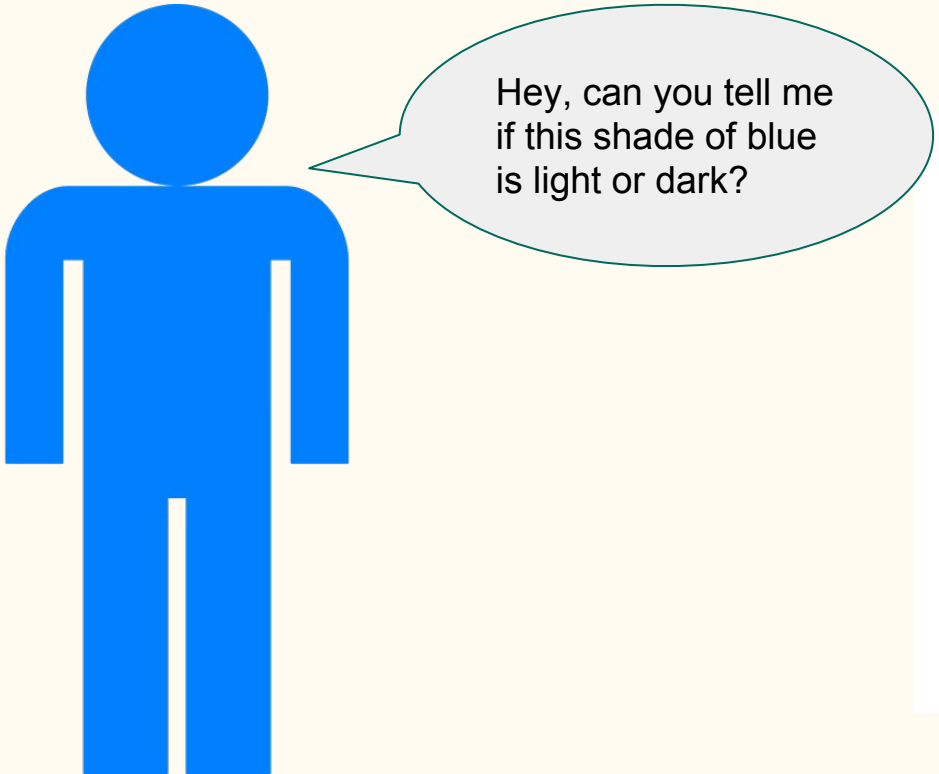
Machine Learning

(Using JavaScript)

What is Machine Learning?

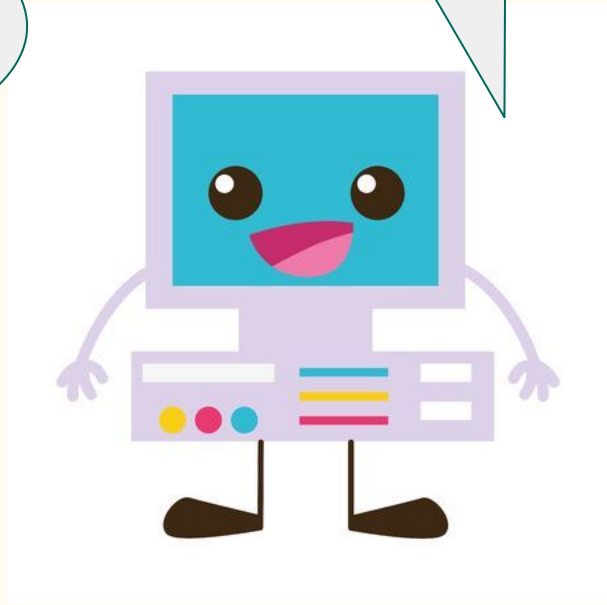
Using data to answer questions.

But first, a question.



Hey, can you tell me if this shade of blue is light or dark?

Probably…..if you teach me?



What is Machine Learning?

Using data to answer questions.

Machine Learning Paradigms

1. Supervised Learning
2. Unsupervised Learning
3. Reinforcement Learning

Supervised Learning

We give the computer historical data in which we know the answer to

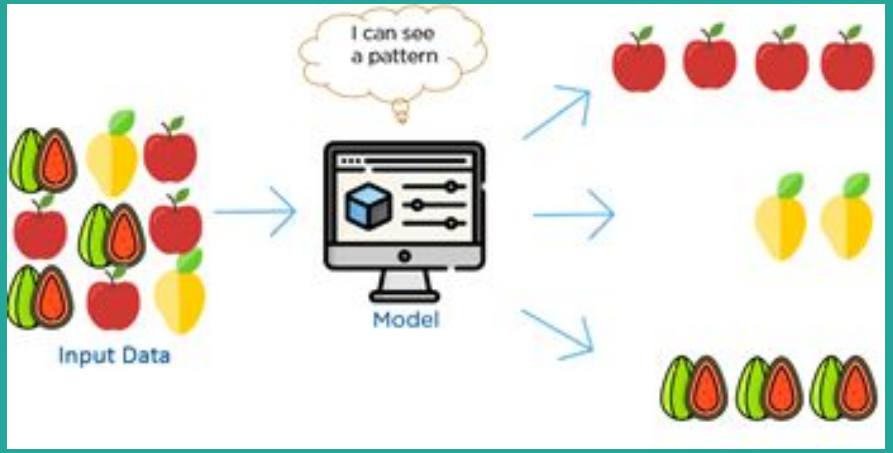
Example: Cancer diagnosis

Patient ID	# of Tumors	Avg Area	Avg Density	Diagnosis
1	5	20	118	Malignant
2	3	15	130	Benign
3	7	10	52	Benign
4	2	30	100	Malignant

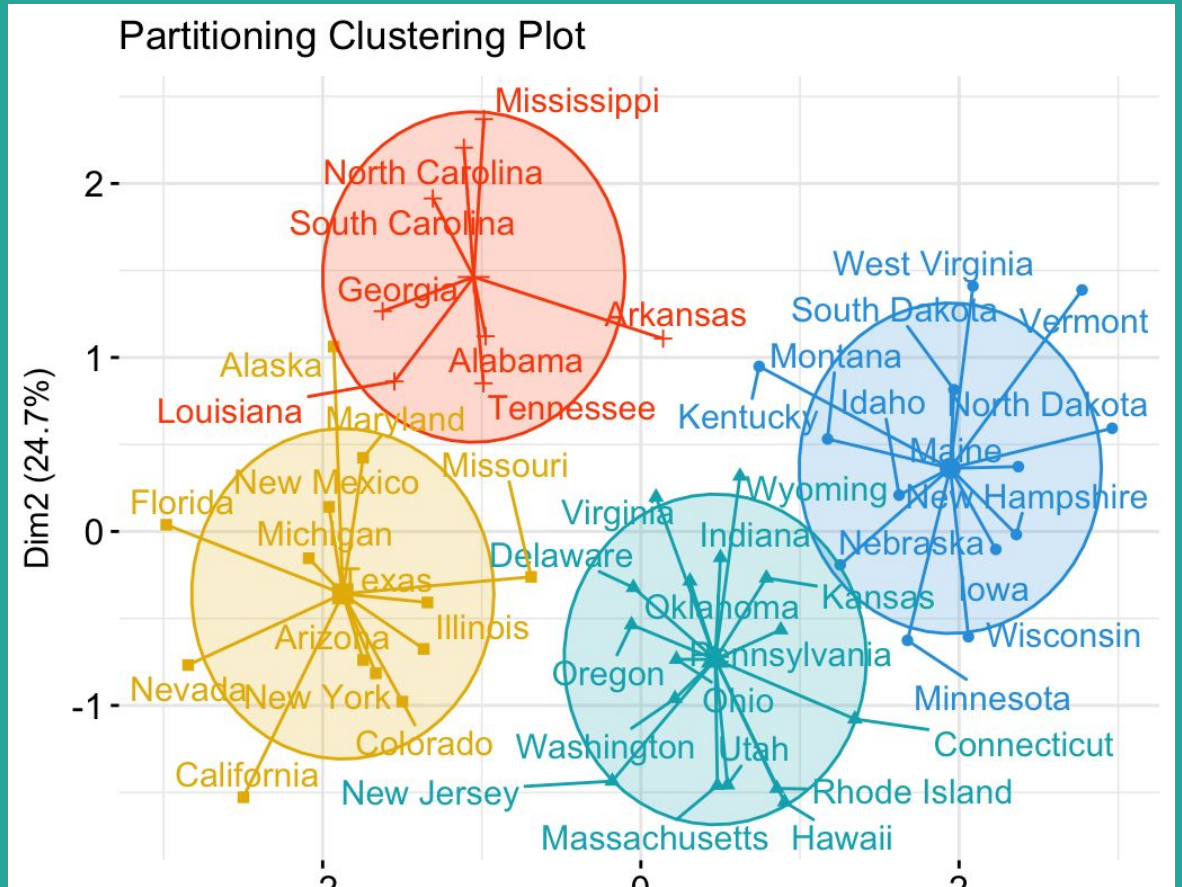
Training Set

Unsupervised Learning

No information is given, we see what the computer spits out on it’s own! Works well with clustering.

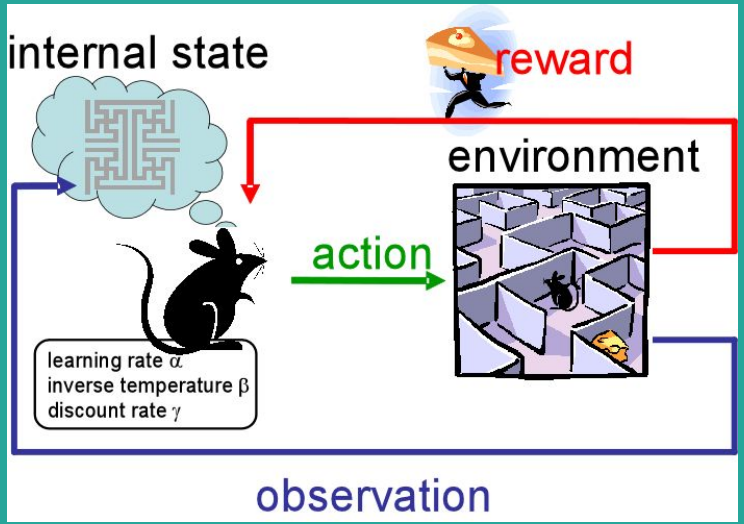


Unsupervised Learning

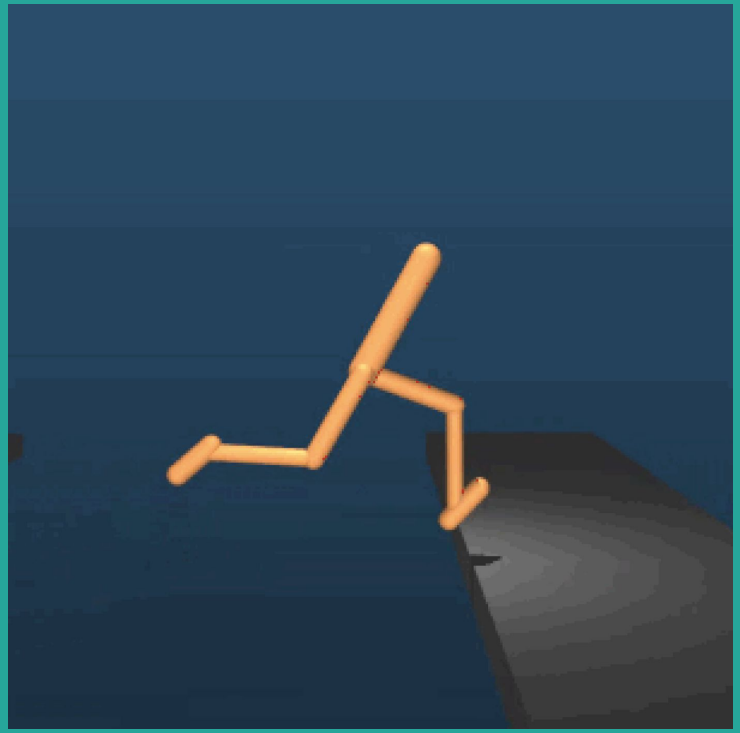


Reinforcement Learning

Based off classical conditioning in psychology.
We let a computer play out and give it rewards based on certain factors.



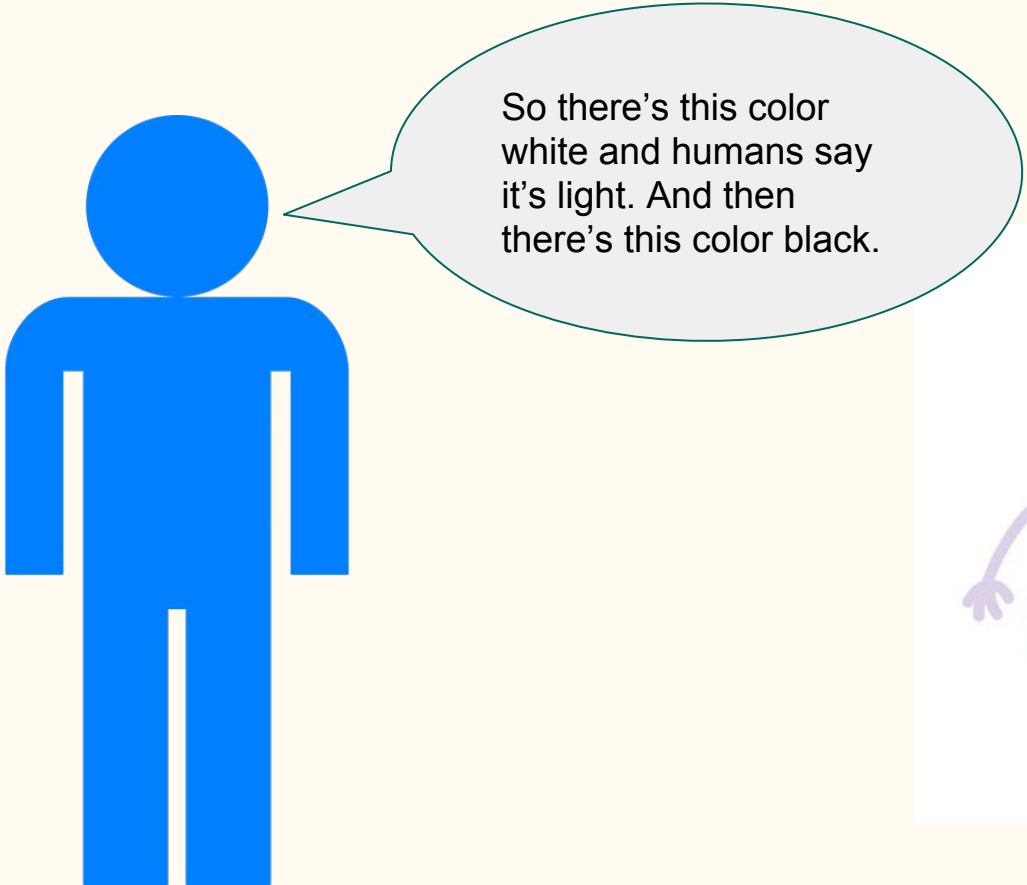
All DeepMind’s programmers have done is give the agent a set of virtual sensors (so it can tell whether it’s upright or not, for example) and then incentivize to move forward. The computer works the rest out for itself, using trial and error to come up with different ways of moving.

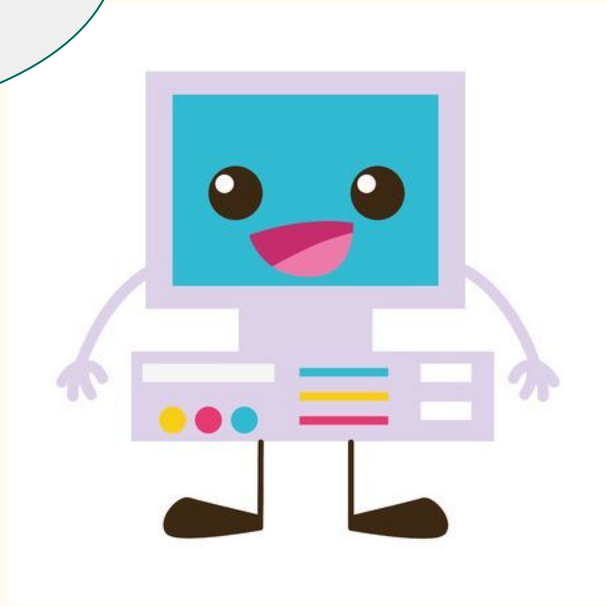


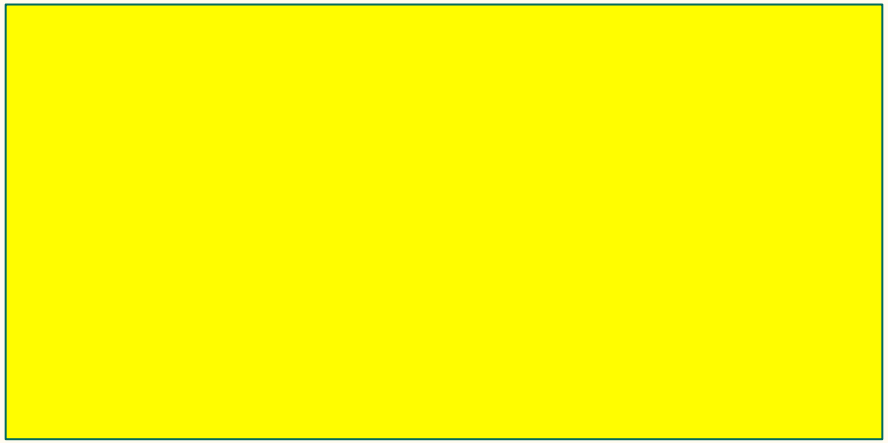
Reinforcement Learning

Reinforcement Learning in JavaScript

Back to our question.







rgb(255, 253, 0)

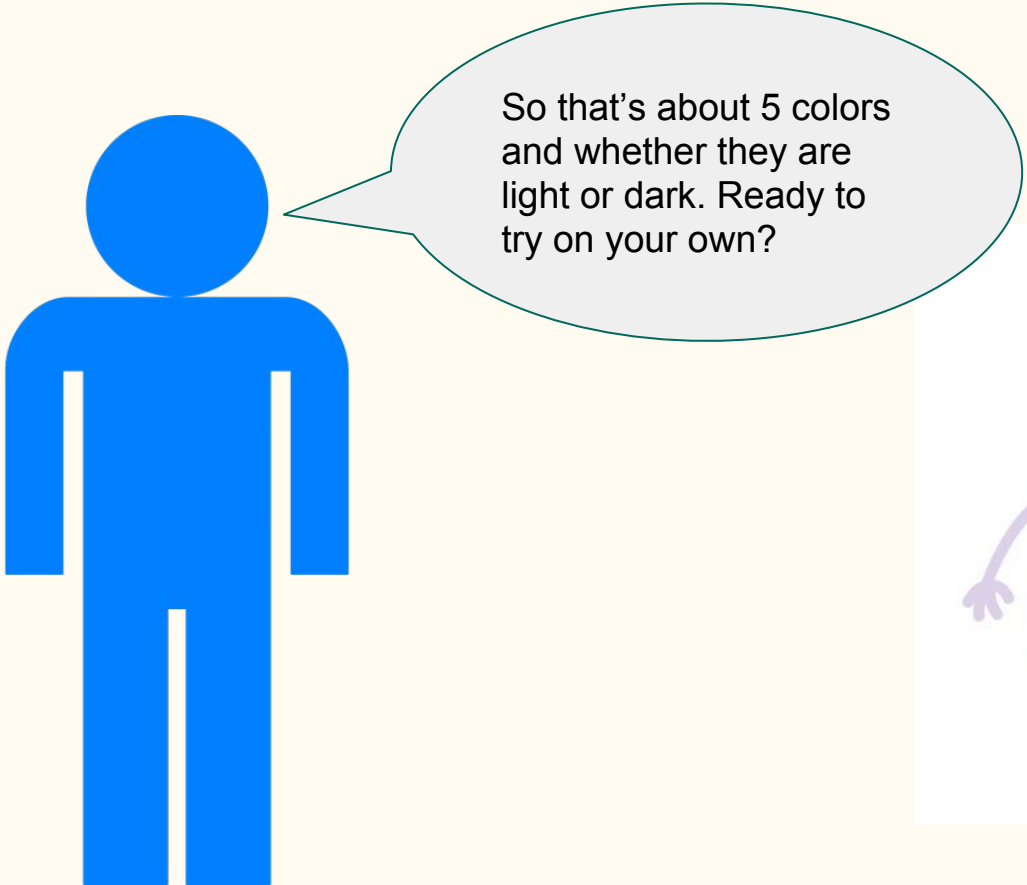
light

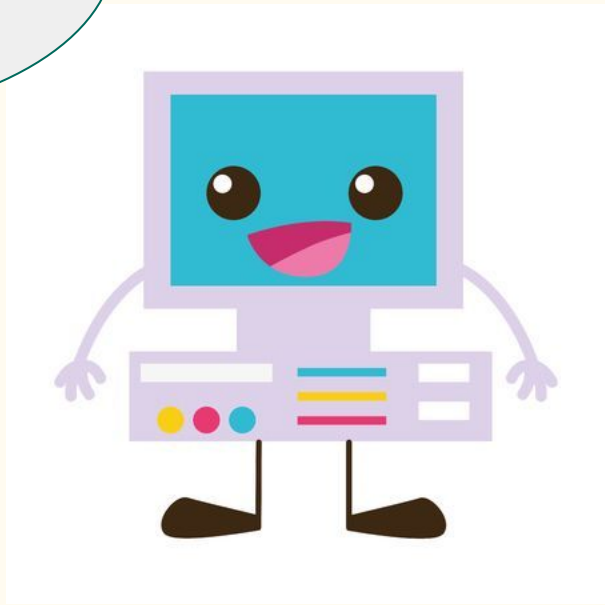
`rgb(152, 0, 0)`

dark

```
COLORS = [

 // black
 {input: {r: 0, g: 0, b: 0}, output:{dark: 1}},

  // lime green
  {input: {r: 0.8, g: 0.6, b: 0.8}, output:{light: 1}},

  // light pink
  {input: {r: .9, g: 0.8, b: 1}, output:{light: 1}},

  // grey
  {input: {r: 0.6, g: 0.6, b: 0.6}, output:{light: 1}},

  //white
  {input: {r: 1, g: 1, b: 1}, output:{light: 1}}
]
```

So now the computer has data.

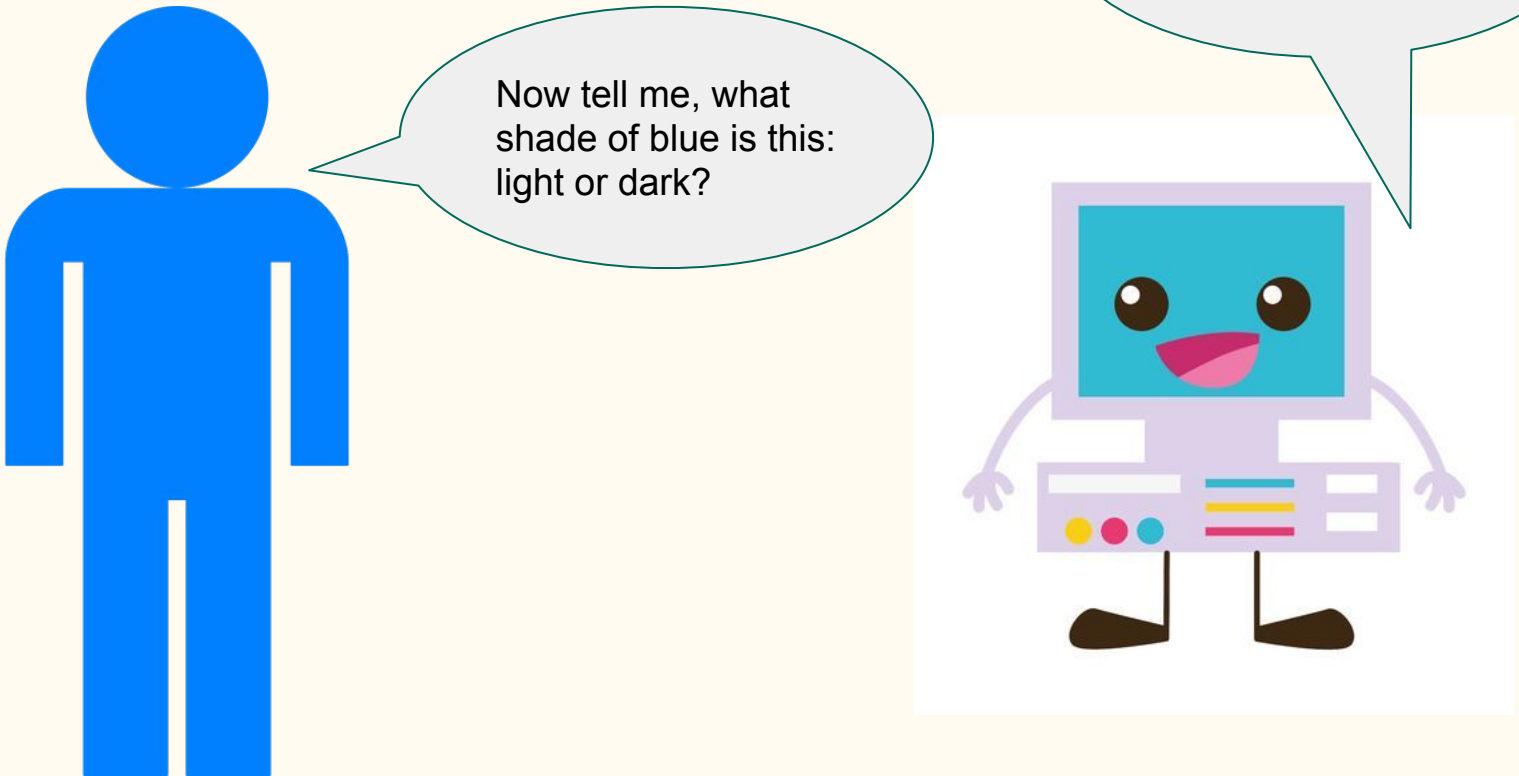




What is Machine Learning?

Using data to answer questions.

Here comes the math...

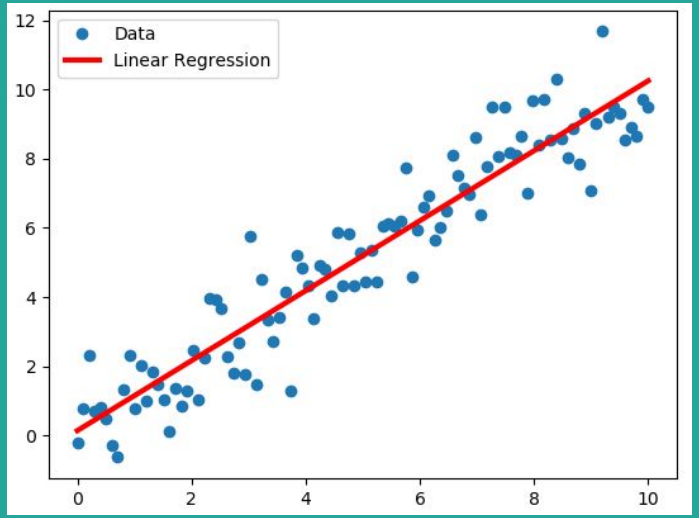


Machine Learning Techniques

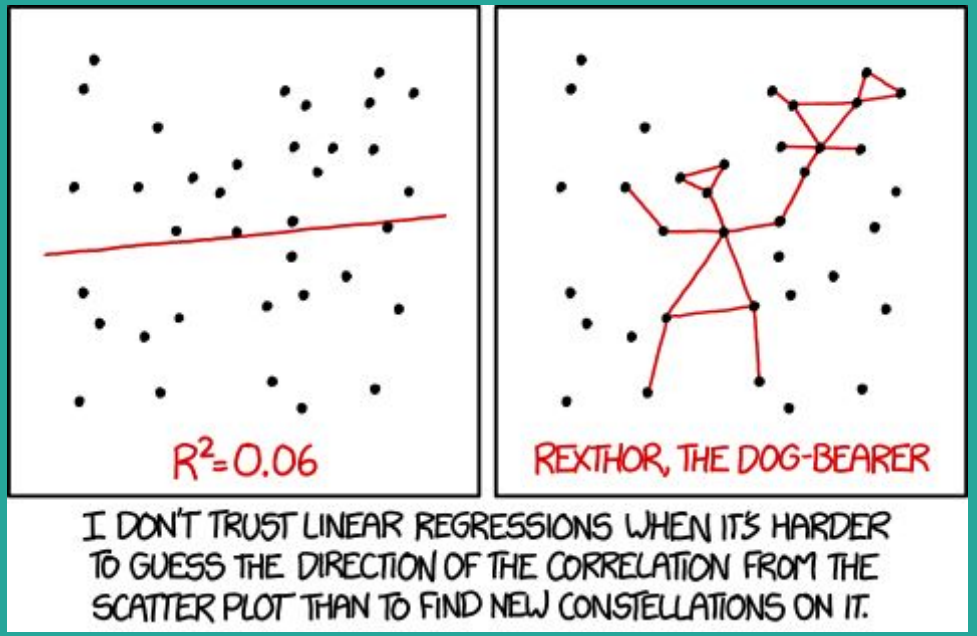
1. Linear regression
2. Neural Networking
3. Clustering

Linear Regression

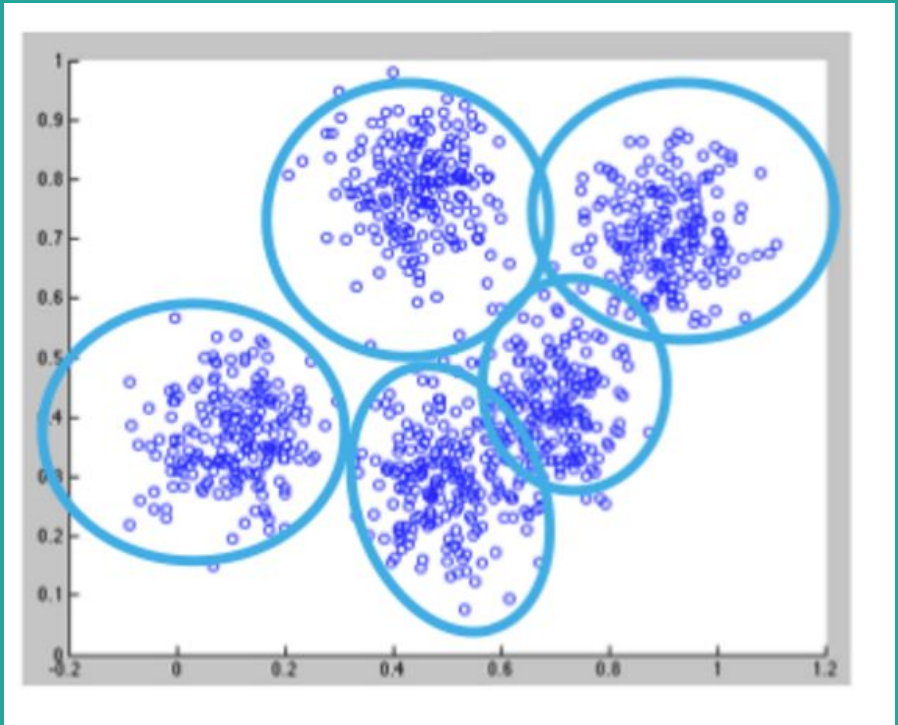
The finding a relationship between an independent and dependent variable.



Linear Regression

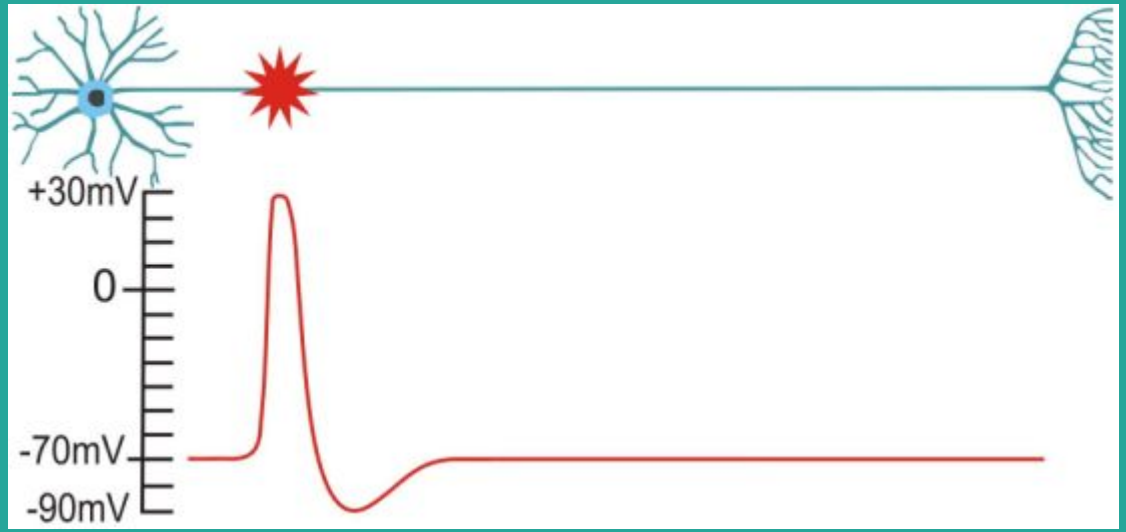


Clustering



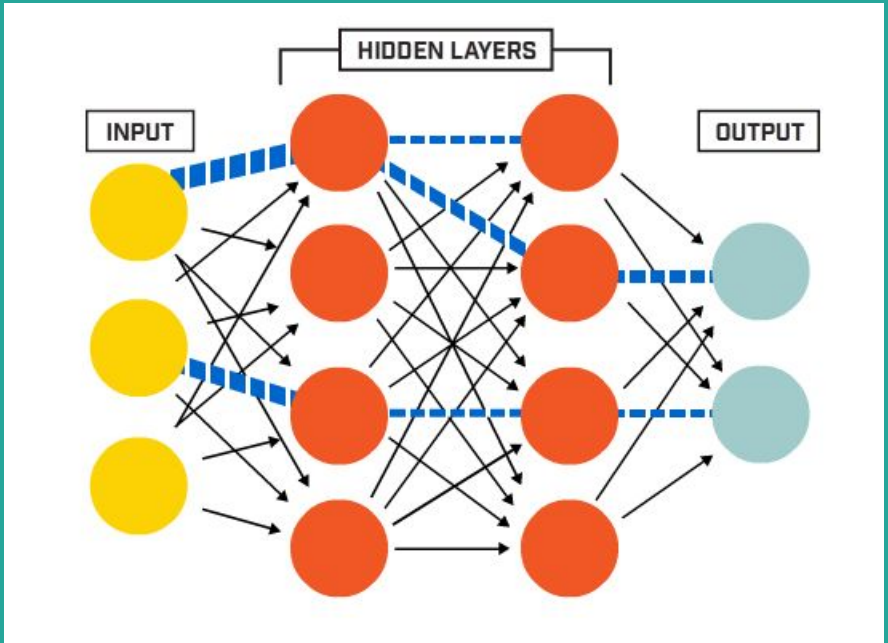
Neural Networking

Modeled off the human brain!



Neural Networking

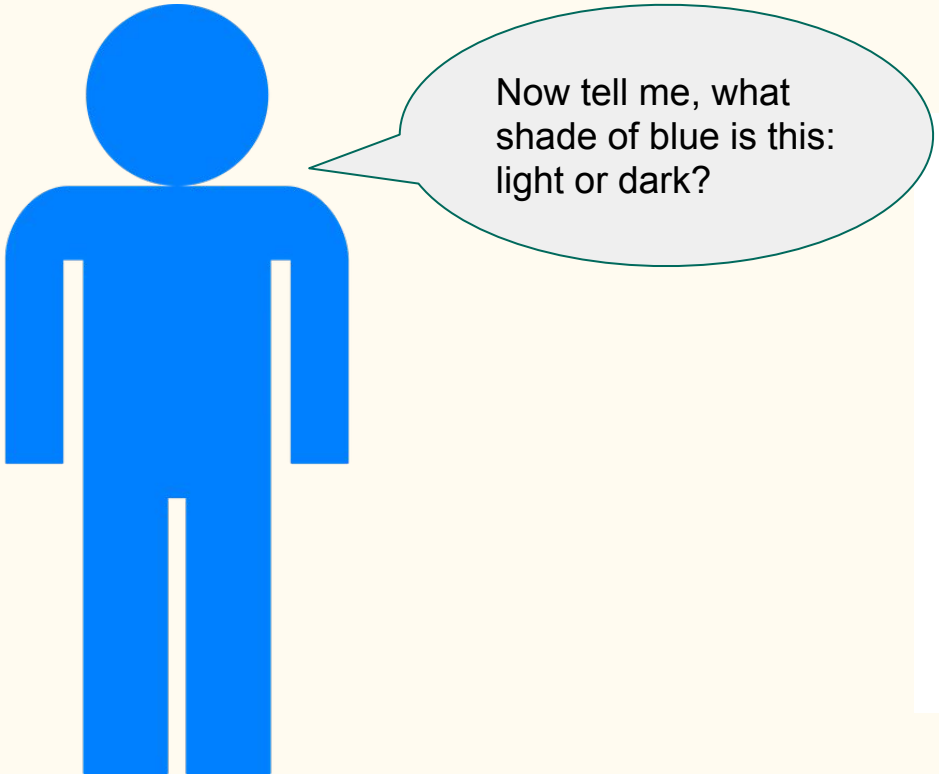
We try to model the idea of hitting a threshold to fire in computers.

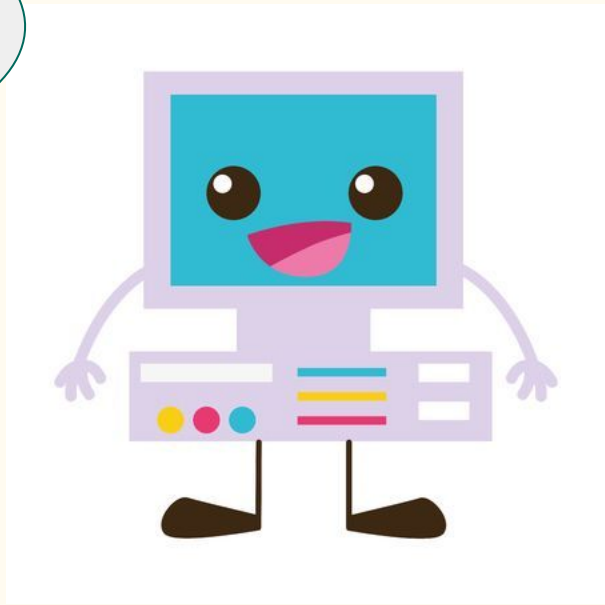


Brain.js for Neural Networking in JavaScript

```
const brain = require("brain.js")
const network = new brain.NeuralNetwork()
const calculate = require('./calculate_rgb.js')
const colors = require('./colors.js')

network.train(colors)

const result = network.run(OUR COLOR)
console.log(result)
```

Whatcha say?





Ask a Question	Give it Data	Math!	Ask it to predict
	Typically supervised learning.	Typically neural networking.	The computer will often spit out a percentage telling us how likely it is that the answer it has provided is true.