

Neural Networks

Alex Fefegha

Computational Futures & AI

a.fefeghaetta@arts.ac.uk

Did anyone do the homework?

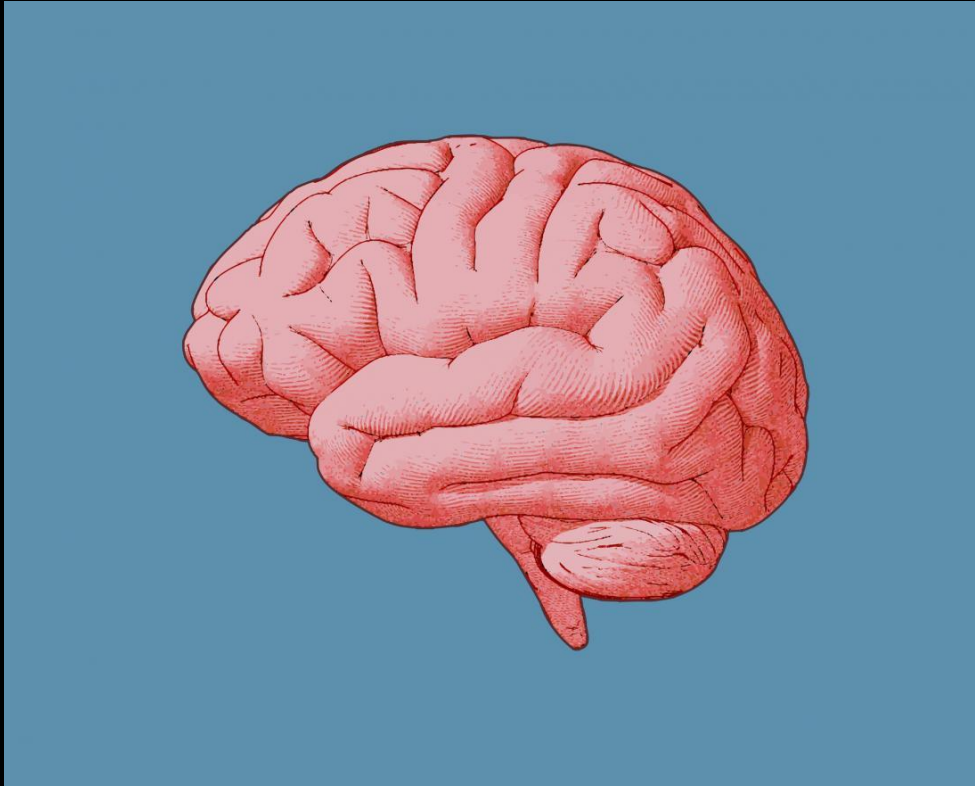


Present - 1 MIN

Q&A - 1 MIN

**Slide here
for a Break**

So neural networks?
(what are those)

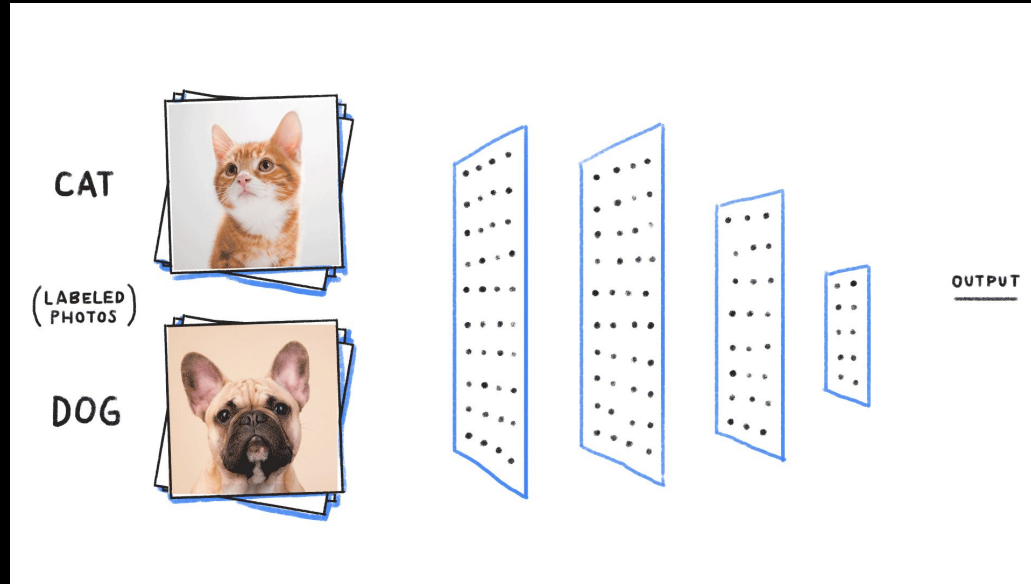


Computer scientists have been inspired by
the human brain for a long time.

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

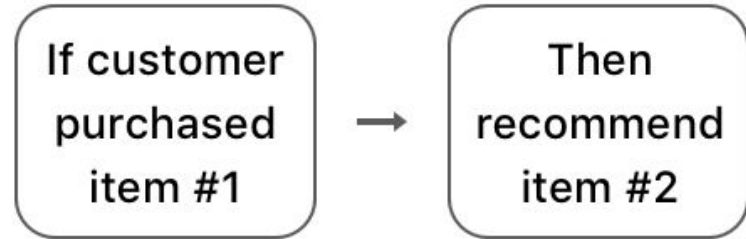
#burger #fries #food #happy

The hastags are the *labeled data*

Unsupervised Learning

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

Association



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

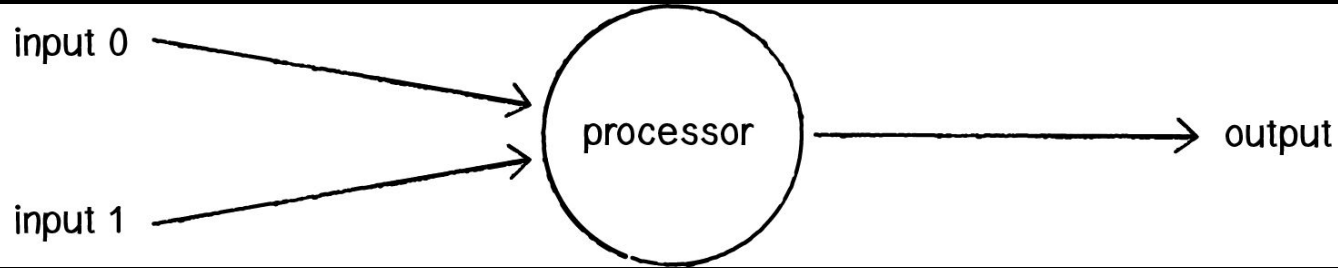
prediction

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(w_1, w_2) 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

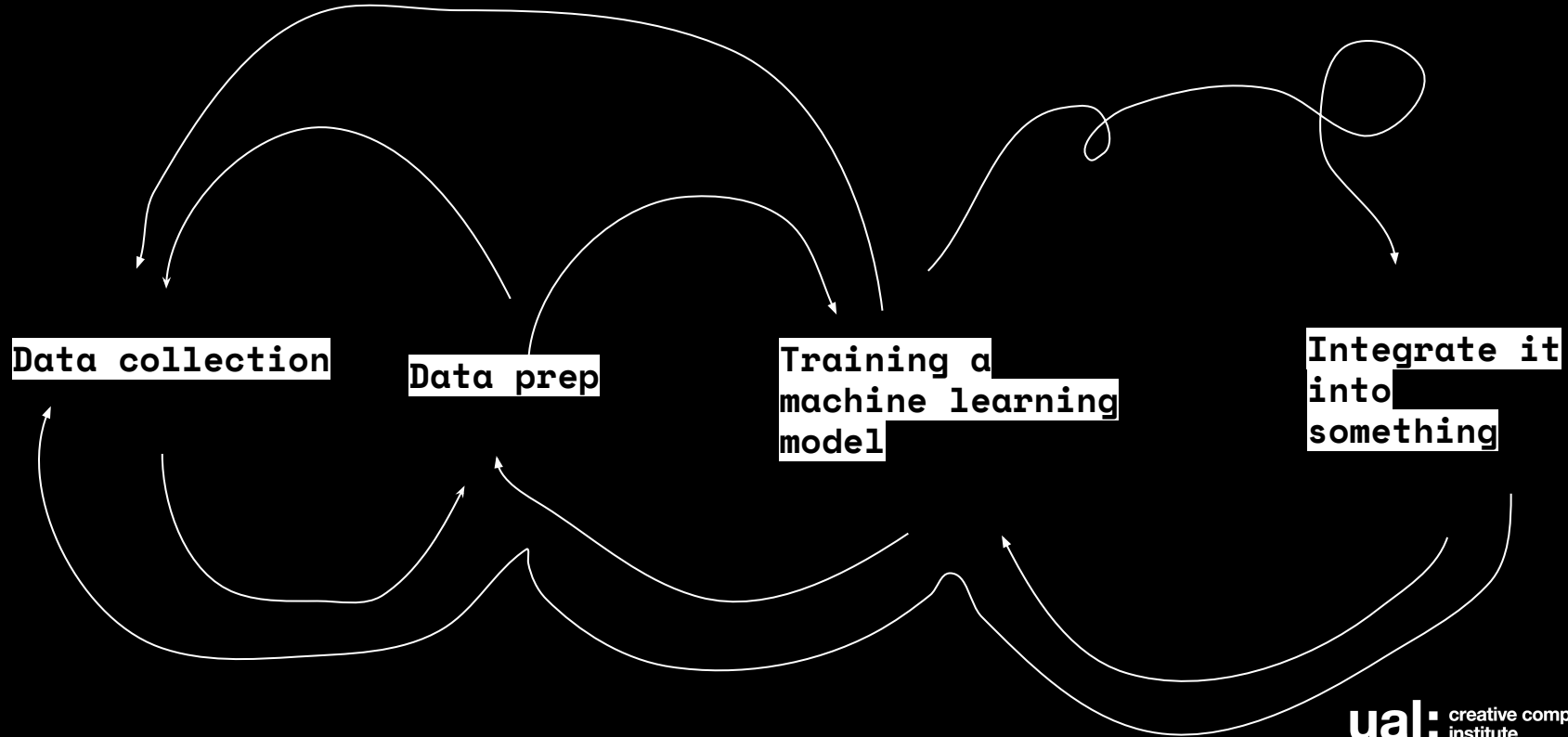
Multi-layered perceptions

**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)*

Play with the code that I left if you haven't finished the data wrangling tutorial.

Try it out and let me know how you feel with it.

Peace.

or

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!**