Neural Networks

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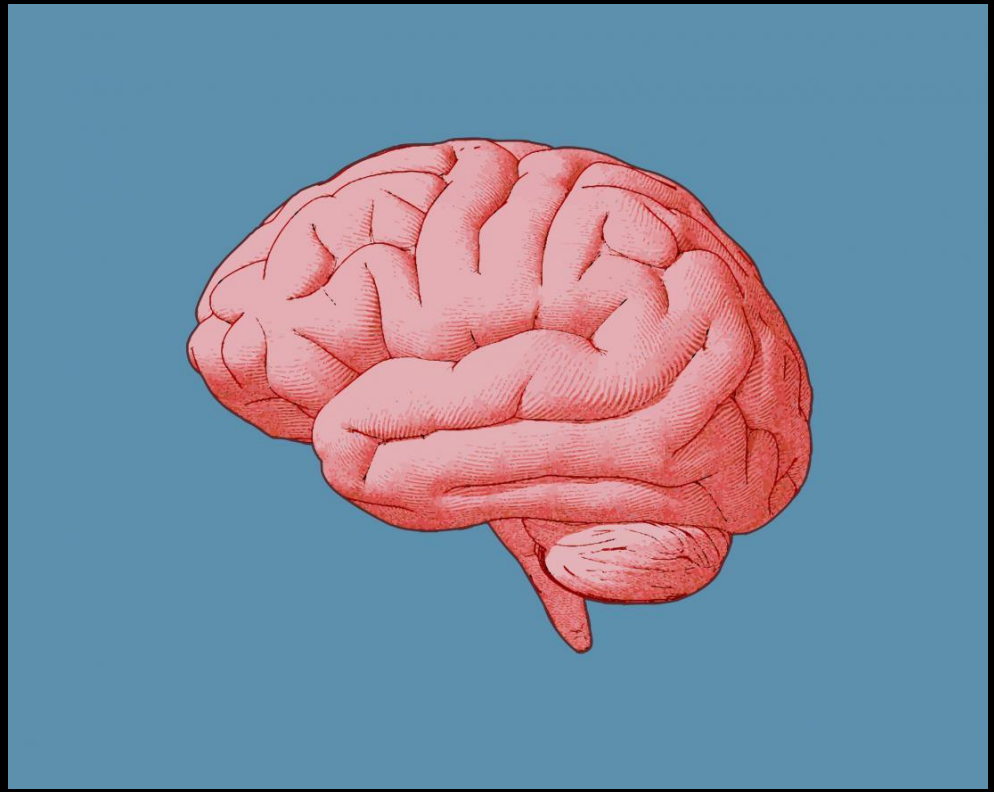
Did anyone do the homework?

Present - 1 MIN
Q&A - 1 MIN

Slide here for a Break

So neural networks?
(what are those)

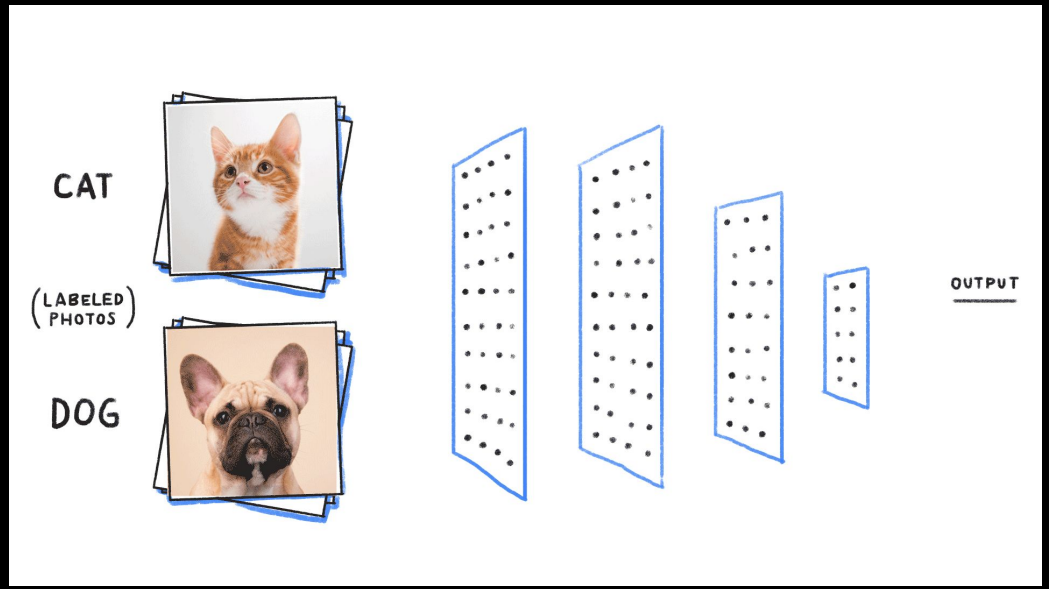


Computer scientists have been inspired by the human brain for a long time.

Neural Networks

This is what makes deep learning work like the brain, connecting different pieces of information together, like neurons connecting at junctions.

(definition is from AI CHEAT SHEET BY **COMUZI***)*



Neural networks read inputs, process it and generate outputs.

But computers/machines are stupid!

“*Easy-for-a-human, difficult-for-a-machine*” tasks

How do machines learn? (recap)

supervised learning

unsupervised learning

reinforcement learning

Supervised Learning

You label that data that you train the machine with.

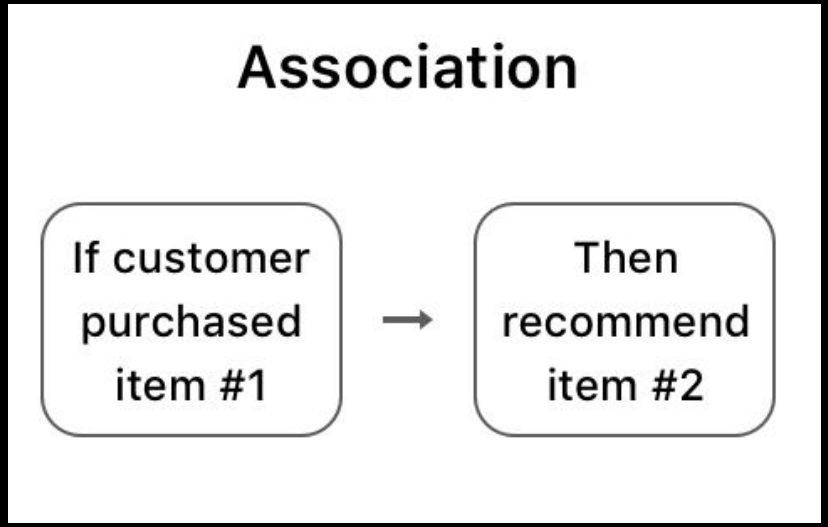
USER-CREATED HASHTAGS

#burger #fries #food #happy

The hastags are the *labeled data*

Unsupervised Learning

The machine aims to learn from data that is not labelled.



Reinforcement Learning

The machine learns by trial-and-error through reward or punishment.

What neural networks can do (examples)

object recognition

speech and sound detection

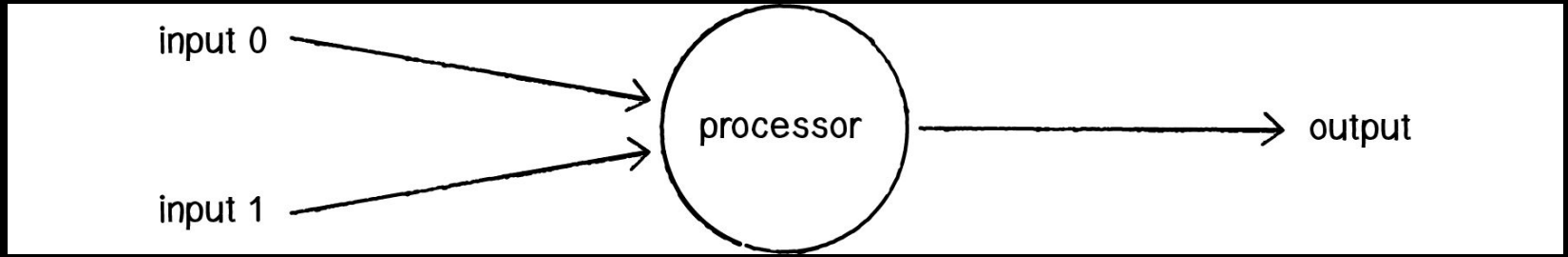
natural language processing

prediction

translation

This stuff is complex, complicated and difficult.

So let’s look at the simplest Neural network.



A perceptron consists of one or more inputs, a processor, and a single output.

The inputs are weighted(w1,w2) by real numbers expressing the importance of the respective inputs to the output.

Perceptron

A fundamental unit of the neural network which takes weighted inputs, process it and capable of performing binary classifications.

(definition is from Perceptron — Deep Learning Basics)

Suppose the weekend is coming up, and you've heard that there's going to be a cheese festival in your city.

You like cheese, and are trying to decide whether or not to go to the festival.

You might make your decision by weighing up three factors:

1. Is the weather good?

2. Does your partner want to accompany you?

3. Is the festival near a tube station?

x1=1 if the weather is good.
x1=0 if the weather is bad.

x2=1 if your boyfriend or girlfriend wants to go,
x2=0 if not.

x3=1 for next to tube station.
x3=0 for not next to tube station.

Now, suppose you absolutely adore cheese, so much so that you're happy to go to the festival even if your boyfriend or girlfriend is uninterested and the festival is hard to get to.

But perhaps you really loathe bad weather, and there's no way you'd go to the festival if the weather is bad.

You can use perceptrons to model this kind of decision-making.

w1 = 6
w2 = 2
w3 = 2

The larger value of **w1** indicates that the weather matters a lot to you, much more than whether your partner joins you, or the nearness of a tube station.

If you choose a threshold of 5 for the perceptron.

The perceptron implements the desired decision-making model, outputting **1** whenever the weather is good, and **0** whenever the weather is bad.

If you chose a threshold of **3**.

Then the perceptron would decide that you should go to the festival whenever the weather was good or when both the festival was near a tube station and your partner was willing to join you.

This stuff is complex, complicated and difficult.

Things you should explore further

Activation functions

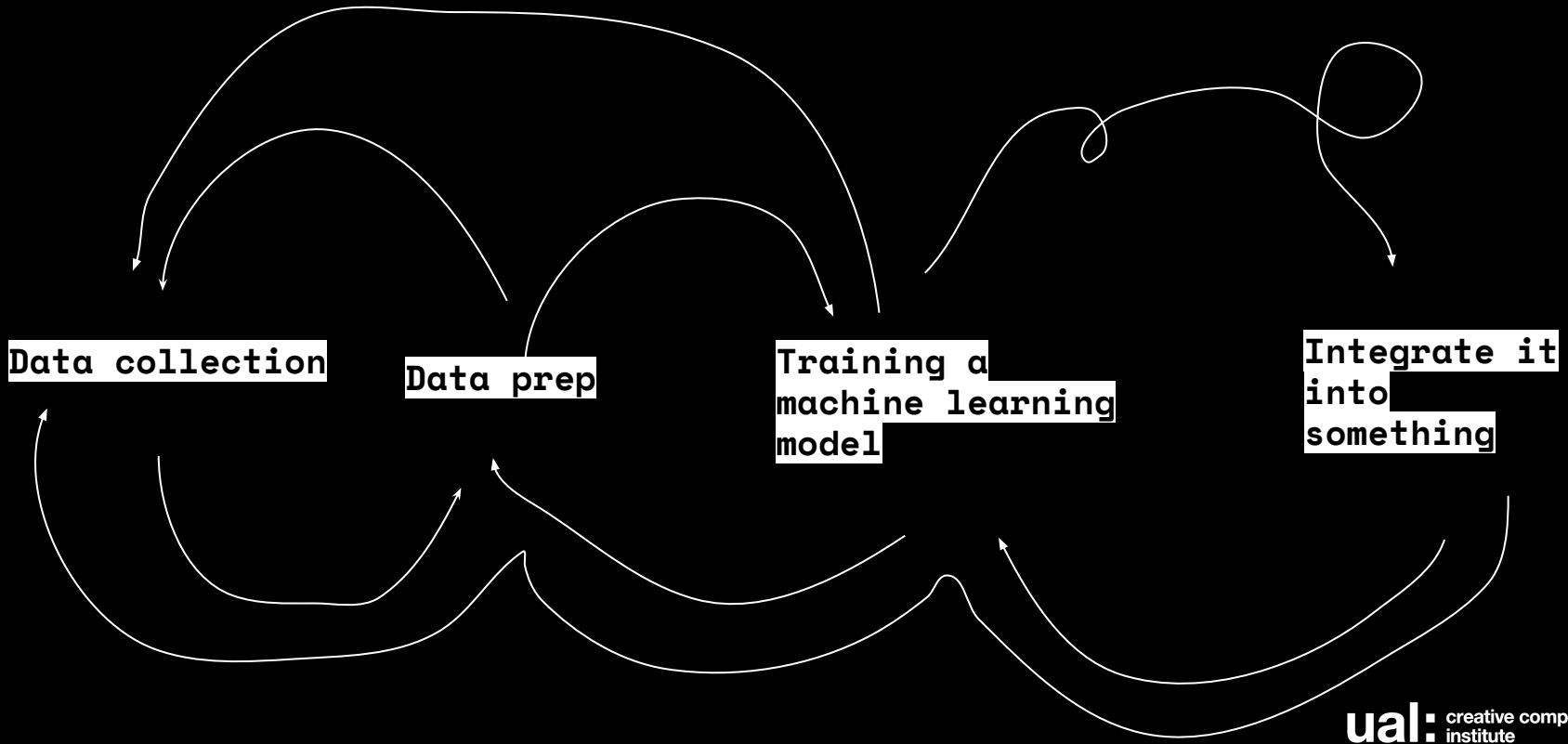
Multi-layered perceptions

Slide here for a Break

Exercise

Let's attempt to train a model.

How the machine learning process works



Our goal

To clean a raw dataset
To train a model on our cleaned dataset.

Some keywords

Training - give an algorithm training data

Learning rate - how quickly the neural network replaces the concepts it has learned up until now with new ones

Epochs - the number of times that the algorithm will work through the entire training dataset

Some keywords

Batch Size - the number of training examples utilized in one iteration.

Loss - a number indicating how bad the model's prediction was on a single example. 0 is perfect.

Inference - Apply model on unseen data to assess performance.

Go to **http://bit.ly/data_fefegha**

Follow the data tutorial guide.

Go to **http://bit.ly/titanic_p5_fefegha**

Look at code. Think about how it works.

Upload your file.

See how it works.

Go back to the original titanic dataset and add another column from the raw data to the cleaned version. Upload a new CSV and retrain the model - what changes?

Homework!

(If you want more things to do)

Watch the series on **Color Classifier** by the Coding Train on **Youtube**.

Train a model on a color classifier data set in p5 + ml5.js, **not tensorflow.js!**

I have left you an example of my code.

Class done.
You are free!