



# Day 1

## What deep learning is good for?

- Problems with long lists of rules
  - When the traditional approach fails, ML / DL may help
- Continually changing environments
  - DL can be helpful
- Discovering insights within large collections of data
  - can you imagine trying to hand-craft rules? Might not

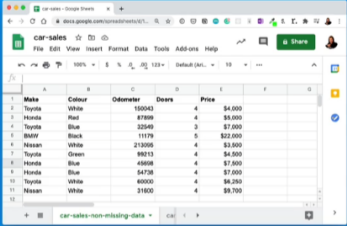
## What deep learning is not typically good for?

- When you need to explain
  - the patterns learned by a deep learning model are typically uninterpretable by human
- When the traditional approach is a better option
  - if you can accomplish what you need with a simple rule-based system
- When errors are unacceptable
  - since the outputs of deep learning model aren't always predictable
- When you don't have much data
  - deep learning models usually require a fairly large amount of data
  - But we'll learn how to handle small data-set

## ML vs DL

# Machine Learning vs. Deep Learning


**Machine Learning**



	Make	Colour	Odometer	Doors	Price
1	Toyota	White	100043	4	\$4,000
2	Honda	Black	87888	4	\$6,000
3	Toyota	Blue	35549	3	\$7,000
4	BMW	Black	11179	5	\$12,000
5	Nissan	White	210096	4	\$3,800
6	Toyota	Green	98073	4	\$4,500
7	Toyota	Blue	48068	4	\$7,500
8	Honda	Blue	34738	4	\$7,000
9	Toyota	White	40000	4	\$8,250
10	Nissan	White	31000	4	\$9,700

**Structured data**

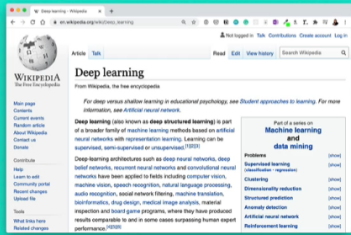
**Deep Learning**



What you want to hear:  
1. Learn Python  
2. Learn Math/Stats/Probability  
3. Learn software engineering  
4. Build

What you need to do:  
1. Google it  
2. Go down the rabbit hole  
3. Resurface in 6-9 months and reassess

See you on the other side.



**Unstructured data**

- Machine Learning needs Structured data such as row-data as excel
- Deep Learning might not need structured data

# Machine Learning vs. Deep Learning

(common algorithms)

- Random forest
- Naive bayes
- Nearest neighbour
- Support vector machine
- ...many more

*(since the advent of deep learning these are often referred to as "shallow algorithms")*

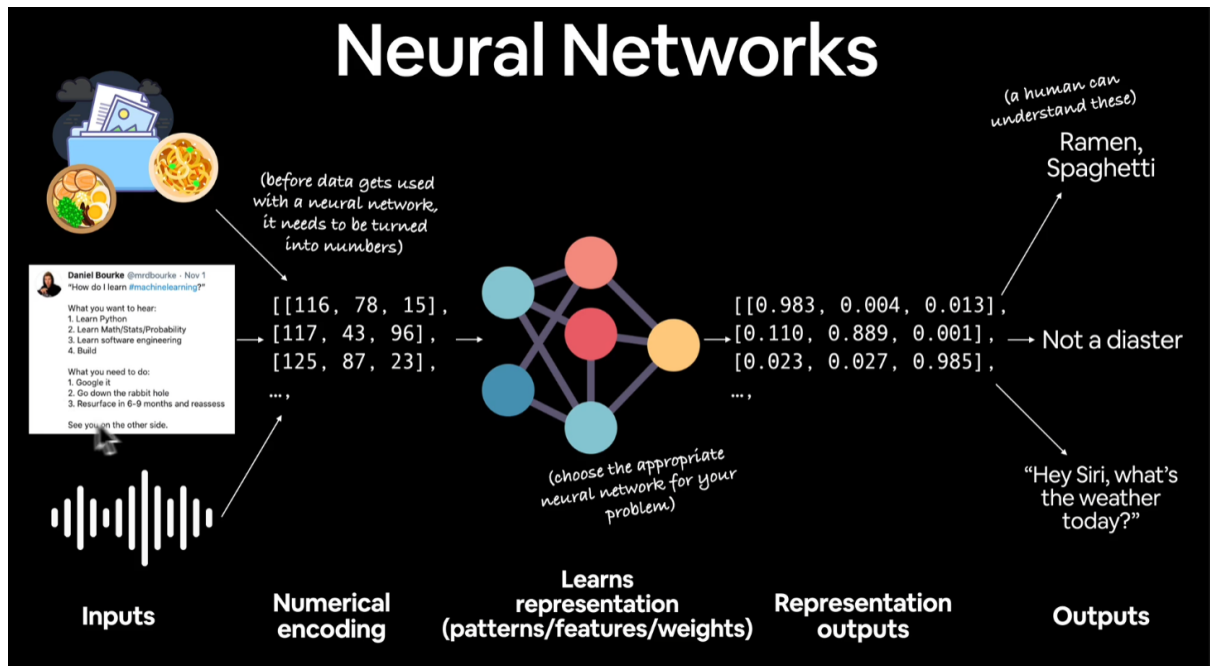
- Neural networks
- Fully connected neural network
- Convolutional neural network
- Recurrent neural network
- Transformer
- ...many more

Structured data

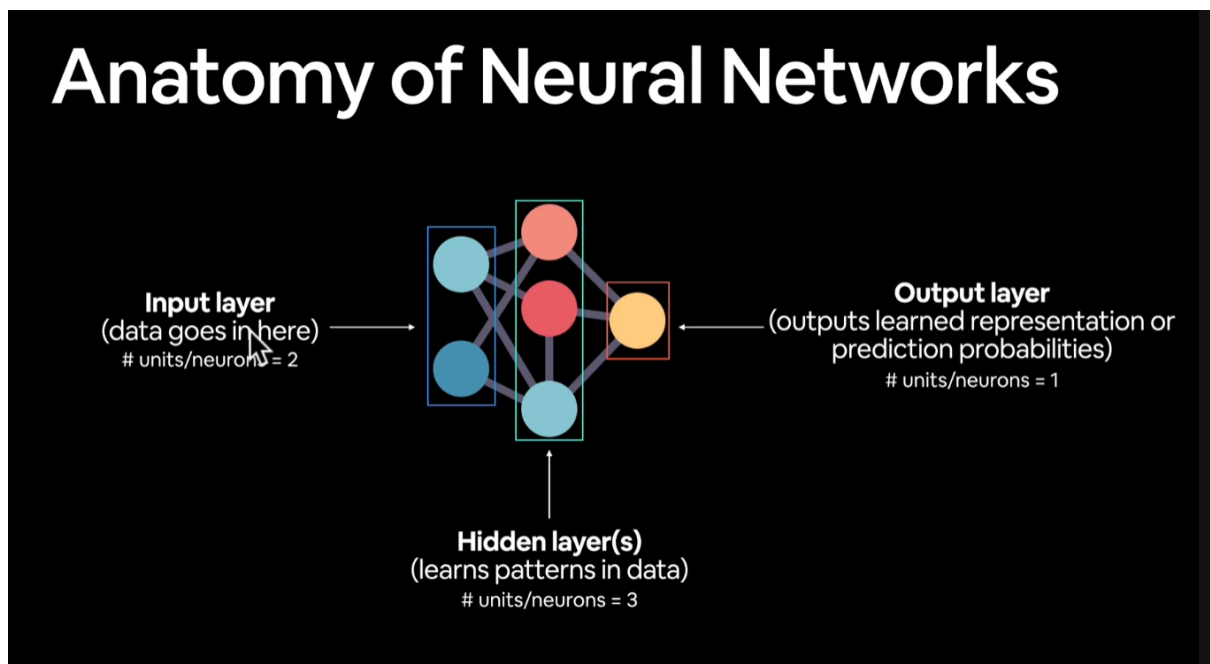
Unstructured data

**What are neural networks?**

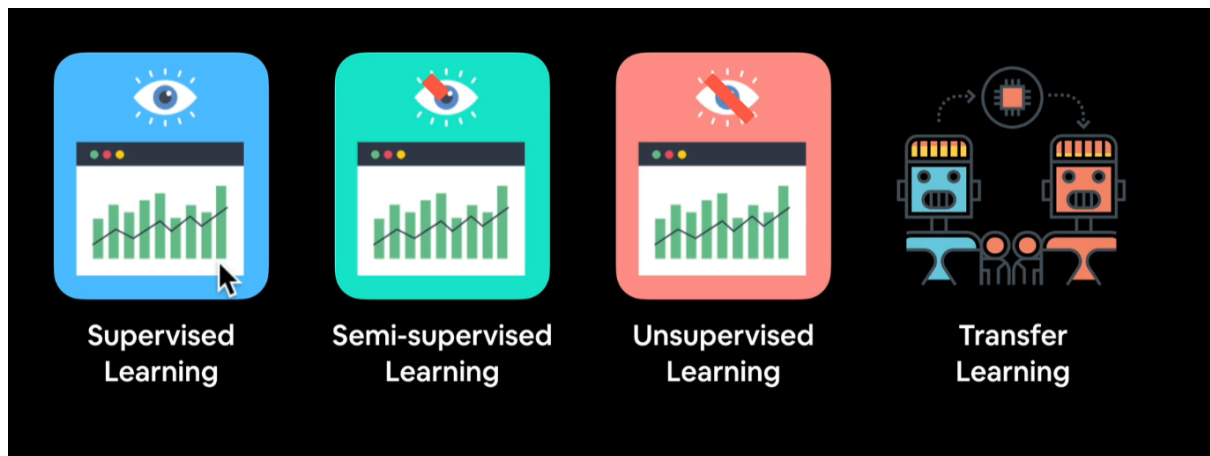
# Neural Networks



# Anatomy of Neural Networks



## Types of Learning



Supervised Learning : Data with all the labels

Semi-supervised : Data with some labeling

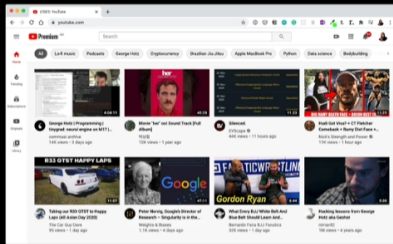
Unsupervised Learning : Data with no Label

Transfer Learning : Take one deep learning model and use it to another deep learning model

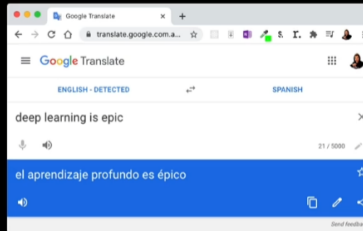
## **“Some” Deep Learning Uses**

(some)

# Deep Learning Use Cases



Recommendation



Translation



"Hey Siri, who's the biggest big dog of them all?"

Speech recognition



Computer Vision

To: [daniel@mrdbourne.com](mailto:daniel@mrdbourne.com)  
Hey Daniel,

This deep learning course is incredible!  
I can't wait to use what I've learned!

Not spam

To: [daniel@mrdbourne.com](mailto:daniel@mrdbourne.com)  
Hay daniel...

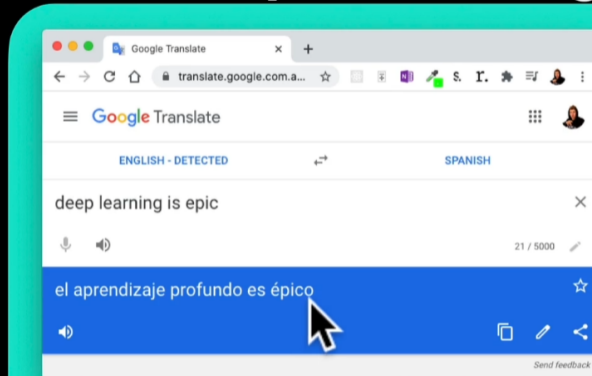
C0ongratu1ations! U win \$1139239230

Spam

Natural Language Processing (NLP)

(some)

# Deep Learning Use Cases



Translation



"Hey Siri, who's the biggest big dog of them all?"

Speech recognition

Sequence to sequence  
(seq2seq)

## What is TensorFlow?

# What is TensorFlow?

- End-to-end platform for machine learning
- Write fast deep learning code in Python/other accessible languages (able to run on a GPU/TPU)
- Able to access many pre-built deep learning models (TensorFlow Hub)
- Whole stack: preprocess data, model data, deploy model in your application
- Originally designed and used in-house by Google (now open-source)

## Why TensorFlow?

# Why TensorFlow?



### Easy model building

Build and train ML models easily using intuitive high-level APIs like Keras with eager execution, which makes for immediate model iteration and easy debugging.



### Robust ML production anywhere

Easily train and deploy models in the cloud, on-prem, in the browser, or on-device no matter what language you use.



### Powerful experimentation for research

A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

Source: [TensorFlow.org](https://www.tensorflow.org)

# What is Tensor?

In some numerical way to represent the information

