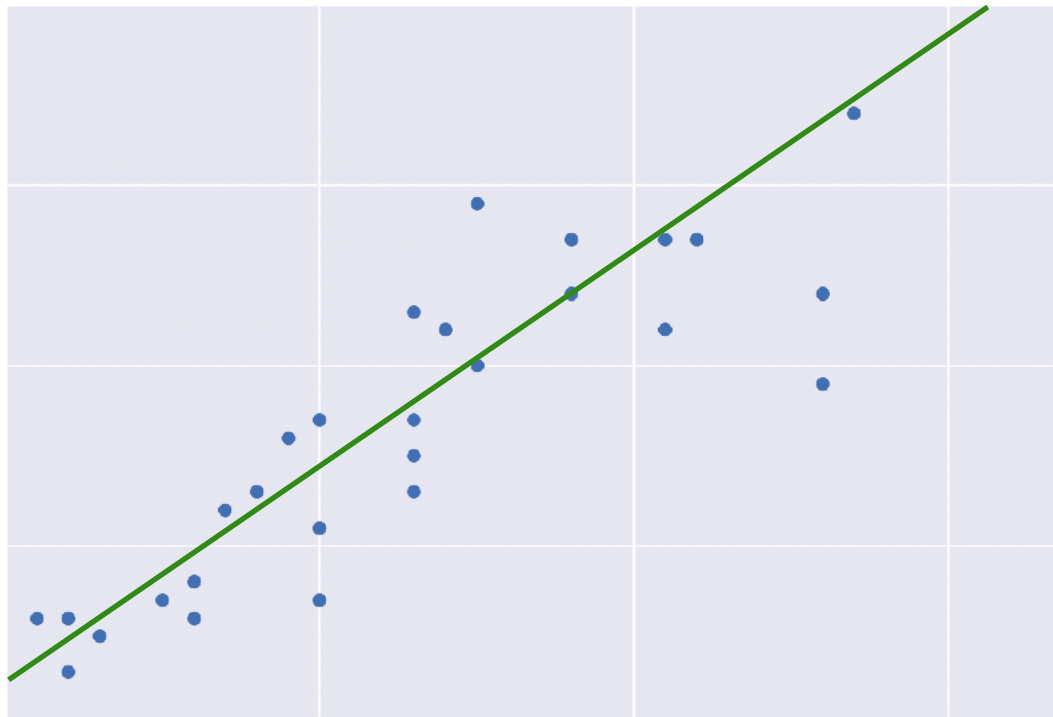
Get labeled examples,
understand their patterns



Prediction Phase

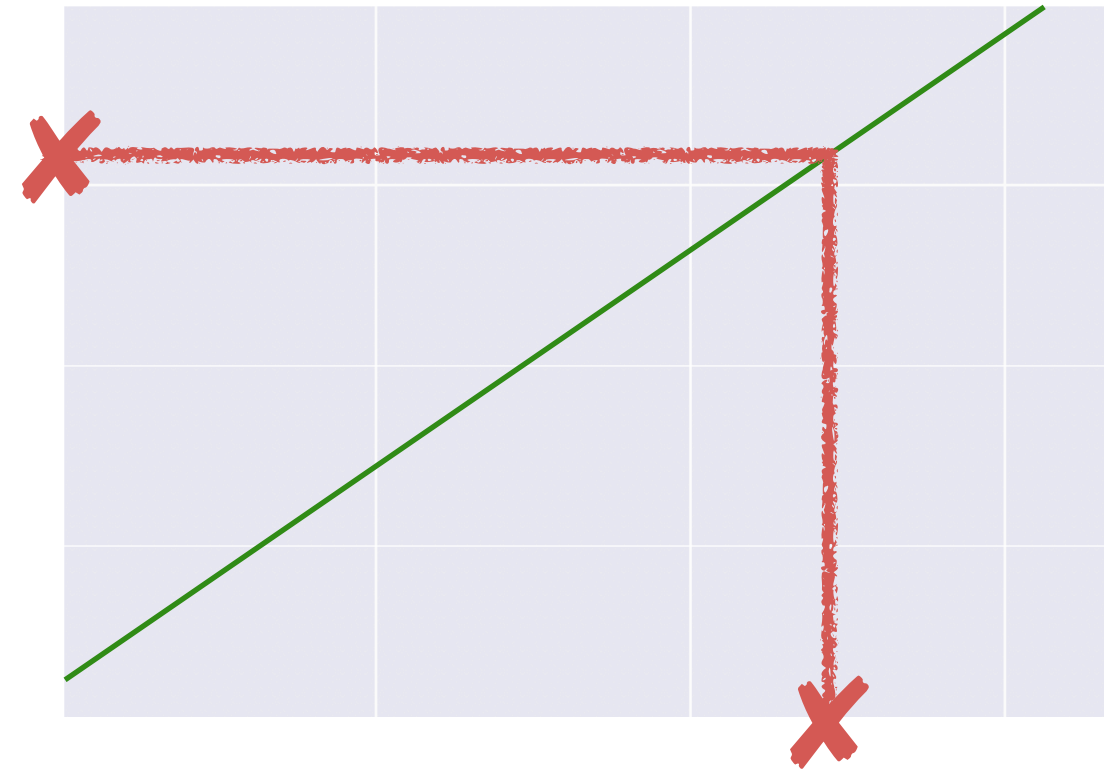
Get unlabeled examples,
predict their label

Linear Regression



Training Phase

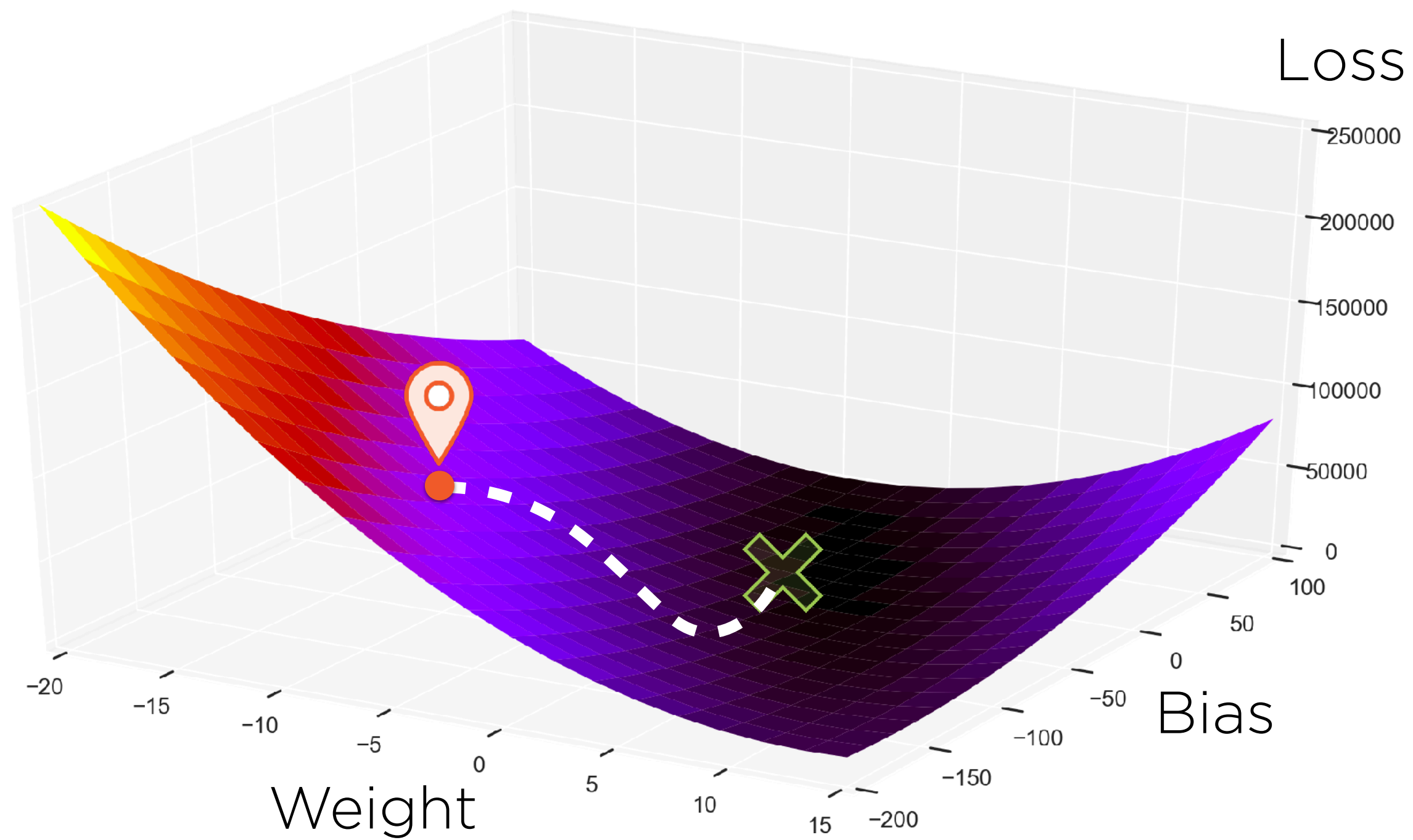
Approximate labeled
data with a model



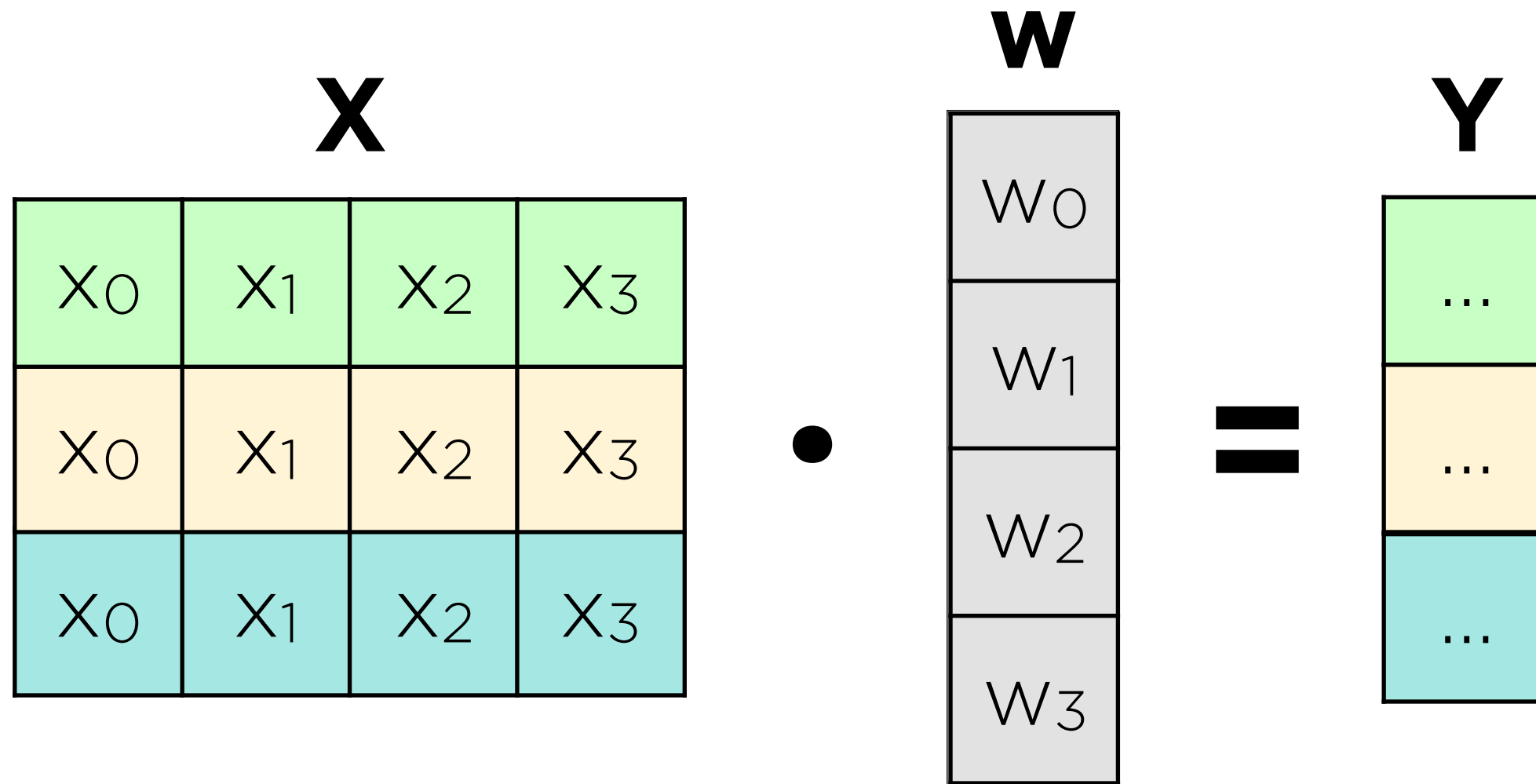
Prediction Phase

Use the model to predict
unlabeled data

Gradient Descent



Multiple Linear Regression

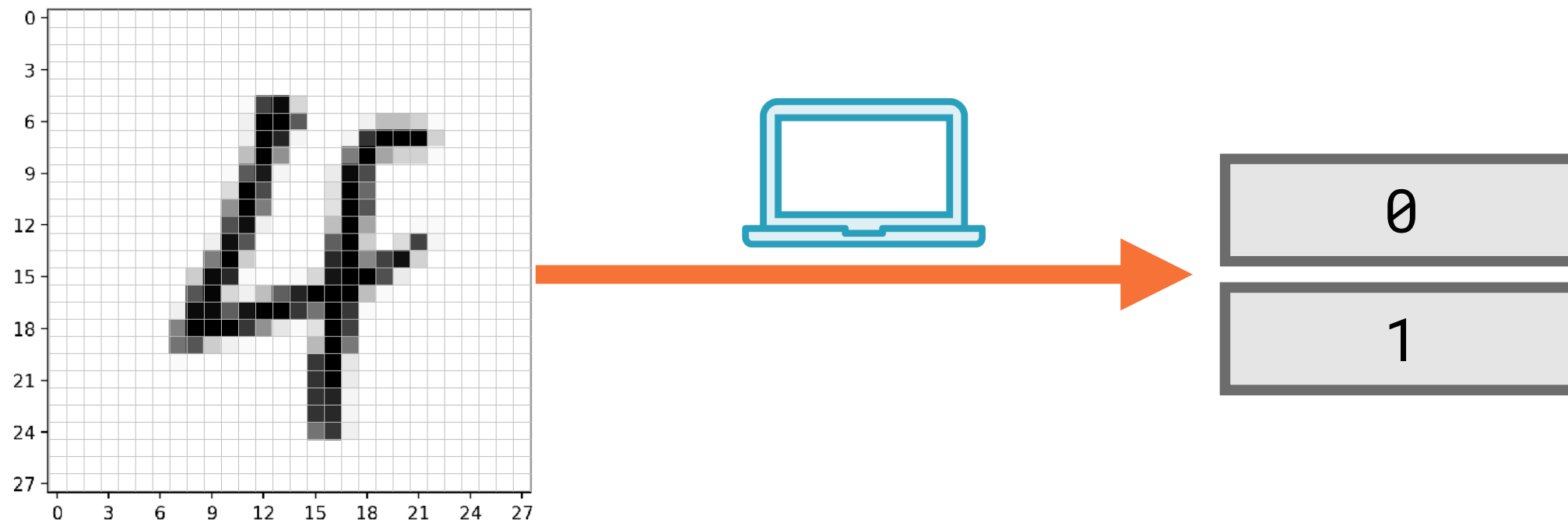


$$y = w_0 x_0 + w_1 x_1 + w_2 x_2 + w_3 x_3 + \dots$$

Classification



Classification on an MNIST Digit



Classification on All MNIST Digits

333538207942204219567233910030
1229586925184196055409123~8510
120723071413770747551825408926
712201892425223450170354356039
984068305141526551970134748238
284274861327660202996108606768
936610807350797988765543793239
742440445803185182787315471050
916009078406637639043240685070
438024981419983534087369303167
528958537409996888800168960964
866912504681073468320947975475
694517623251463874421165123135
168987374704089015947576416817
670510899728510010127715792325
553187875632147642788481878834
806017907371307485330176570058
986084265963092711973701774129
942821780815449549933847477531
28707207029666894005366222960



0

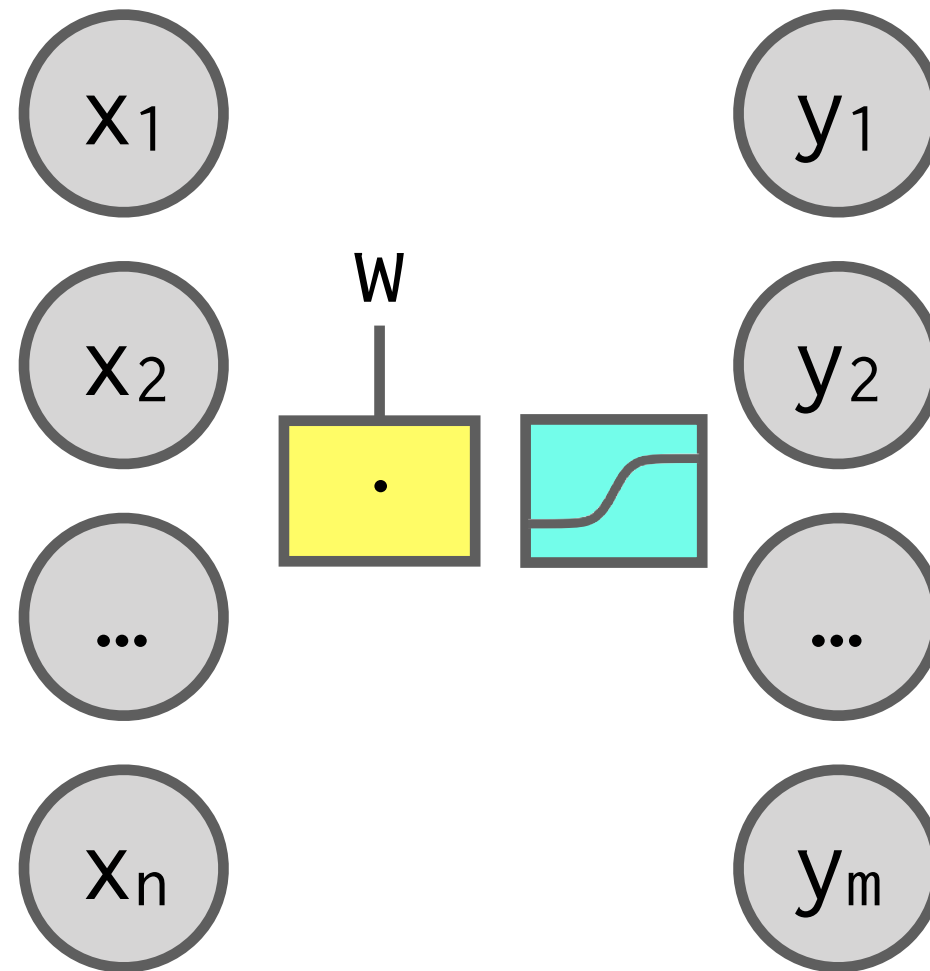
1

2

...

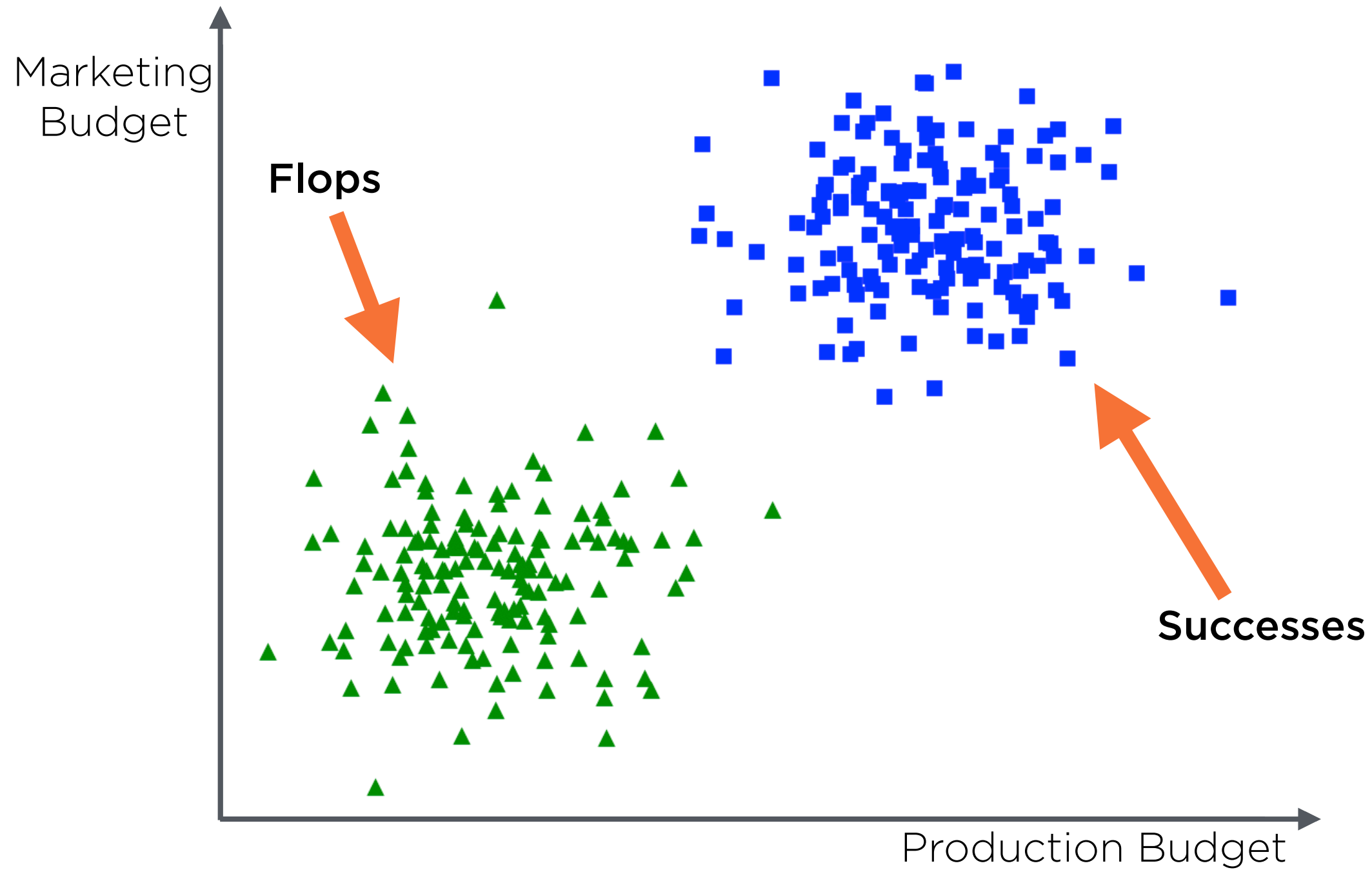
9

Perceptron

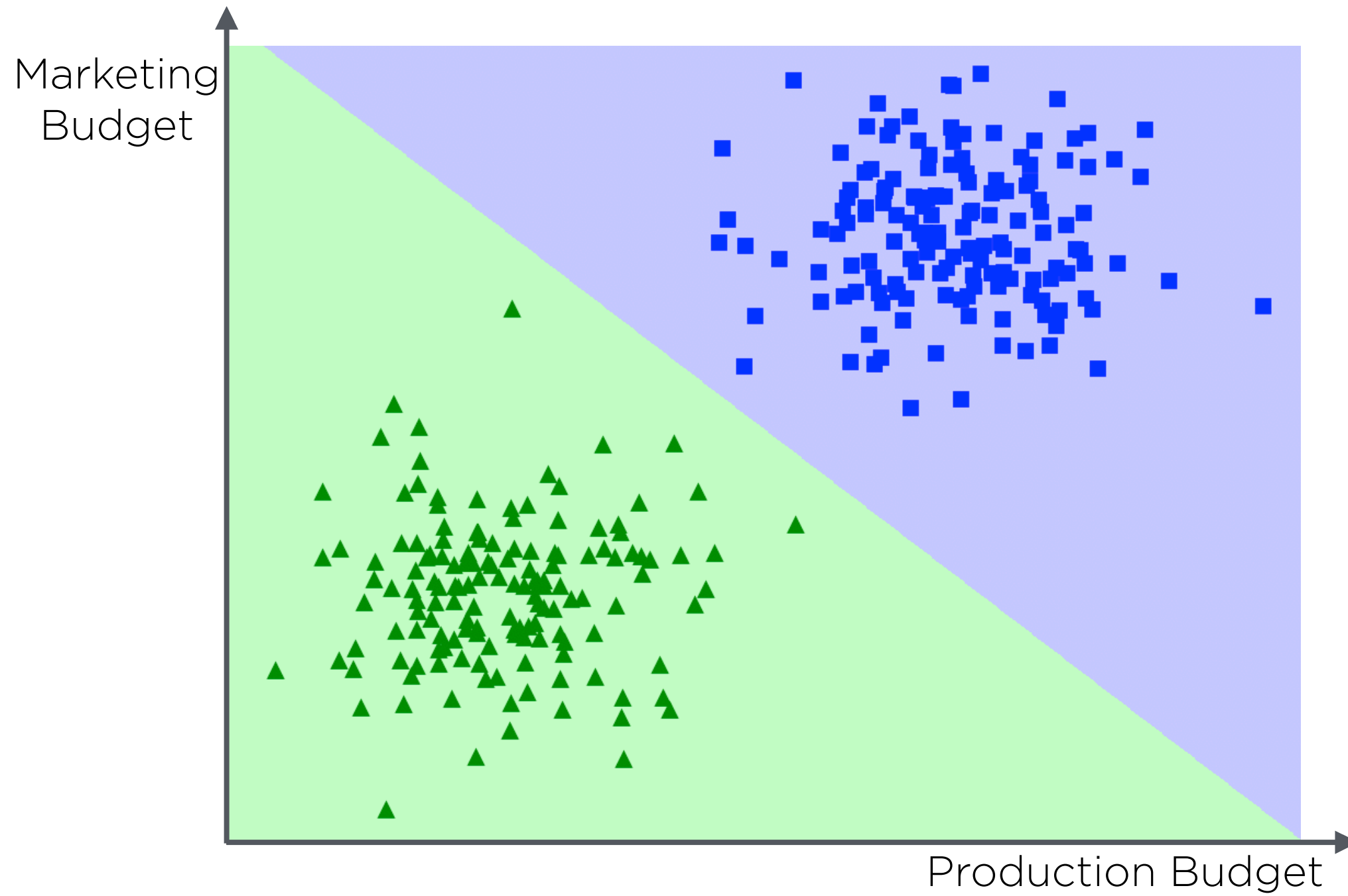


Understanding the Perceptron's Limitations

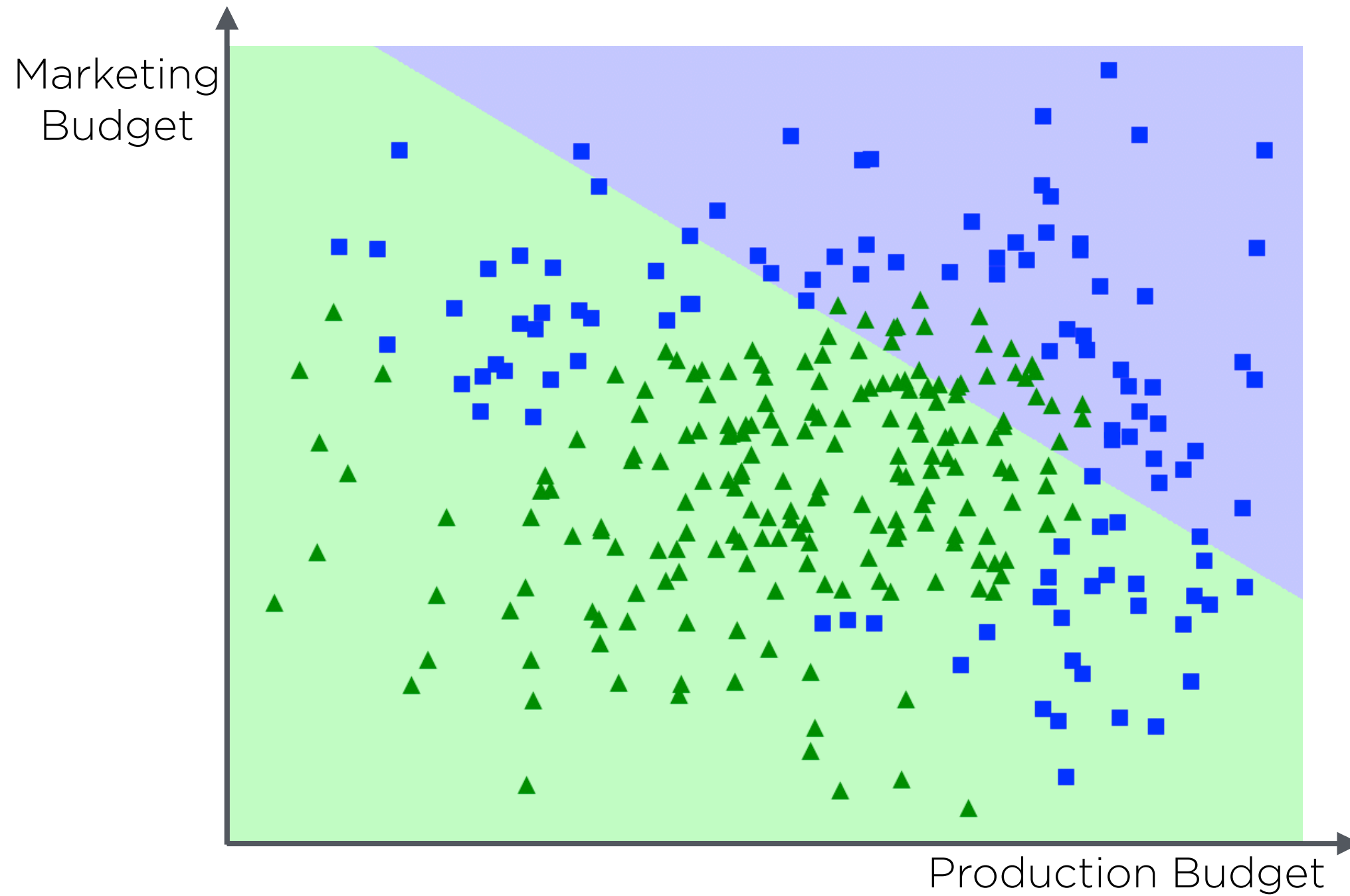
A Movie Classifier



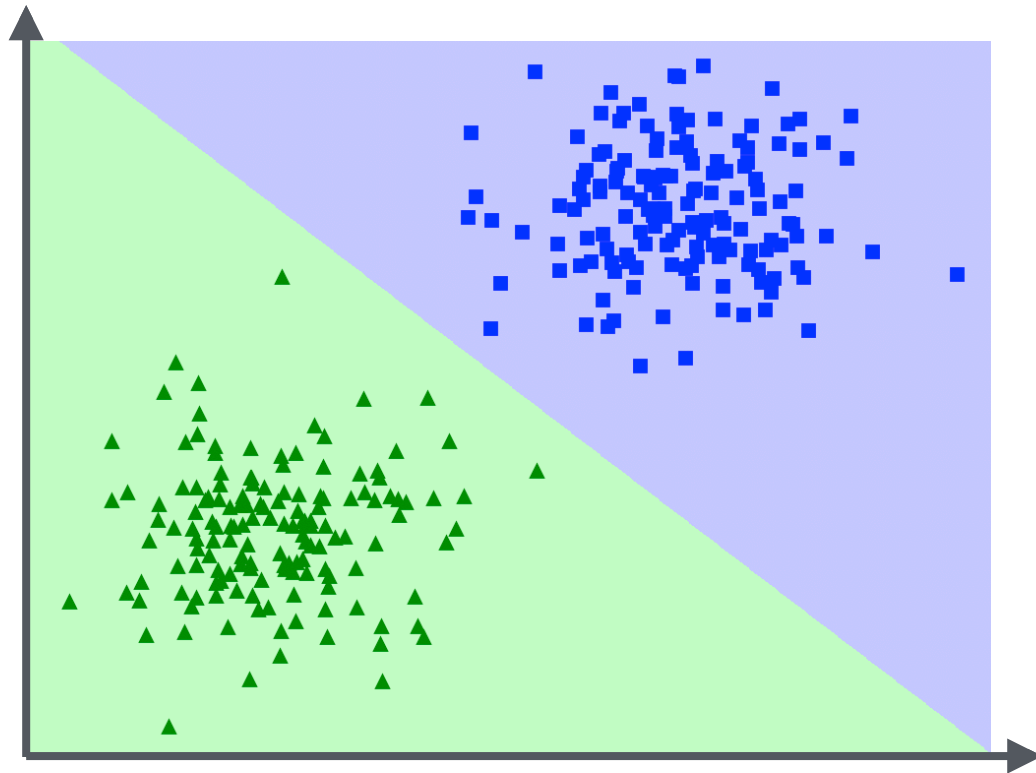
A Movie Classifier



Non Linearly Separable Data

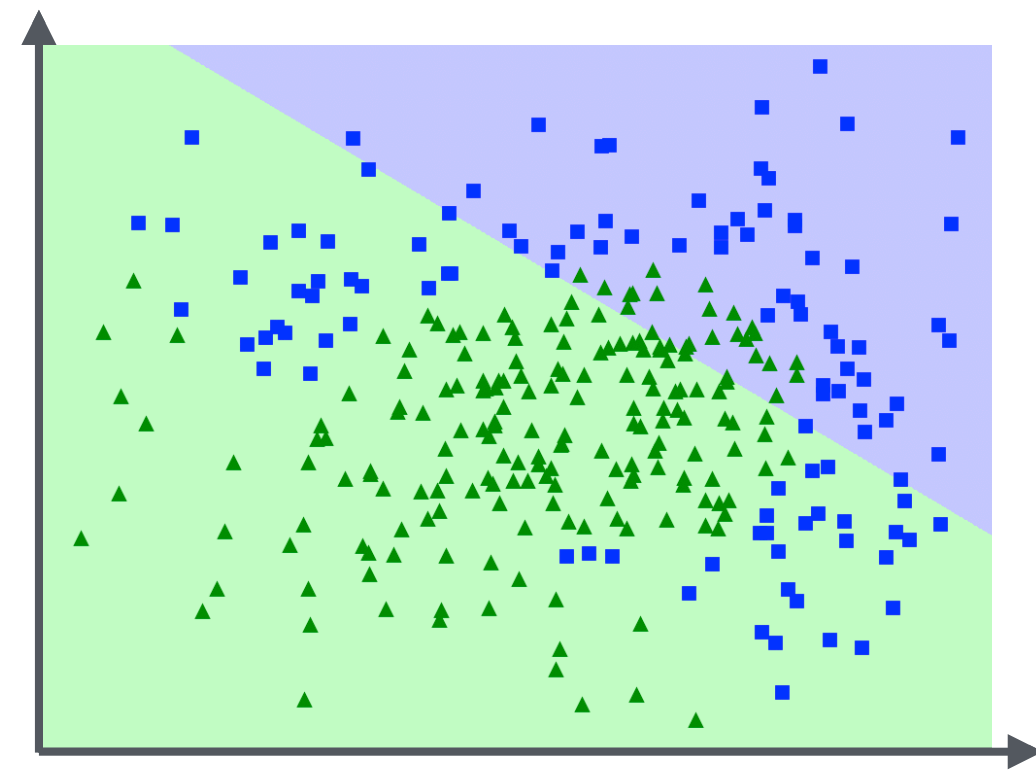


Data and Perceptrons



Linearly Separable

Straight decision boundary, good
for perceptrons



Non Linearly Separable

Curved decision boundary, bad
for perceptrons

Perceptrons only work well on
linearly separable data

The 1950s



CSIRAC Computer, Trevor Pearcey, Sydney, 5 Nov 1952, Creative Commons PDM 1.0

Symbolists vs. Connectionists



Symbolist AI

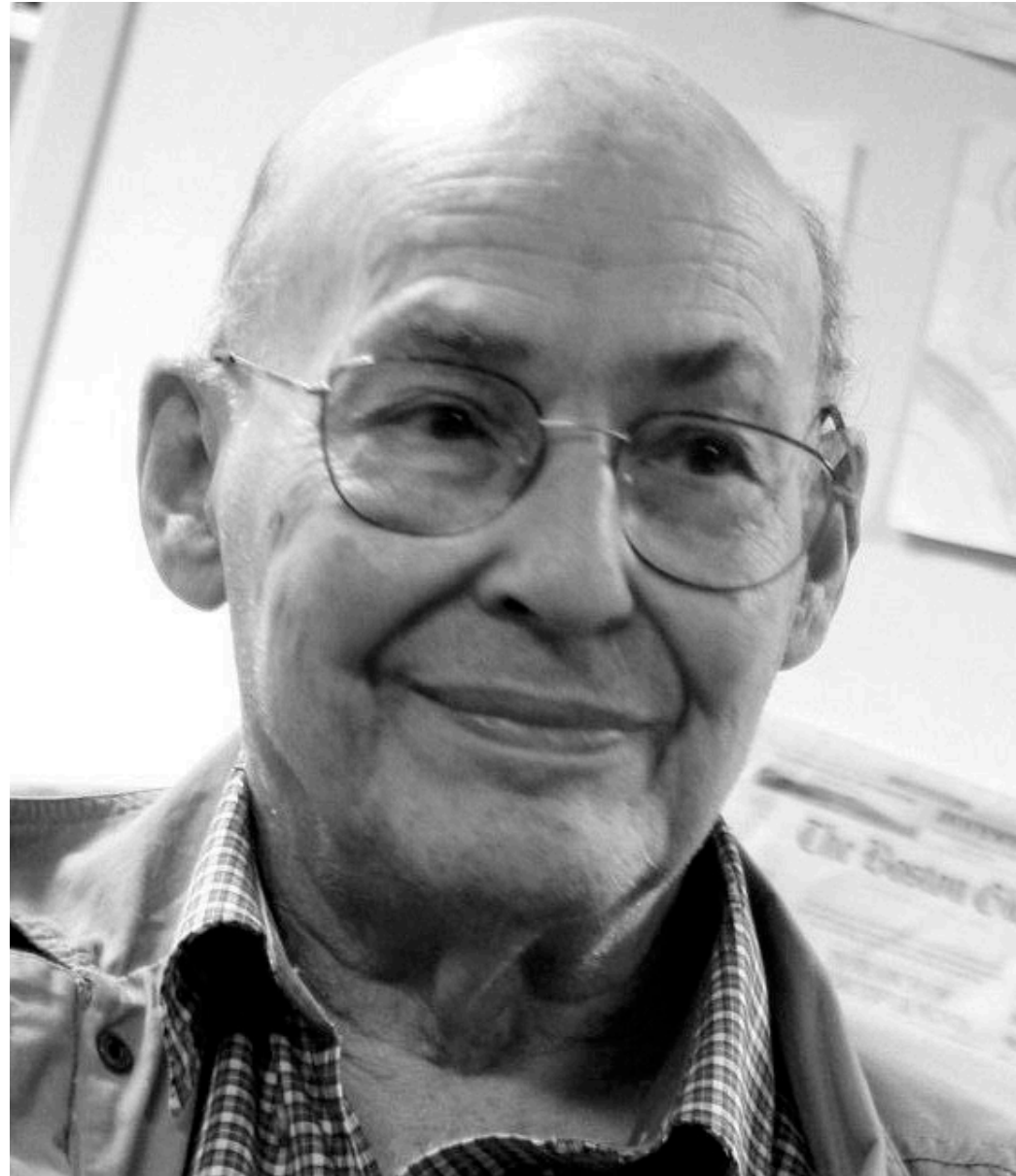
Build intelligence by coding it



Connectionist AI

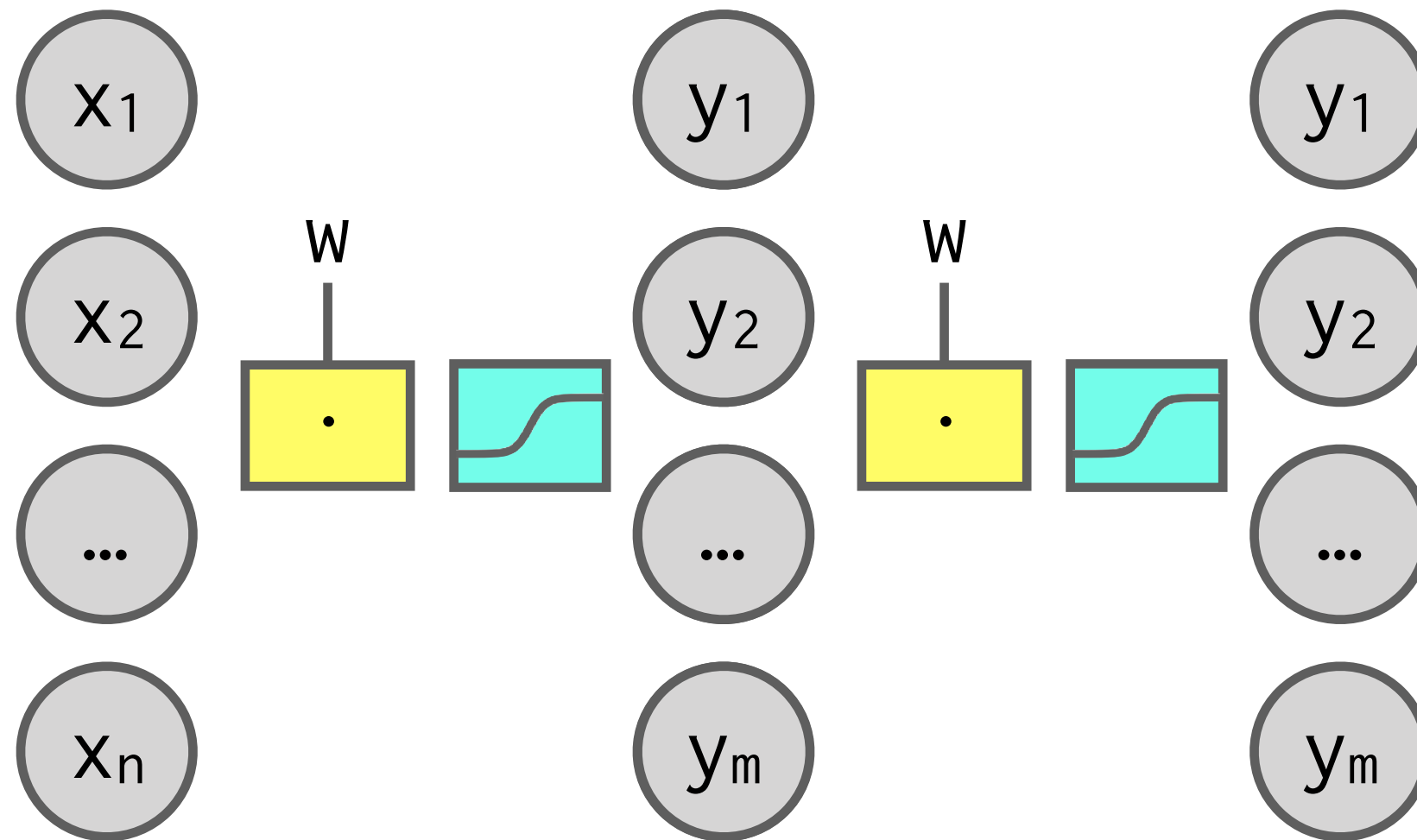
Build a brain-like machine

The “Perceptrons” Book

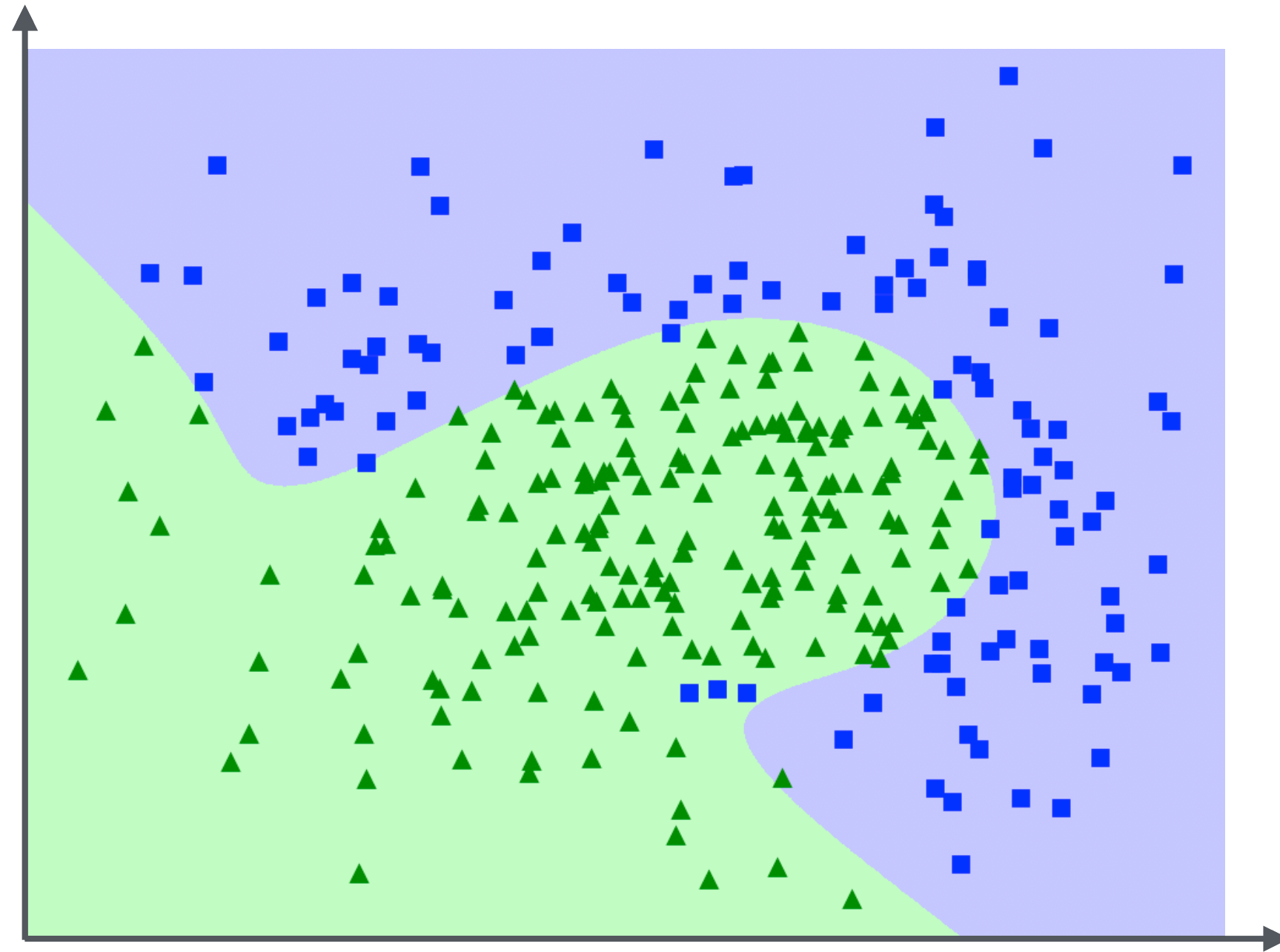


Marvin Minsky, Cropped from an original by Sethwoodworth on Wikipedia. Creative Commons BY 3.0.

Multilayer Perceptron



A Multilayer Perceptron's Decision Boundary



To Be Continued?

Book:
“Programming Machine Learning”
By Paolo Perrotta

Thank You!



Paolo Perrotta
FREELANCE DEVELOPER
@nusco