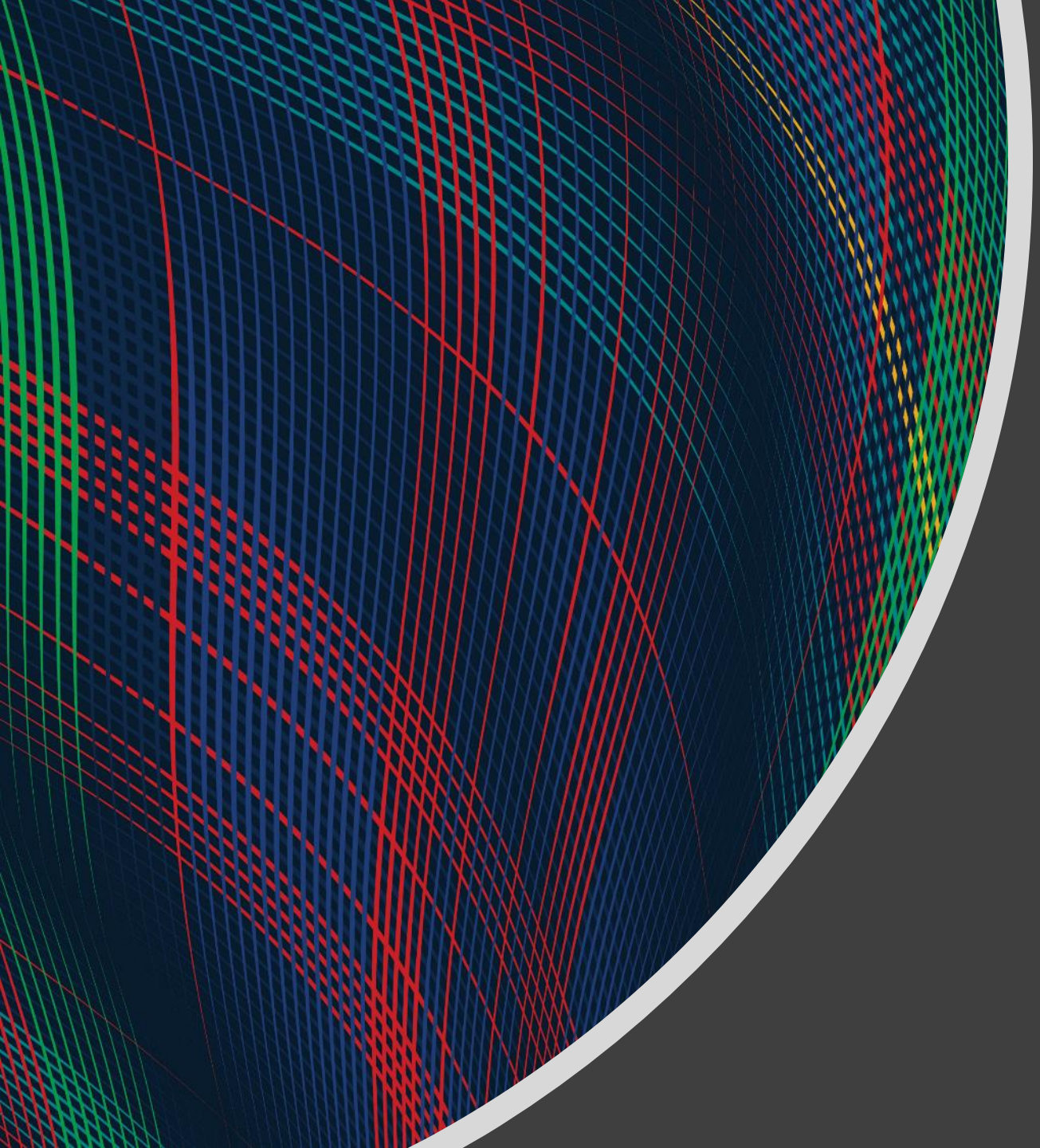


Demystifying AI

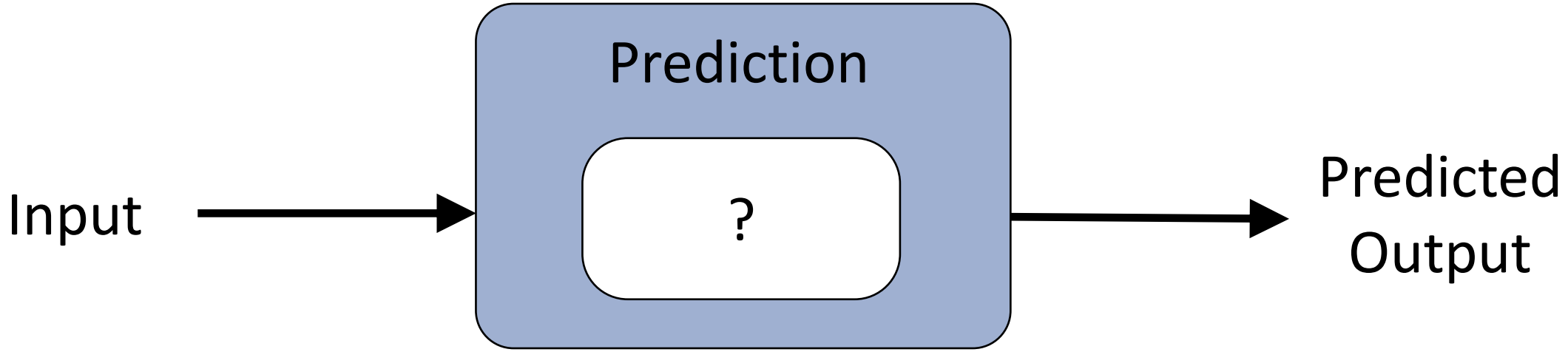
Image Classification

Instructor: Pat Virtue

Image Classification

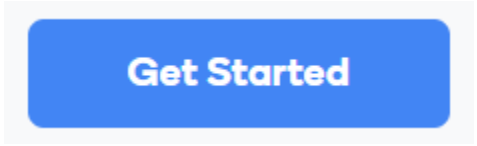
Input: Image

Output: Category that object in image belongs to (label)

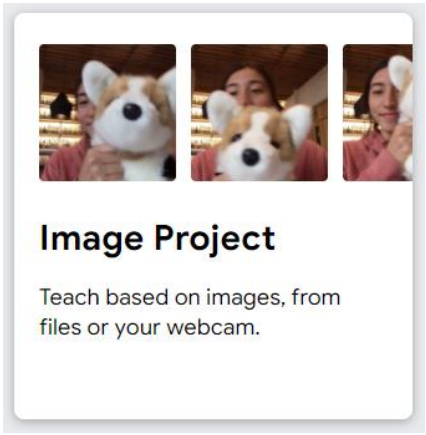


Teachable Machine

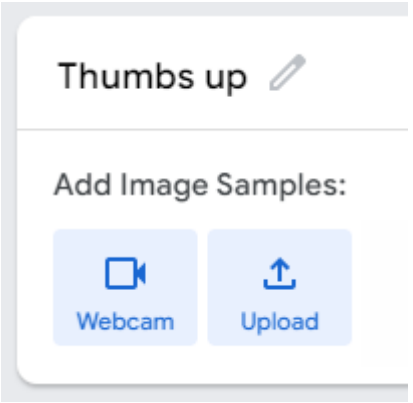
1. https://teachablemachine.withgoogle.com/
2. Click Get Started



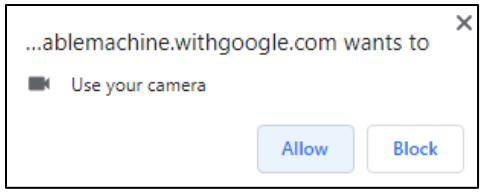
3. Select Image Project



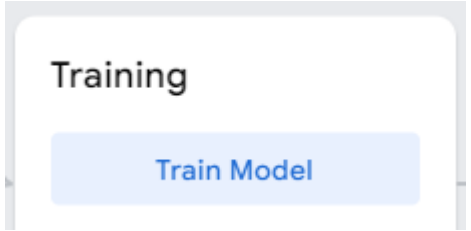
4. Select Standard Image Model



5. Rename Class 1 and 2: Thumbs up and thumbs down
6. Use webcam to collect images

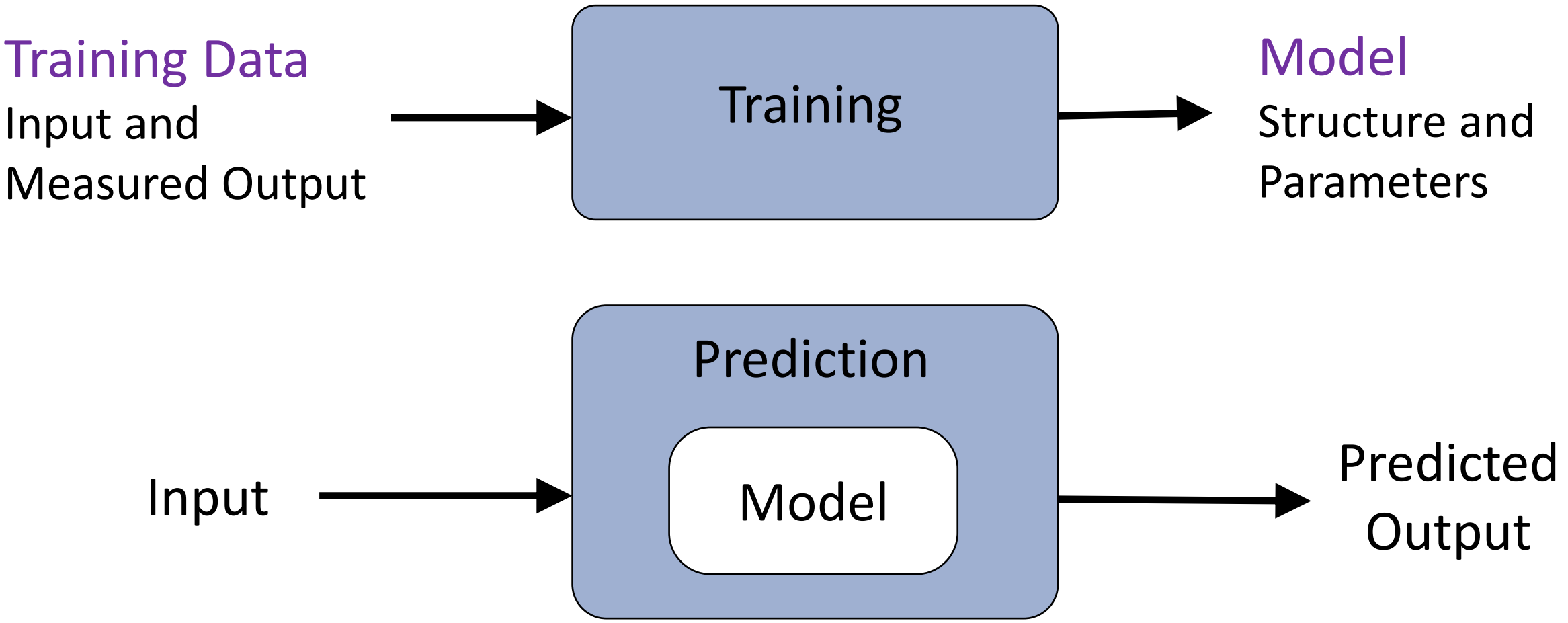


7. Train your model



Reminder: Machine Learning

Using (training) data to learn a model that we'll later use for prediction



ML Image Classification Training

Training Data:

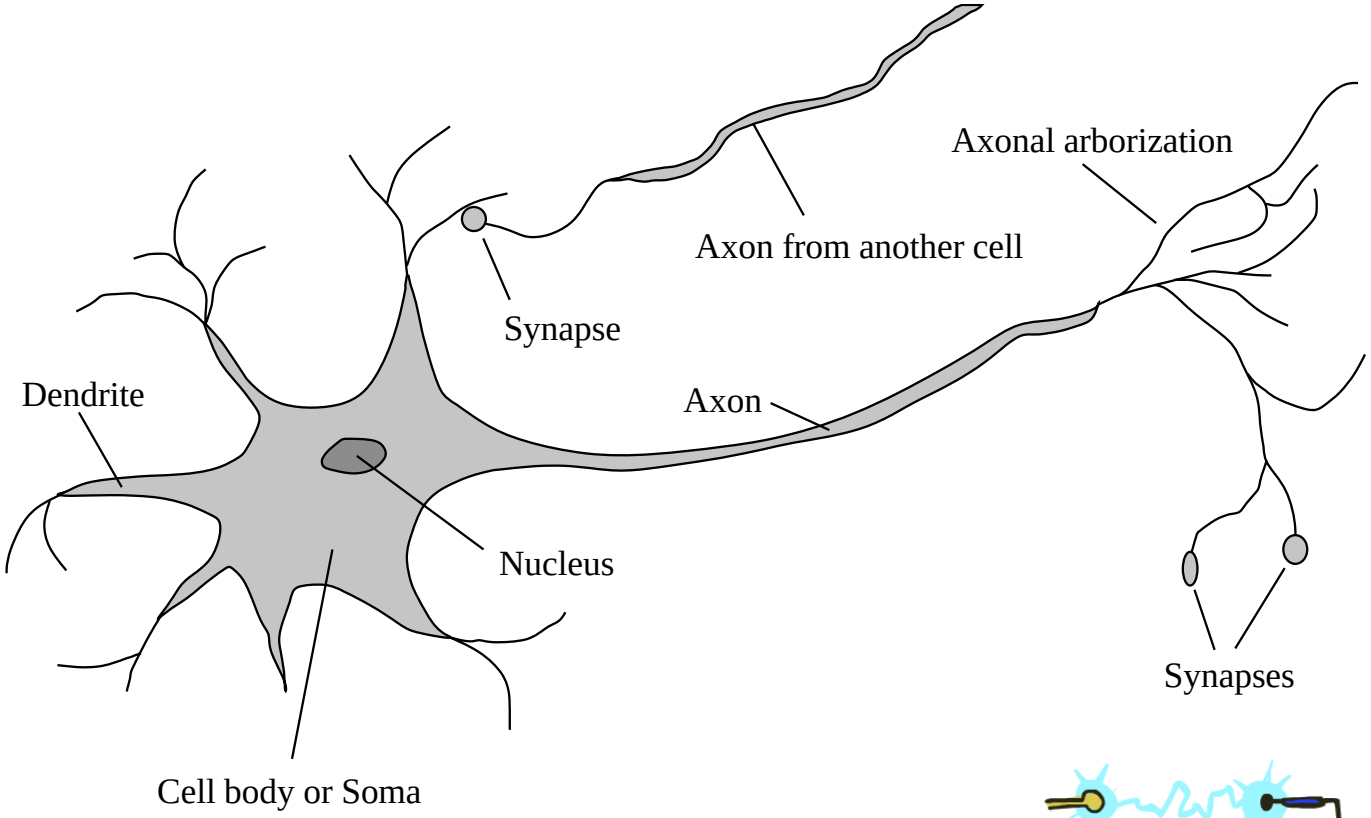
Images and corresponding labels

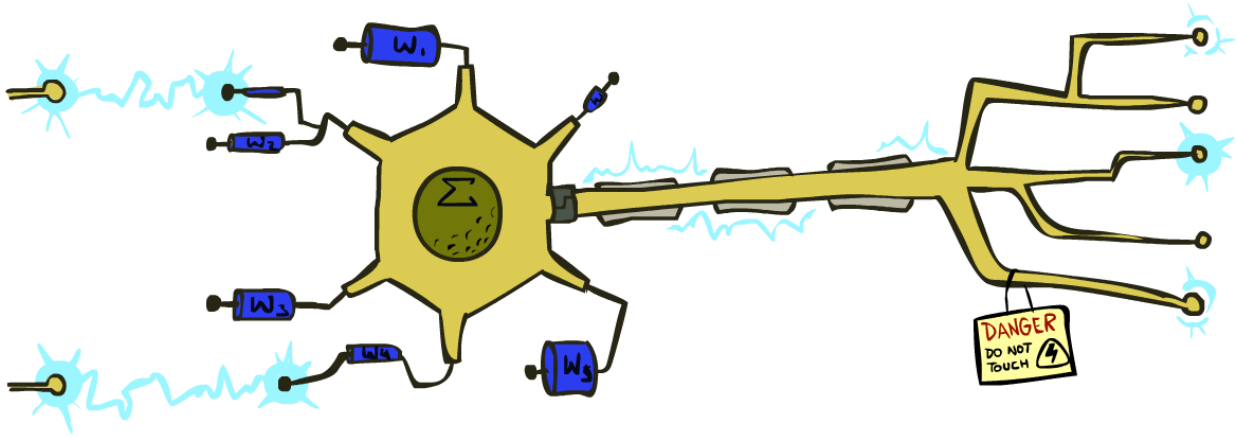
Model:

Neural network

- Humans design the neural network *structure*
- Network *parameters* (think slope and intercept, but a whole lot of them) are determined during training to minimize training error

Very Loose Inspiration: Human Neurons



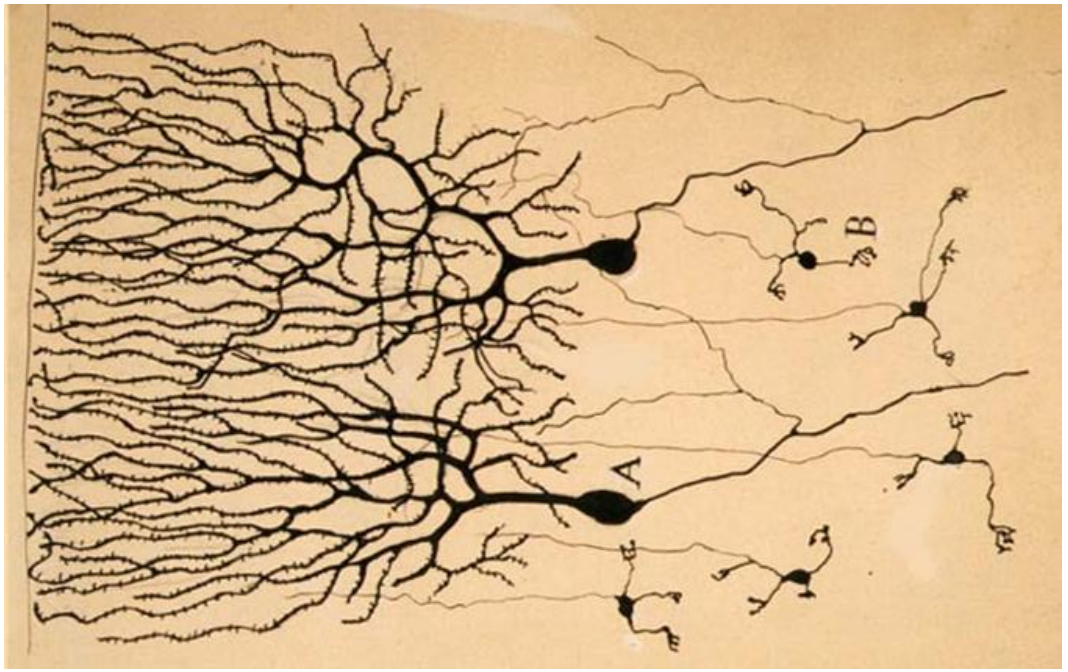


Slide from UC Berkeley AI

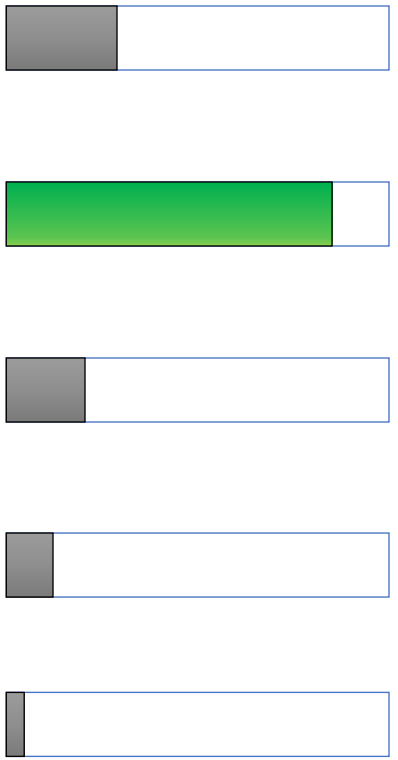
Neural Networks

Inspired by actual human brain

Input Signal



Output Signal



DOG

CAT

TREE

CAR

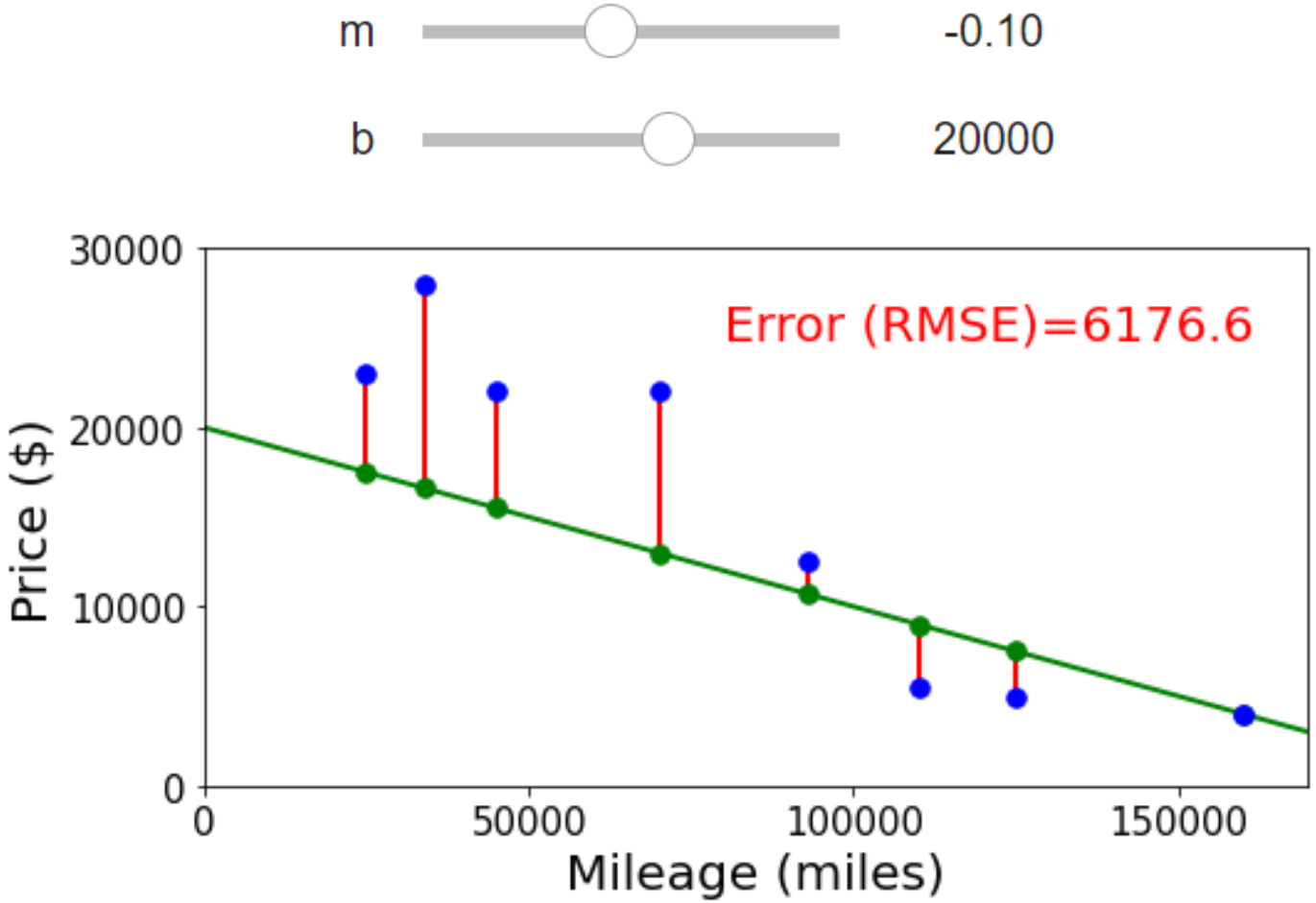
SKY

Image: https://en.wikipedia.org/wiki/Neuron

Neural Networks

Building on optimization for linear and logistic regression

- Selling my car



y_{meas}

y_{pred}

Neural Networks

Many layers of neurons, millions of parameters

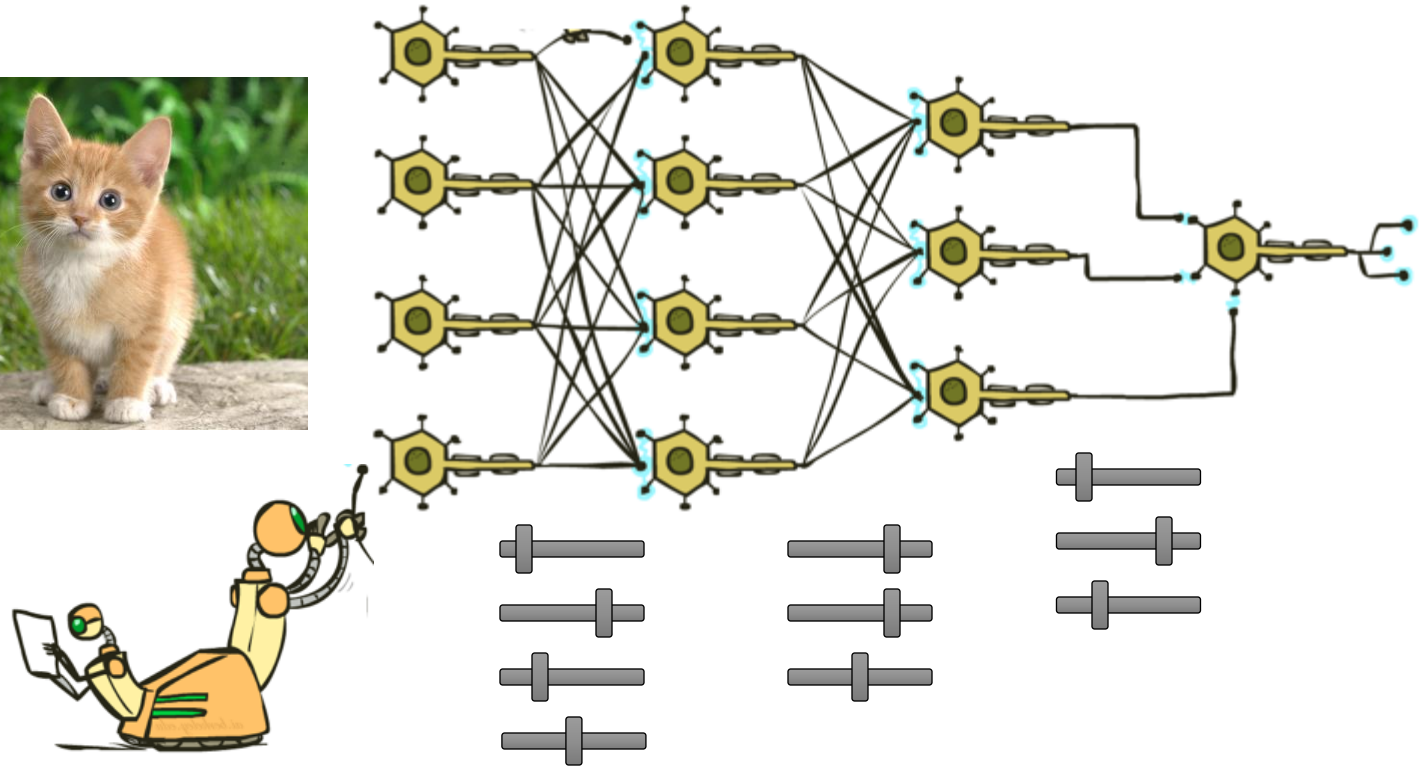
Output

Signal

y_{pred}

Input

Signal



DOG

CAT

TREE

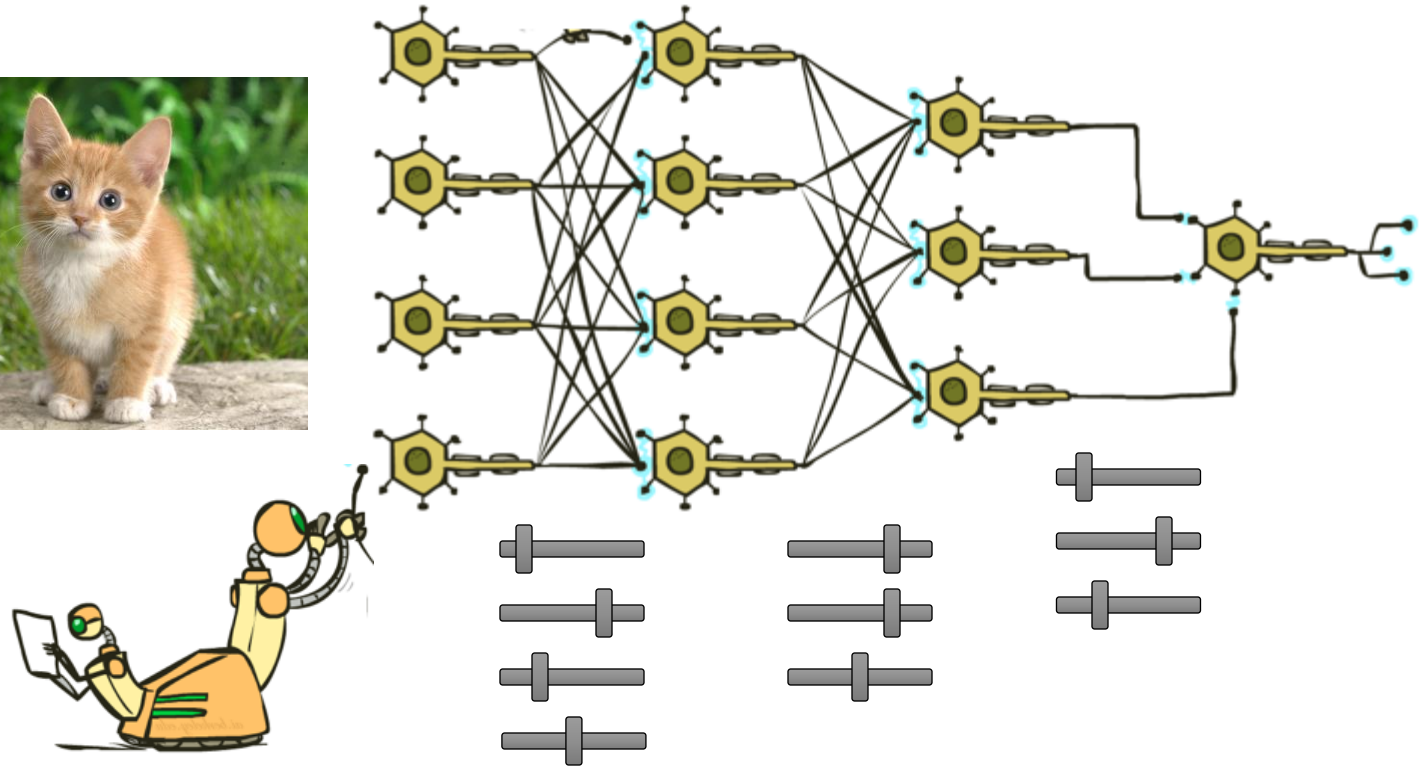
CAR

SKY

Neural Networks

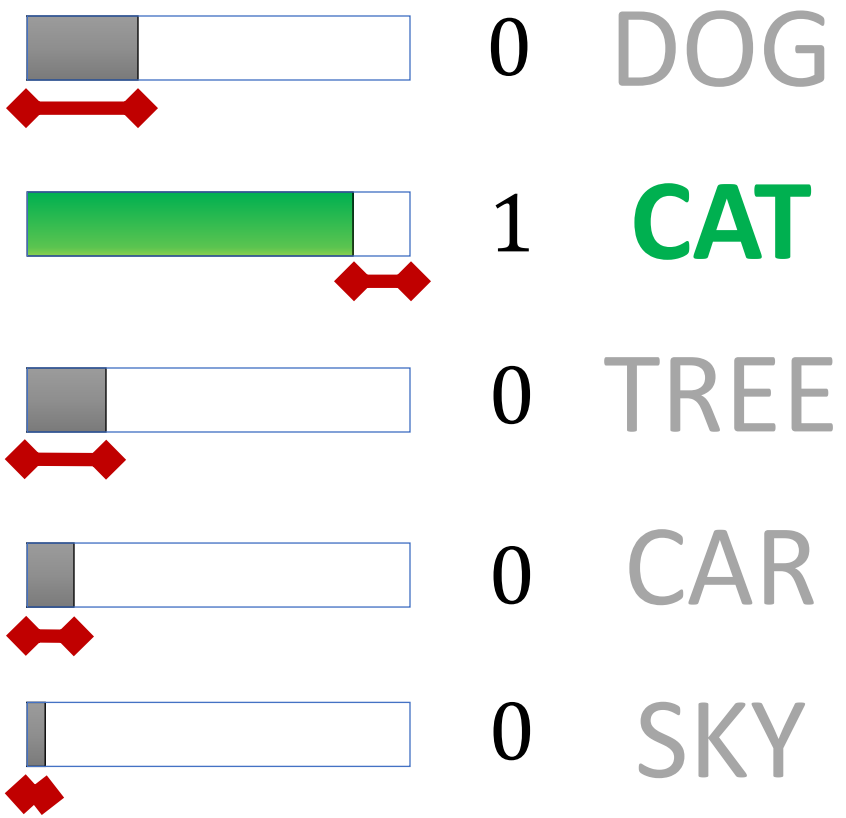
Many layers of neurons, millions of parameters

Input Signal



Output Signal

y_{pred} y_{meas}



Neural Networks

Many layers of neurons, millions of parameters

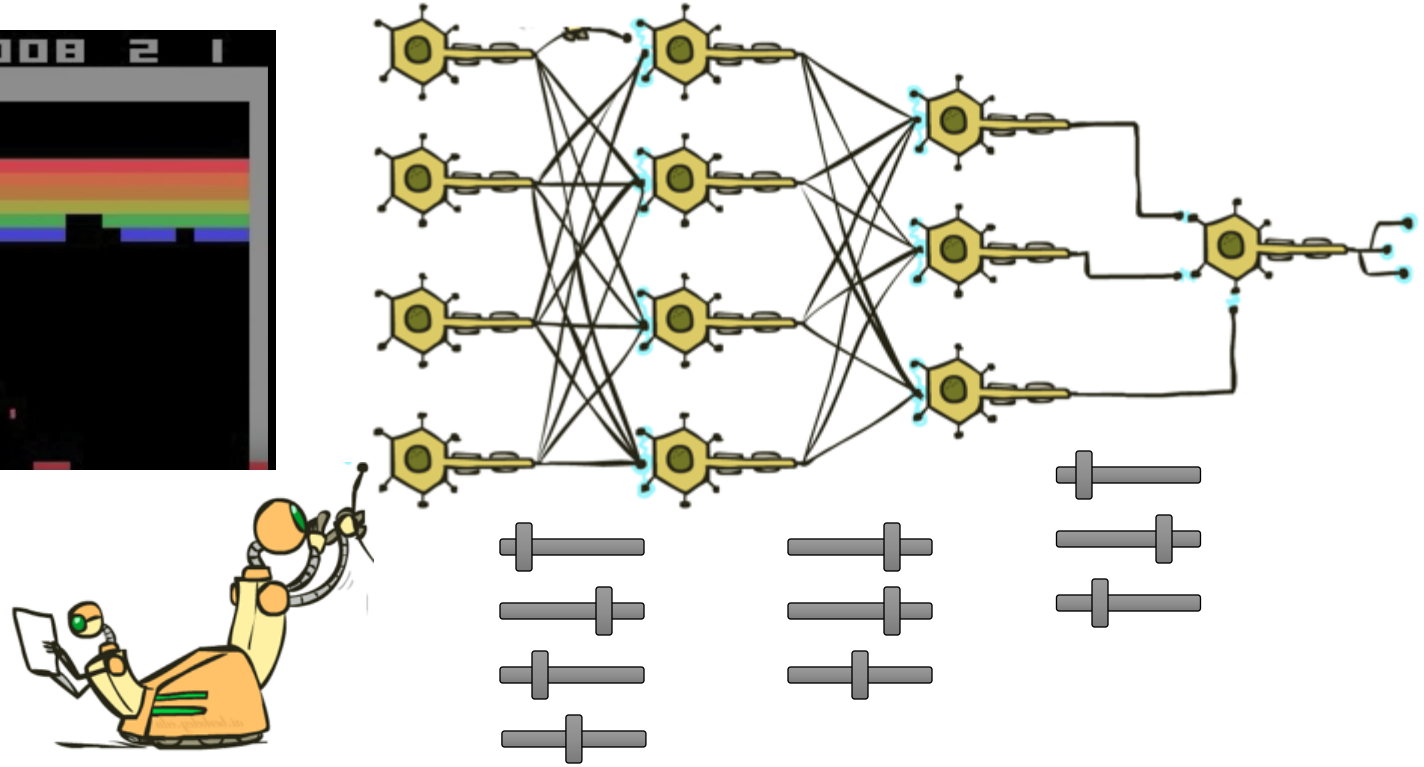
Output

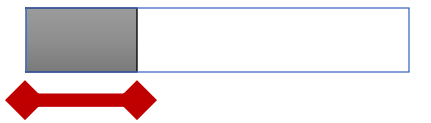
Signal

y_{pred}

Input

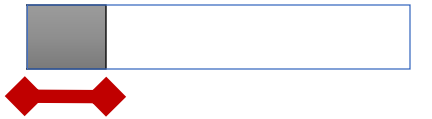
Signal



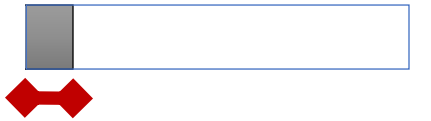


LEFT

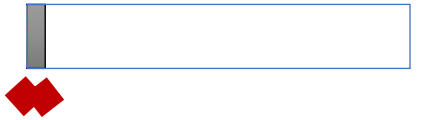
RIGHT



UP



DOWN



BUTTON

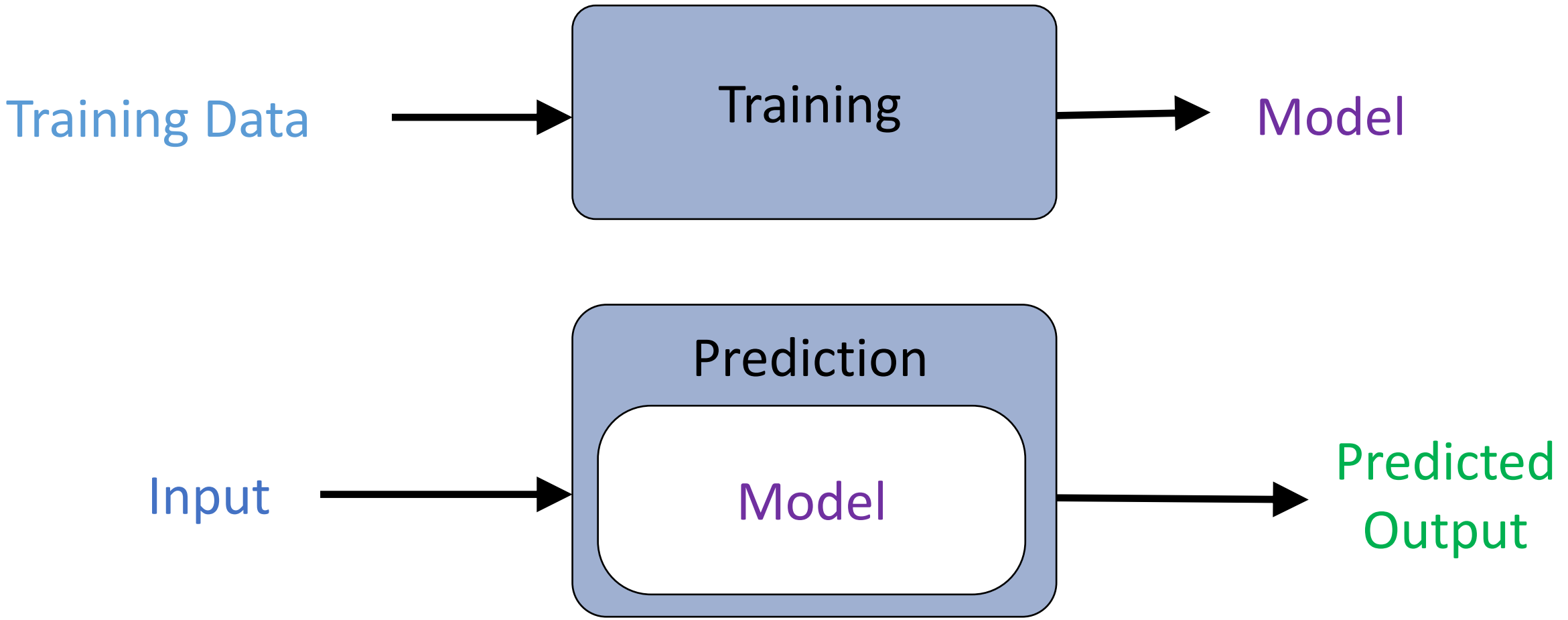
Teachable Machine

https://teachablemachine.withgoogle.com/

1. Task 1: Create a new image classification project with at least three classes
2. Task 2: Try training a project with very few images (one image per class maybe). Is this enough? Why or why not?
3. Task 3: Try training a project with training data that looks decent but is actually really biased.

Reminder: Machine Learning

Using (training) data to learn a model that we'll later use for prediction



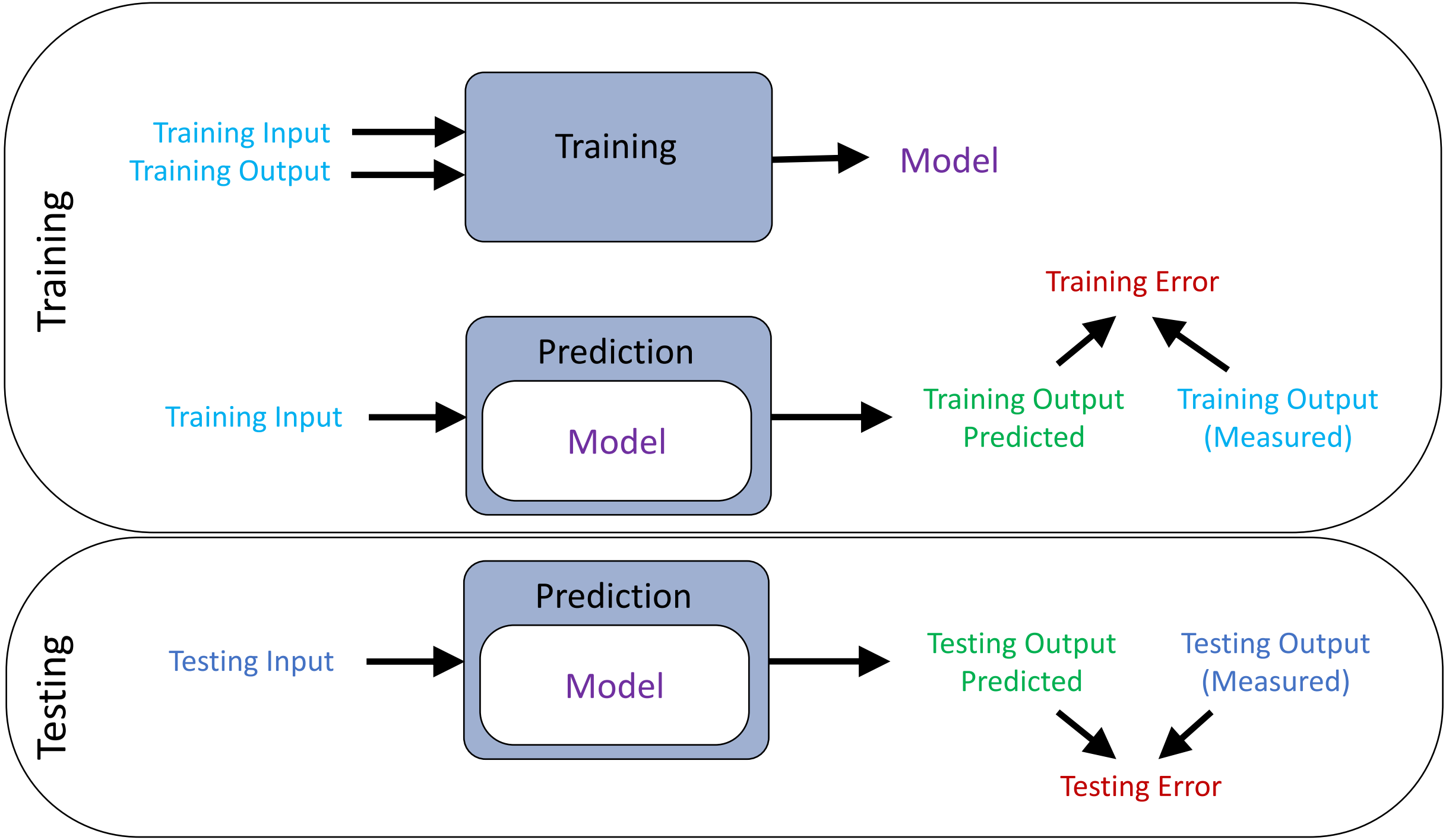

Training
Training Input
Training Output
Training
Model
Prediction
Model
Training Input
Training Error
Training Output
Predicted
Training Output
(Measured)
Testing
Testing Input
Prediction
Model
Testing Output
Predicted
Testing Output
(Measured)
Testing Error

Image Classification Data

Where is the data on the JetBot?