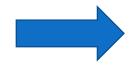# Human Brain VS Computer

Motivation

Human mind   - Good at image recognition, pattern recognition etc
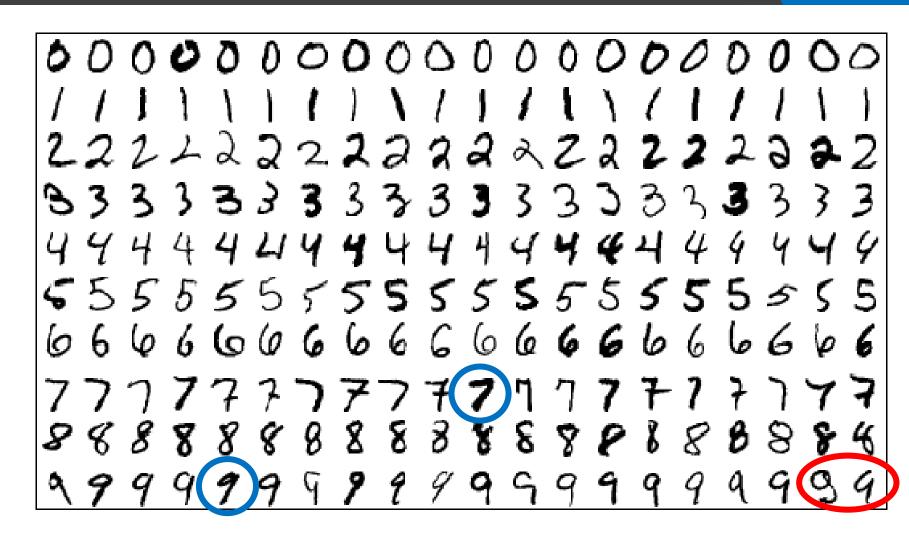Computer   - Good at arithmetic calculations

$$2574304 \times e^{354} \div \tan 5.1\pi$$

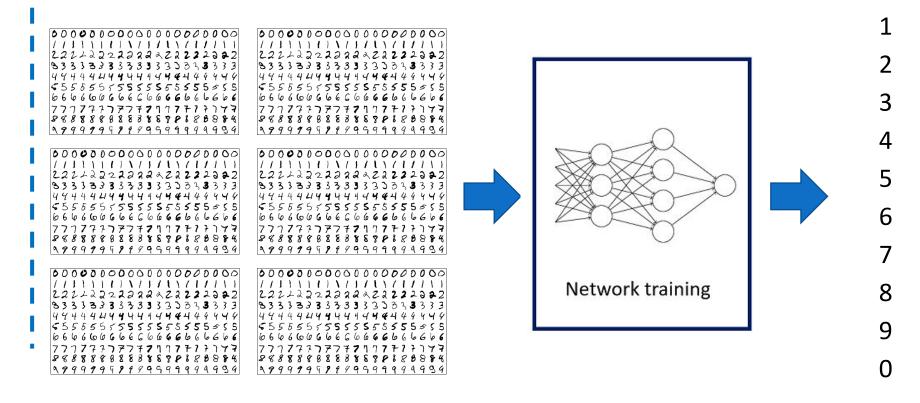# Handwriting recognition

Making precise rules is difficult

Neural Networks

Neural Networks creates own complex pattern recognition rules
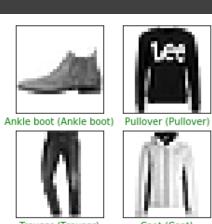

Pattern recognition

Training data

Network training

Future Prediction

1
2
3
4
5
6
7
8
9
0

Dataset

Fashion MNIST

We will classify images into 10 fashion items
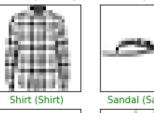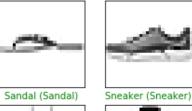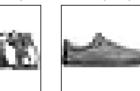
Course Flow

Course Flow

Single cell - Perceptron

Multi level perceptron

Forward and Backward propagation

Stochastic Gradient descent

Implementation in Python

Perceptron
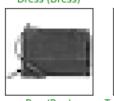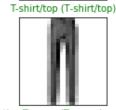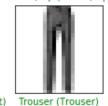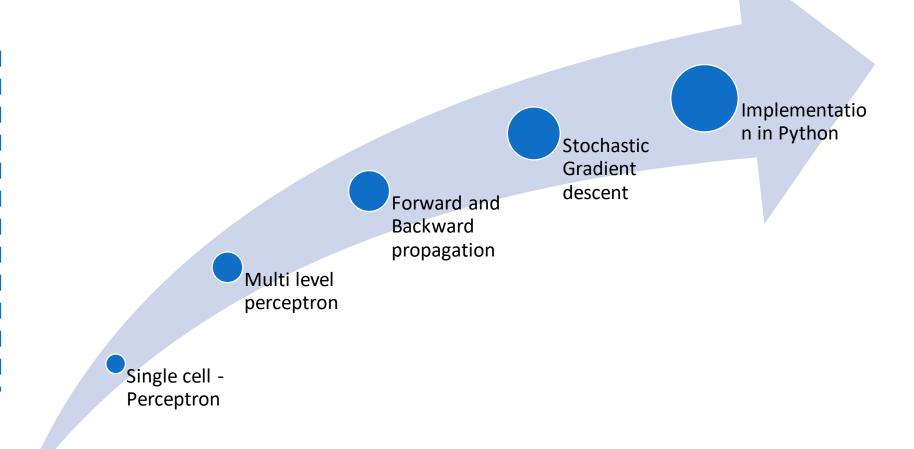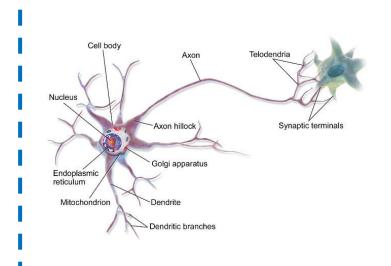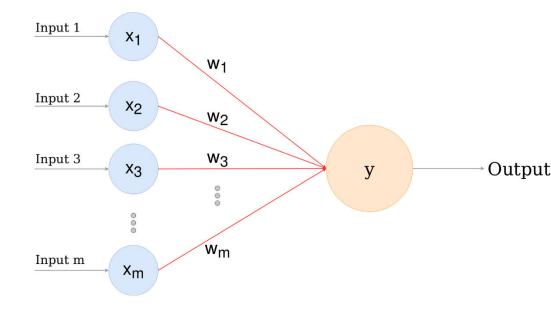
Artificial Neuron

Biological Neuron
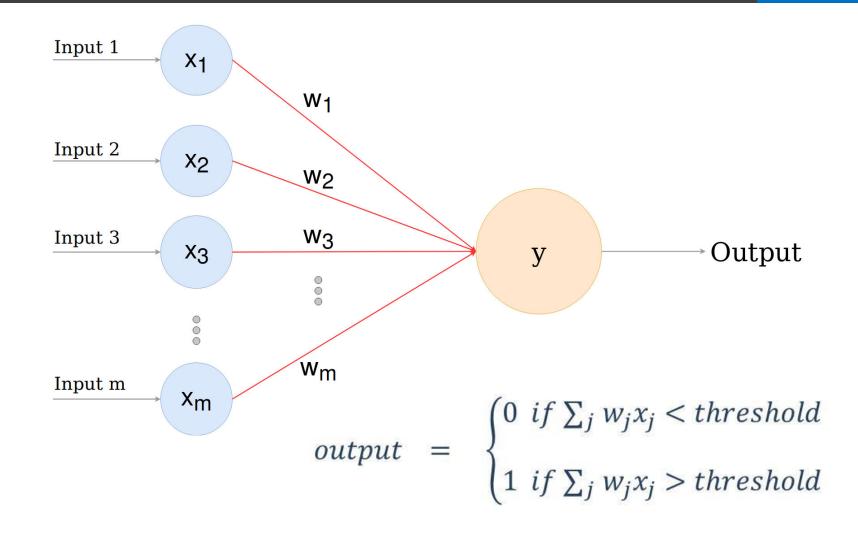
Artificial Neuron

Perceptron

Artificial Neuron
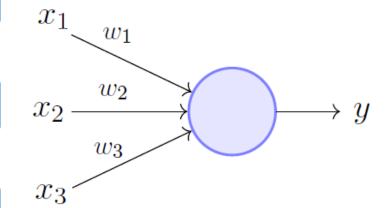
Input 1 → x_1

Input 2 → x_2

Input 3 → x_3

Input m → x_m

w_1

w_2

w_3

w_m

y → Output

$$output \quad = \quad \begin{cases} 0 \ if \ \sum_j w_j x_j < threshold \\ 1 \ if \ \sum_j w_j x_j > threshold \end{cases}$$

Example

Purchasing a Shirt

Color
- Blue or Not

Sleeves
- Full or half

Fabric
- Cotton or not

x_1 **7**

x_2 **4**

x_3 **2**

Threshold Value

8

y

You will buy the shirt or not

Example

Purchasing a Shirt

Color
- Blue or Not

Sleeves
- Full or half

Fabric
- Cotton or not

x_1 7

x_2 4

2

x_3

Threshold Value 8 y
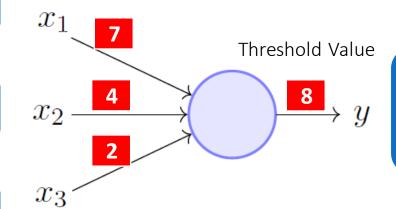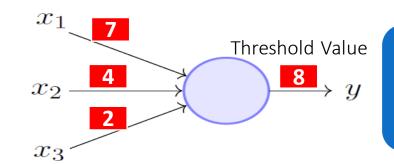
You will buy the shirt or not

Color	Sleeves	Fabric	Calculated Sum	Threshold	Buy / Not Buy
Blue	Half	Non Cotton	7*1 + 4*0 + 2*0 = 7	8	Not buy
Blue	Full	Non Cotton	11	8	Buy
Not Blue	Full	Cotton	6	8	Not Buy

Example

Purchasing a Shirt

Color
- Blue or Not

Sleeves
- Full or half

Fabric
- Cotton or not

x_1 **8**

x_2 **6**

x_3 **3**

Threshold Value **16**

y

You will buy the shirt or not