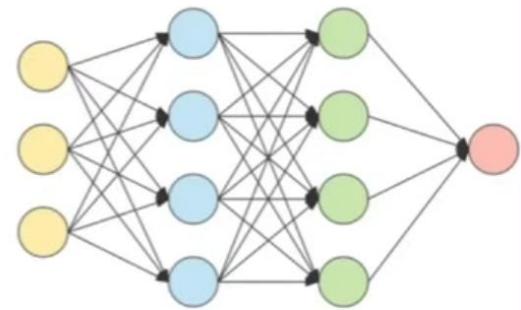
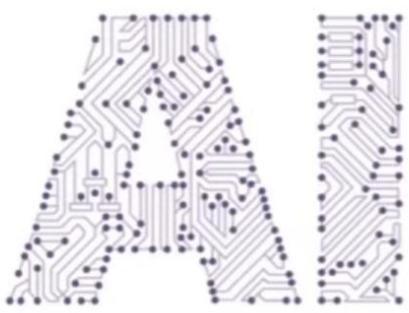


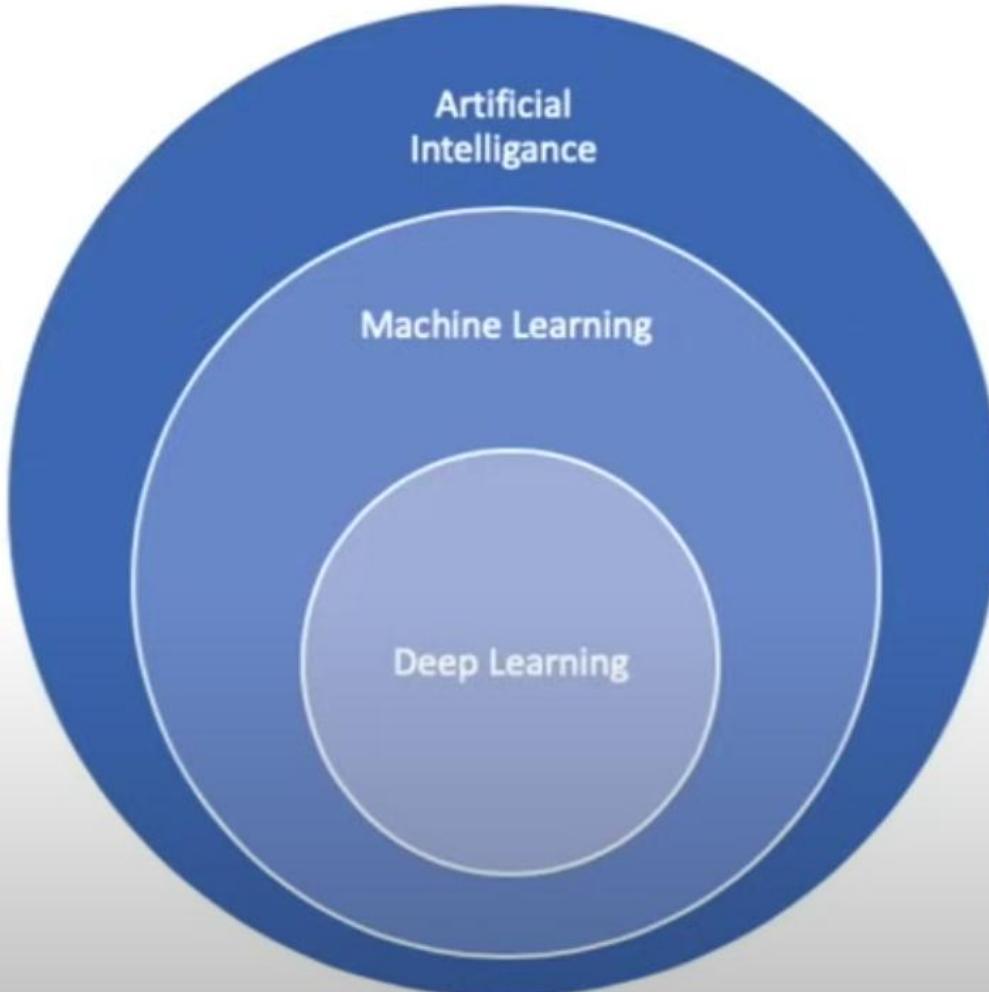
Machine Learning





Deep Learning

AI vs ML vs Deep Learning



*Machine Learning is a subset of
Artificial Intelligence*

*Deep Learning is a subset of
Machine Learning*

What is Artificial Intelligence?

Artificial Intelligence is a branch of Computer Science that is concerned with building smart & intelligent Machines

Non – intelligent machines



Intelligent machines



Google Assistant

Machine Learning

Machine Learning is a technique to implement AI that can *learn* from the data by themselves without being explicitly programmed.



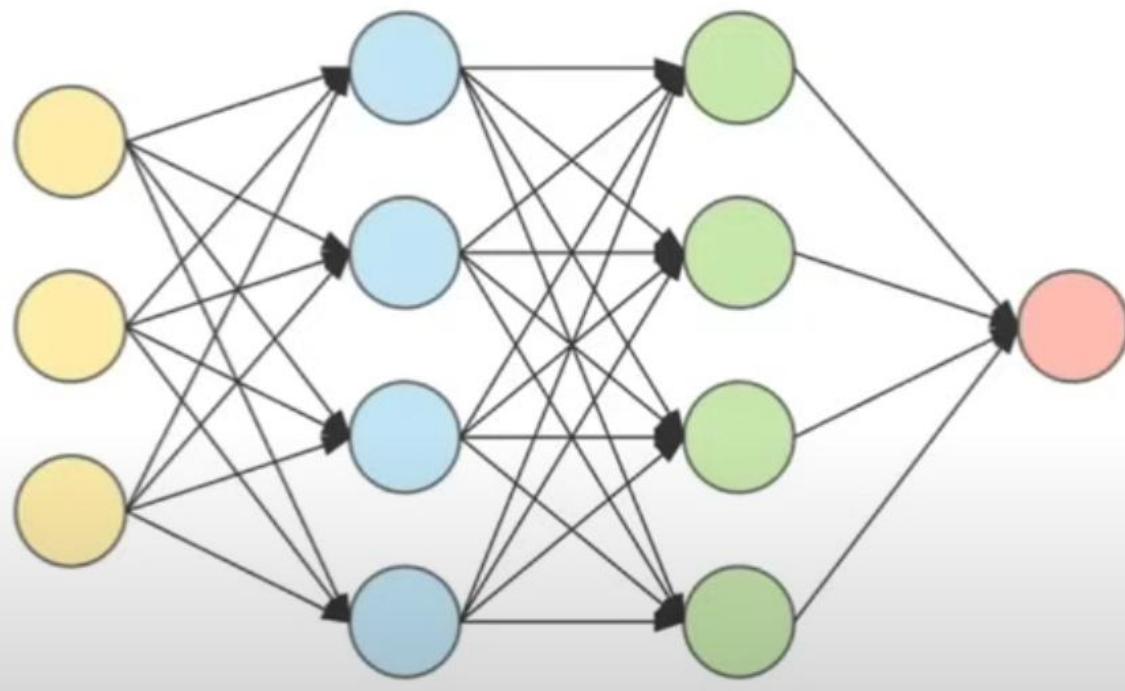
Iron Man



Captain America

Deep Learning

Deep Learning is a subfield of Machine Learning that uses Artificial Neural Networks to learn from the data.



input layer

hidden layer 1

hidden layer 2

output layer



Types of Machine Learning

Machine Learning

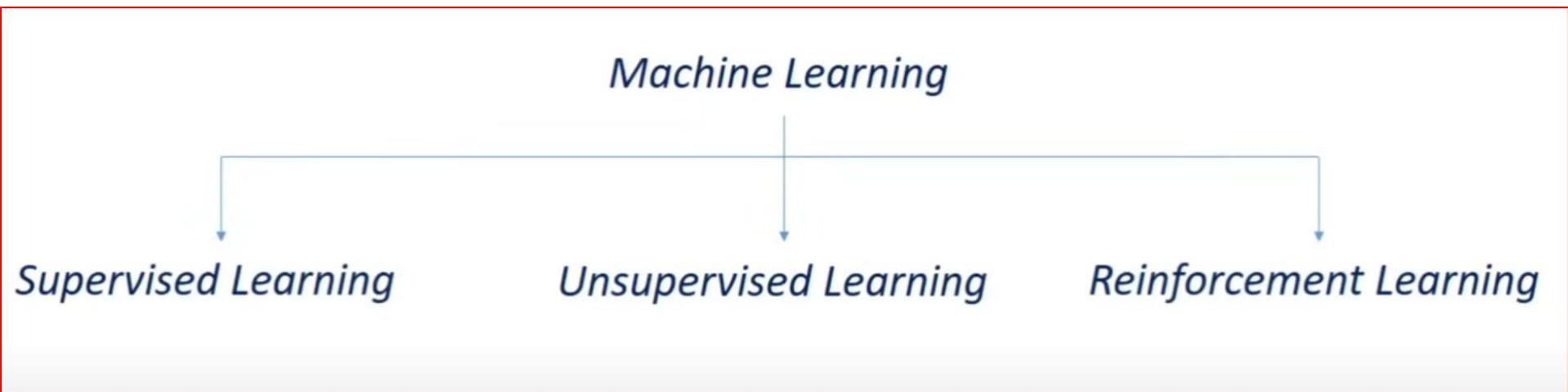
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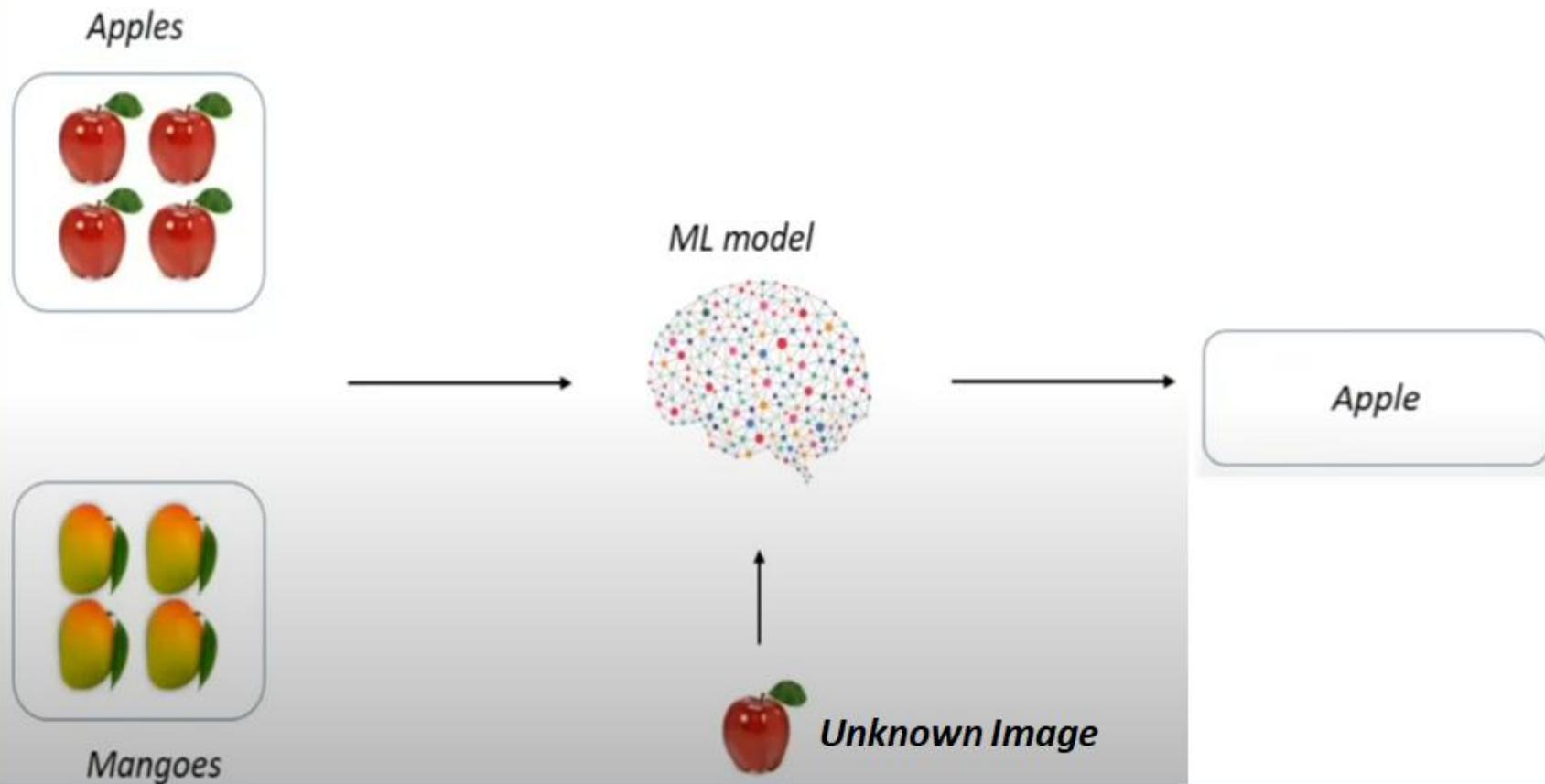
***Supervised Learning;
Types of Supervised Learning.***

Types of Machine Learning



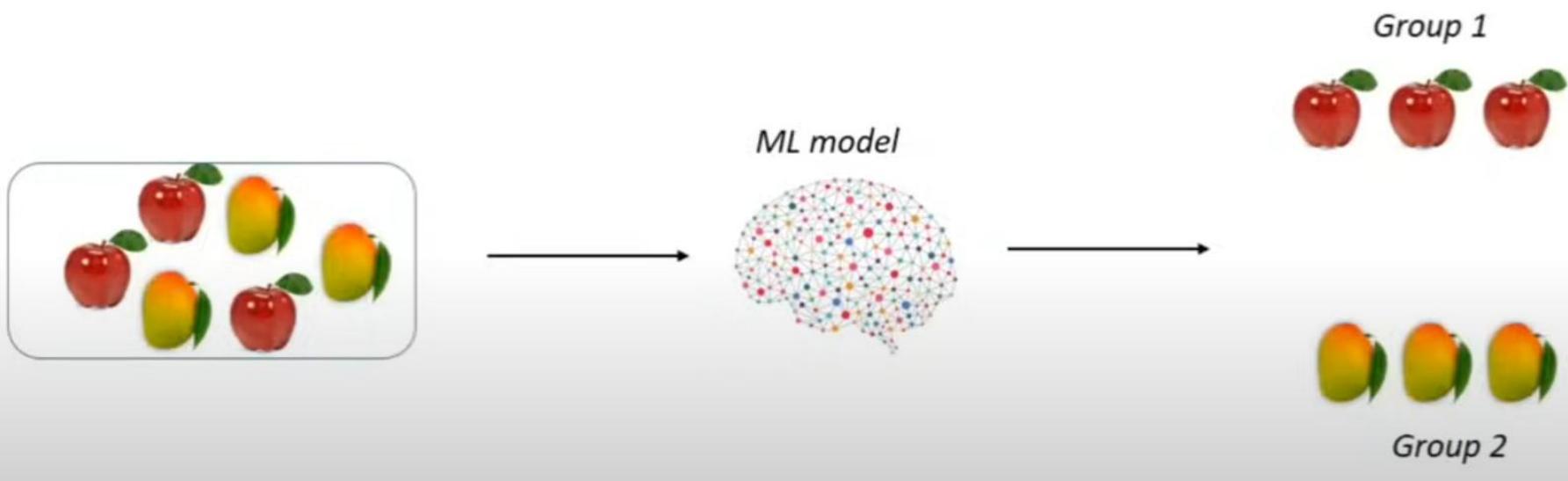
Supervised Learning

*In Supervised Learning, the Machine Learning algorithm learns from **Labelled Data***



Unsupervised Learning

*In Unsupervised Learning, the Machine Learning algorithm learns from **Unlabelled Data***



Reinforcement Learning

Reinforcement Learning is an area of Machine Learning concerned with how intelligent agents take actions in an environment to maximize its rewards.

1. Environment
2. Agent
3. Action
4. Reward



Types of Supervised Learning

Supervised Learning

Classification

Classification is about predicting a class or discrete values

Eg: Male or Female; True or False

Regression

Regression is about predicting a quantity or continuous values

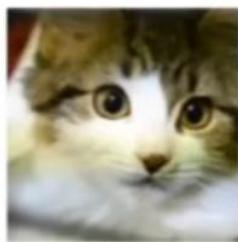
Eg: Salary; age; Price.

Types of Supervised Learning

Classification:



Dog



Cat



(Dog or Cat)

Regression:



Temperature



Rainfall in cm



Rainfall in cm

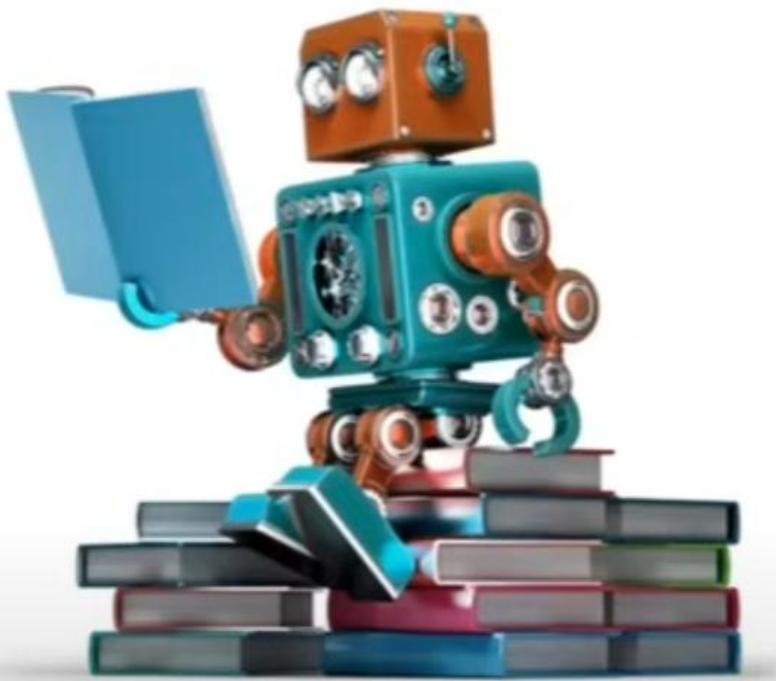
Algorithms

Classification:

1. *Decision Tree Classification*
2. *Random Forest Classification*
3. *K-nearest Neighbor*

Regression:

1. *Logistic Regression*
2. *Polynomial Regression*
3. *Support Vector Machines*



***Unsupervised Learning;
Types of Unsupervised
Learning.***

Types of Unsupervised Learning

Unsupervised Learning

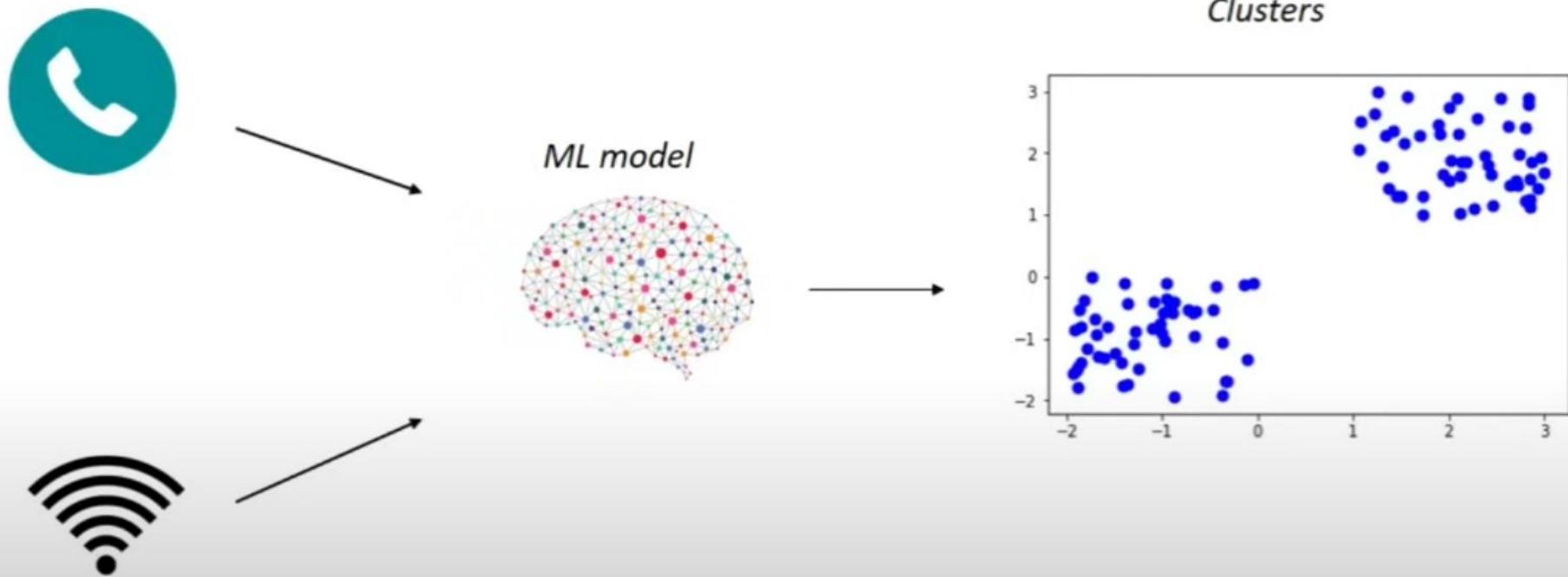
Clustering

Clustering is an unsupervised task which involves grouping the similar data points.

Association

Association is an unsupervised task that is used to find important relationship between data points

Clustering



Association

Customer 1



Customer 2



Customer 3



- Bread
- Milk
- Fruits
- wheat

- Bread
- Milk
- Rice
- Butter

Now, when customer 3 goes and buys bread, it is highly likely that he will also buy milk.

Unsupervised Learning Algorithms

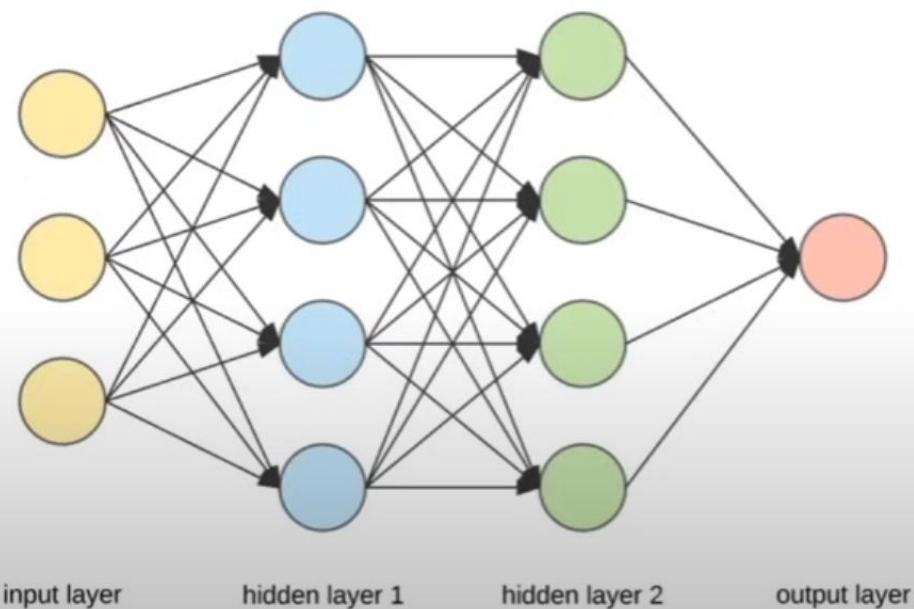
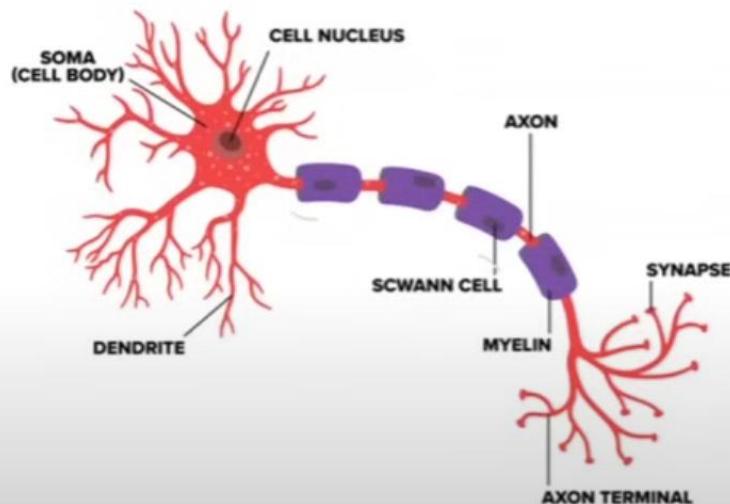
1. *K-Means Clustering*
2. *Hierarchical Clustering*
3. *Principal Component Analysis (PCA)*
4. *Apriori*
5. *Eclat*



- Deep Learning:*
- ✓ *Basics*
 - ✓ *Neural Networks*
 - ✓ *Applications*

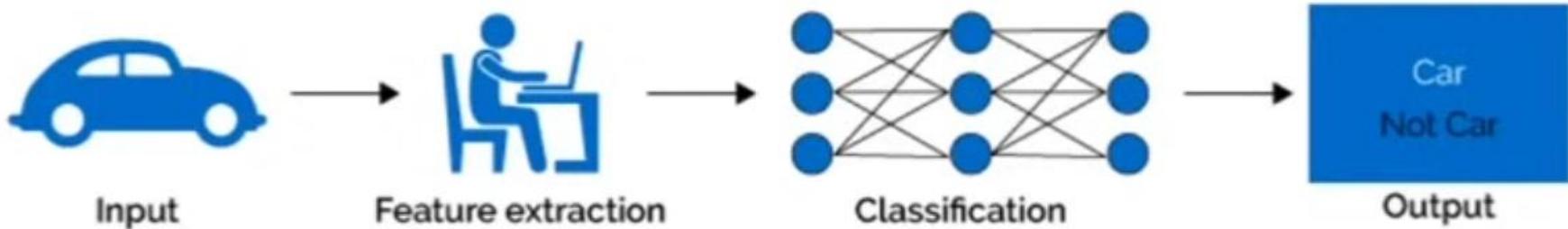
Deep Learning

Deep Learning is a subfield of Machine Learning that uses Artificial Neural Networks to learn from the data.

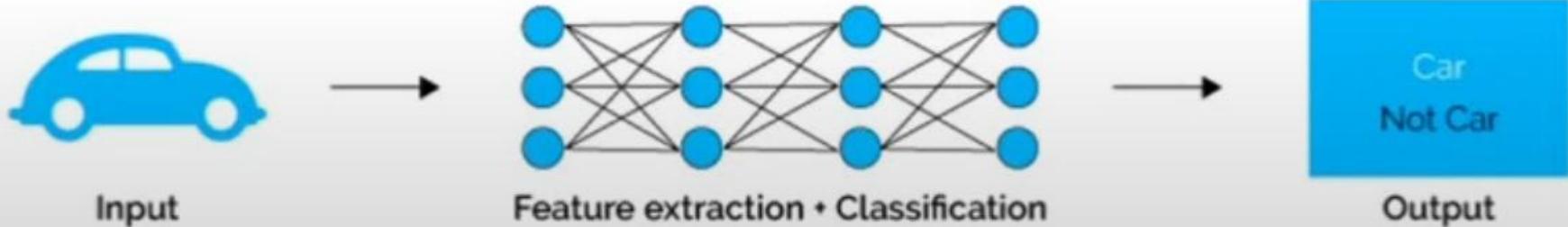


Machine Learning vs Deep Learning

Machine Learning



Deep Learning



Deep Learning - Applications



Healthcare



Autonomous cars



Computer Vision

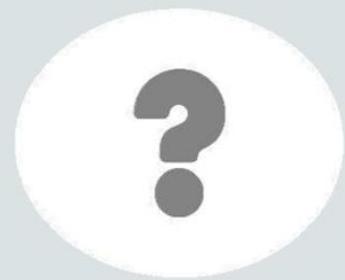


Natural Language Processing

Scikit-Learn



What is Sckit-learn?



Introduction to Scikit-learn

Open source library which is licensed under **BSD**

Built on **Numpy, Scipy & Matplotlib**

Many tuning Parameters

Documentation & Support



Installation of Scikit-learn



COMMANDS:

`pip install scikit-learn`

OR

`conda install scikit-learn`

Scikit-learn



```
From sklearn.family import Model
```

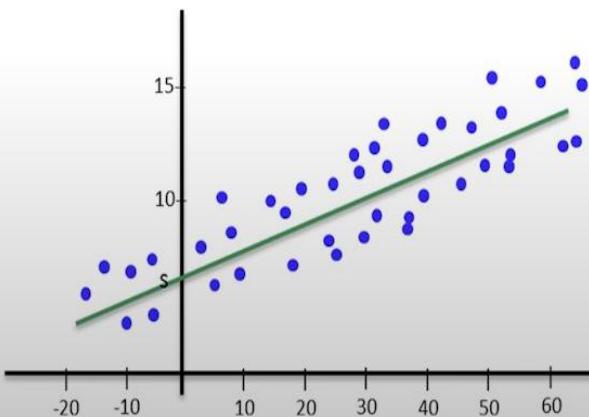
Example:

```
From sklearn.linear_model import LinearRegression
```

Regression & Classification

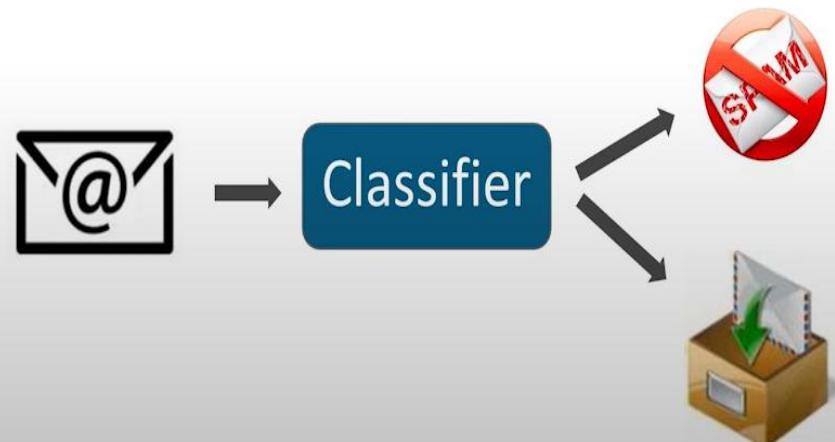
Regression

Regression is the prediction of a numeric value and often takes input as a **continuous** value.



Classification

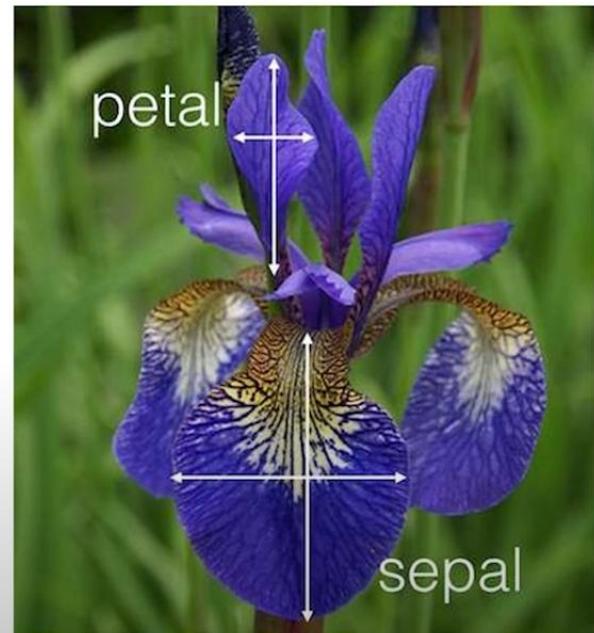
Classification is the problem identifying to which set of **categories** a new observation belongs.



Dataset

IRIS Dataset

- The data set consists of 50 samples from three species of *Iris* - Iris **Setosa**, **Virginica** and **versicolor**
- Four features were measured from each sample: **Length** and the **width** of the **sepals** and **petals**, in centimetres.



Supervised Learning: Implement Logistic Regression



Classification

Algorithms



Decision Tree



Random Forest



Naïive Bayes Classifier

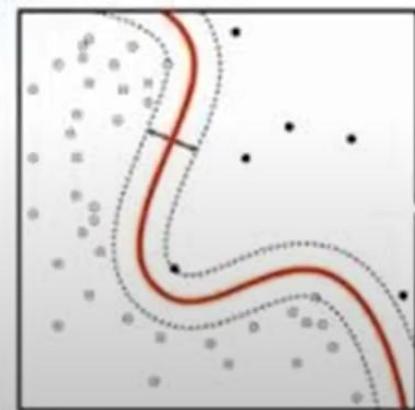
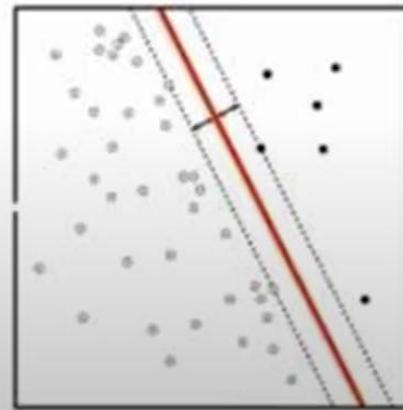


Support Vector Machine

Support Vector Machine (SVM)



- SVM is a **supervised** machine learning algorithm which can be used for both **classification** or **regression** challenges
- It tries to define a **hyperplane** which can split the data in the most optimal way



Artificial Neural Network

Artificial Neurons

➤ Perceptrons

➤ Input Layer

➤ Hidden Layer

➤ Output Layer

Artificial Neural Networks

- **Convolutional Neural Network (CNN)**

- Image Processing
- Computer Vision

- **Recurrent Neural Network (RNN)**

- Speech Processing
- Text Processing

**Neural
Networks**

vs

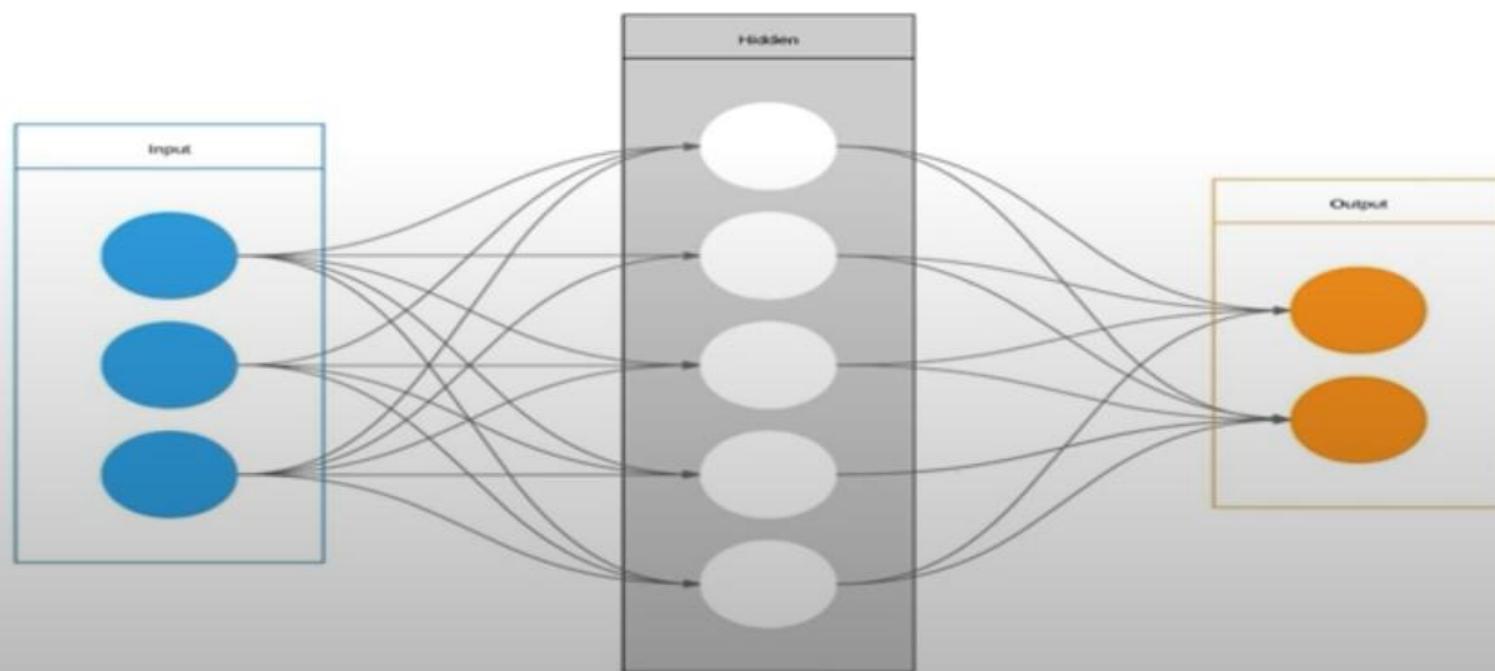
Deep Learning

Deep Learning

What is Deep Learning?

What is Neural Network?

- Human brains are made-up of Neuron.
- To mimic the human brain neural networks were modeled.
- Neural Networks are made-up of perceptron.



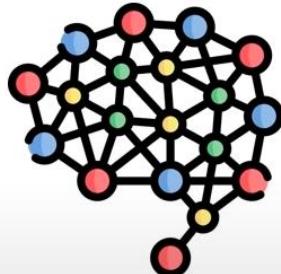
TensorFlow



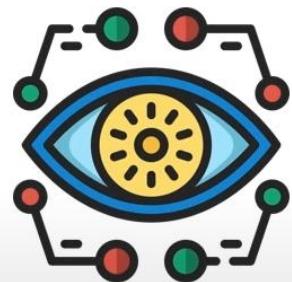
What is TensorFlow?



TensorFlow is an open-source deep learning framework developed by **Google Brain**. It is designed to build, train, and deploy machine learning models efficiently.



Neural Network



Computer Vision

Natural Language Processing

Brief about TensorFlow

TensorFlow operates using *tensors* (multi-dimensional arrays) and *computational graphs*, making it a flexible and scalable tool for machine learning.



TensorFlow provides both high-level APIs like **Keras** for easy model building and low-level APIs for greater customization.

TensorFlow can run on CPUs, GPUs, and TPUs (Tensor Processing Units), making it suitable for both small-scale research and large-scale production.



Significance in AI and ML

TensorFlow empowers developers to turn ideas into scalable AI solutions, from research prototypes to real-world applications.

Machine Learning
Pipeline



Adaptable to
Diverse Needs

Visualization &
Debugging



Scalability and
Performance



Real-World Impact

Why to use TensorFlow?

TensorFlow is one of the leading deep learning frameworks, widely used for machine learning and AI research and production.



Scalability



Ecosystem



Optimized Performance



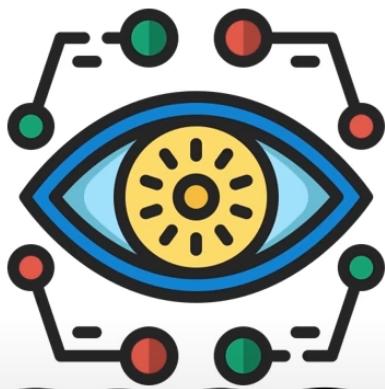
Flexibility



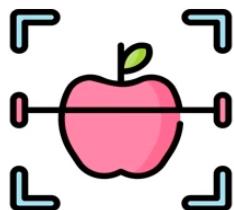
Cross-Platform Support



Real-Word Application of TensorFlow



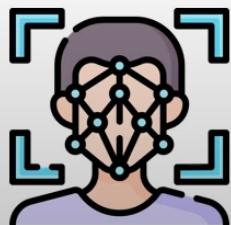
Computer Vision



Identifying objects in images (e.g., YOLO, SSD).

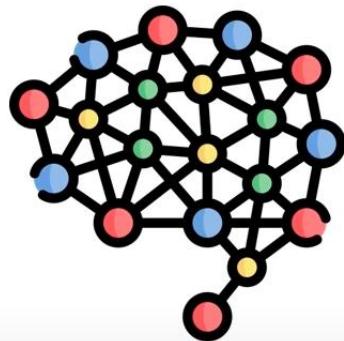


Medical imaging and satellite imagery.

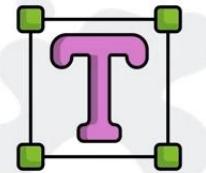


Security systems and user authentication

Real-Word Application of TensorFlow



Natural Language Processing
(NLP)



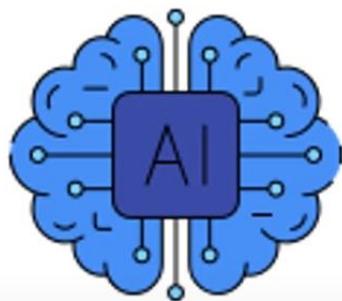
Spam detection, sentiment analysis.

Google Translate uses TensorFlow.



Security systems and user authentication

Real-World Application of TensorFlow



Generative AI



Creating realistic images, art.

GPT models for writing and summarization.



Deepfake audio and speech generation.

Industries using TensorFlow

Predictive Analytics



Healthcare

Medical image Analysis

Decision-Making



Autonomous Vehicles

Object Detection

Algorithmic Trading



Finance



Fraud Detection

Inventory Management



Retail



Personalized Recommendations

Content



Entertainment

Video & Audio



Building a Churn model with TensorFlow

Step 1:



Creating Model

Step 2:



Training Model

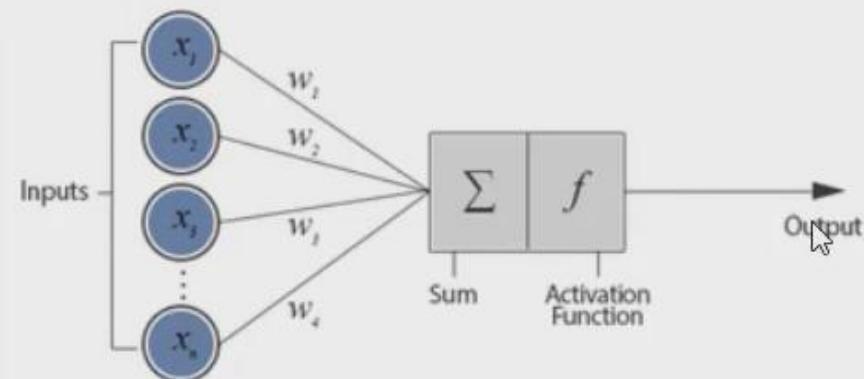
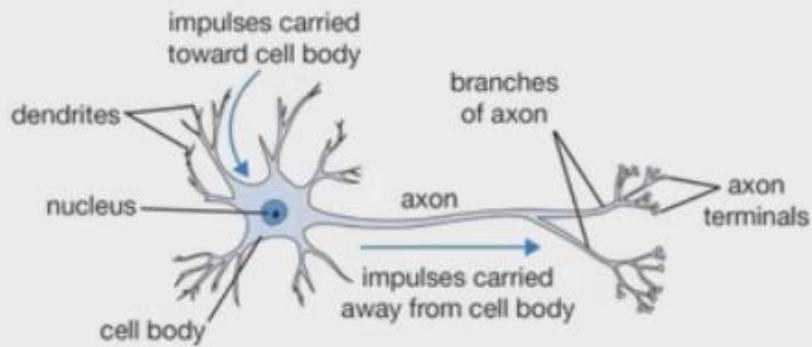
Step 3:



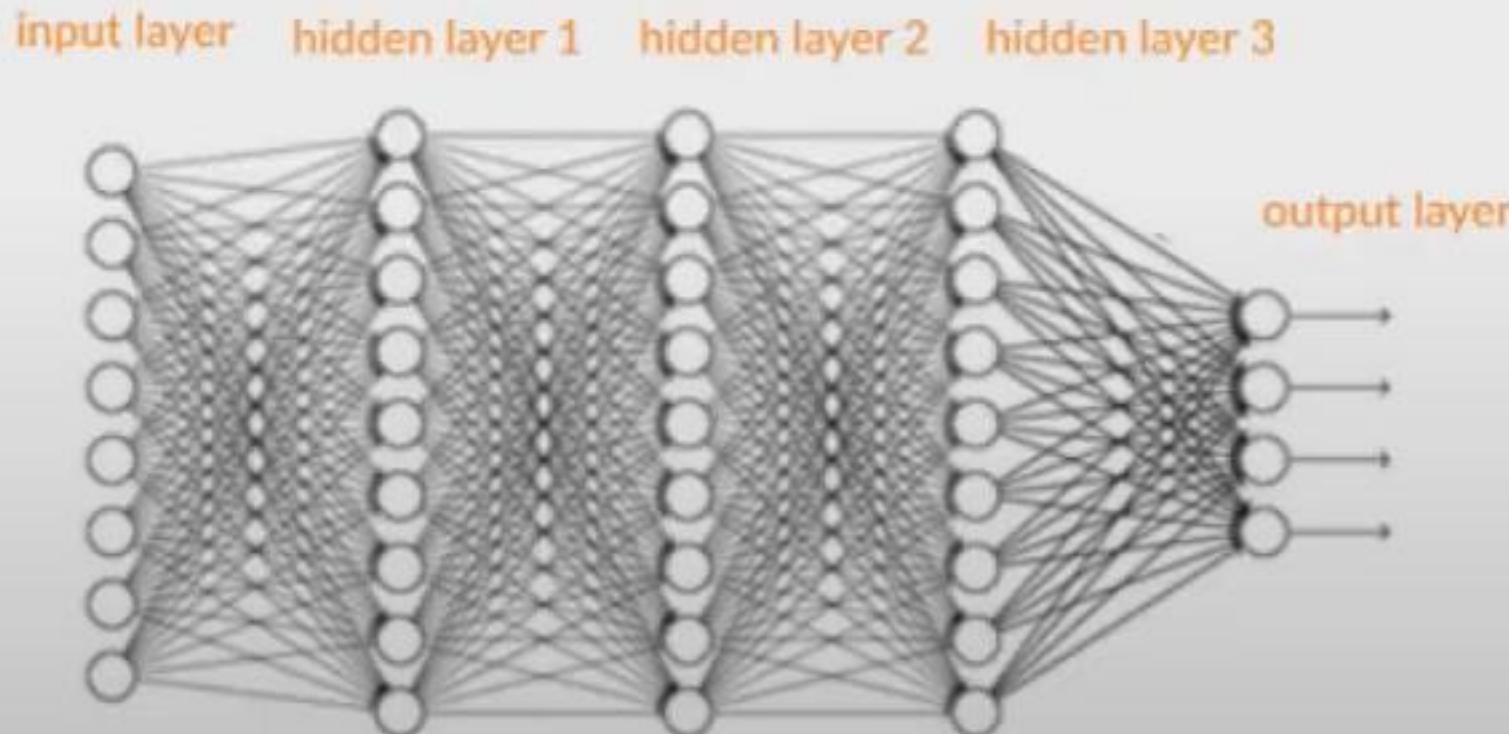
Prediction

Building an ANN with TensorFlow 2.0 and Keras

Biological Neuron versus Artificial Neural Network



Deep neural network

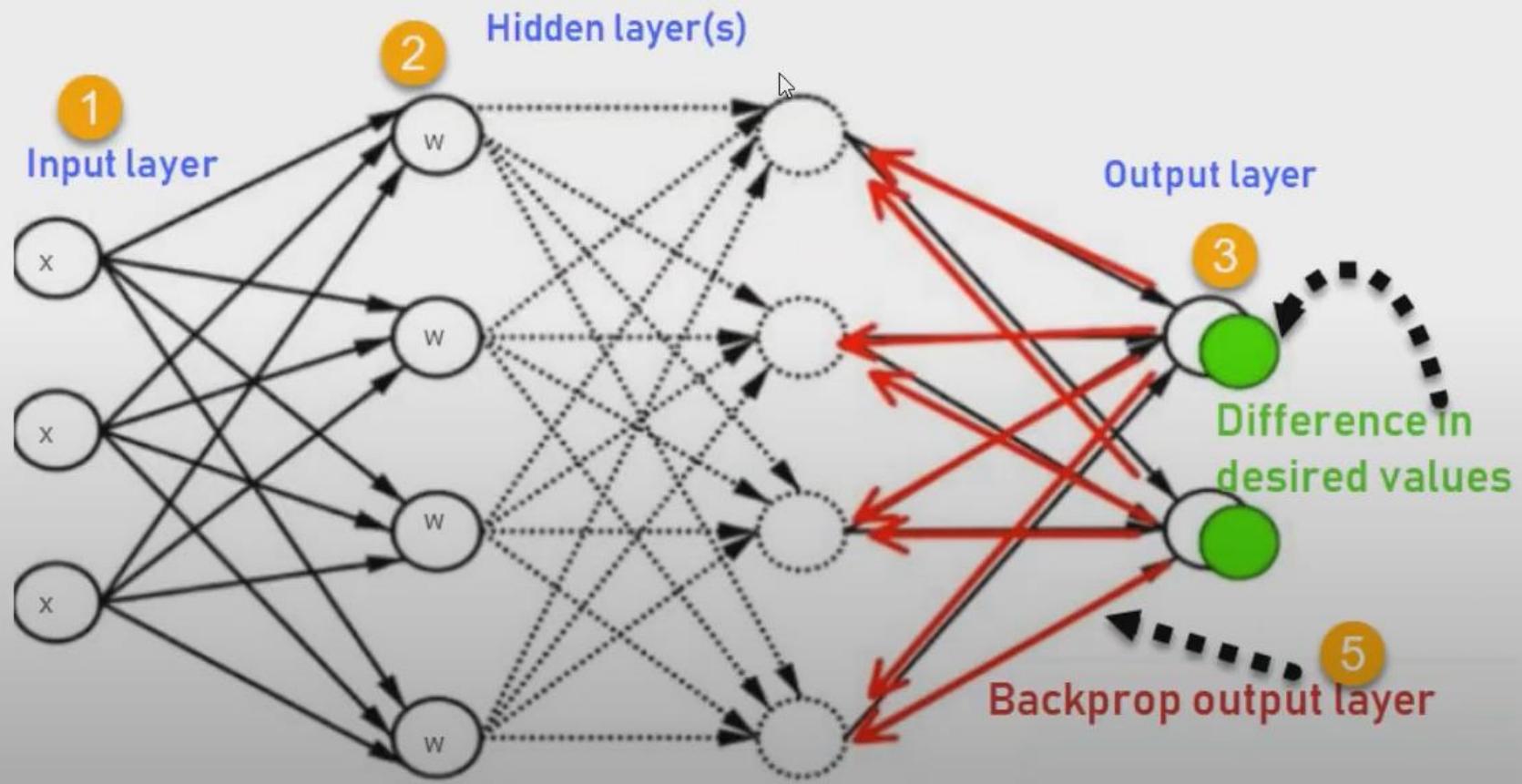


What is Activation Function?

If we do not apply a Activation function then the output signal would simply be a simple linear function. A linear function is just a polynomial of one degree.

- Sigmoid
- Tanh
- ReLu
- LeakyReLu I
- SoftMax

What is Back Propagation?



How to build an ANN using TensorFlow 2.0

Steps for building your first ANN

- Data Preprocessing
- Add input layer
- Random w init
- Add Hidden Layers
- Select Optimizer, Loss, and Performance Metrics
- Compile the model
- use model.fit to train the model
- Evaluate the model
- Adjust optimization parameters or model if needed

Case Study Demo

- Whether a customer is going to leave the Bank or not.