

DEEP LEARNING

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Machine Learning vs Deep Learning

- ❑ A Subset of AI that uses statistical methods to enable machines to improve with experience
- ❑ A Subset of Machine Learning using Neural Networks with many layers to learn from data

Approach

Uses a variety of algorithms to find patterns in data and make decisions

Automates the process of feature extraction and learns representations from raw data

Feature Engineering

Typically requires manual extraction and selection of features.

Automates feature extraction, learning from raw data directly.

Versatility

Handles task Regression, classification, clustering , and Anomaly detection.

Particularly strong in image and Speech recognition, and Natural Language Processing.

Computation Intensity

Generally less computationally intensive, can work on standard computing system.

More computationally intensive ,often requires a GPUs and high-end hardware for training

Aspect	Machine Learning	Deep Learning
Definition	A subset of AI that uses statistical methods to enable machines to improve with experience.	A subset of Machine Learning using neural networks with many layers to learn from data.
Approach	Uses a variety of algorithms to find patterns in data and make decisions.	Automates the process of feature extraction and learns representations from raw data.
Feature Engineering	Typically requires manual extraction and selection of features.	Automates feature extraction, learning from raw data directly.
Versatility	Handles tasks like regression, classification, clustering, and anomaly detection.	Particularly strong in image and speech recognition, and natural language processing.
Data Requirement	Often effective with smaller datasets and less data intensive.	Requires large datasets to perform well, due to model complexity.
Computational Intensity	Generally less computationally intensive, can work on standard computing systems.	More computationally intensive, often requires GPUs or high-end hardware for training.

Machine learning vs. deep learning



Machine learning

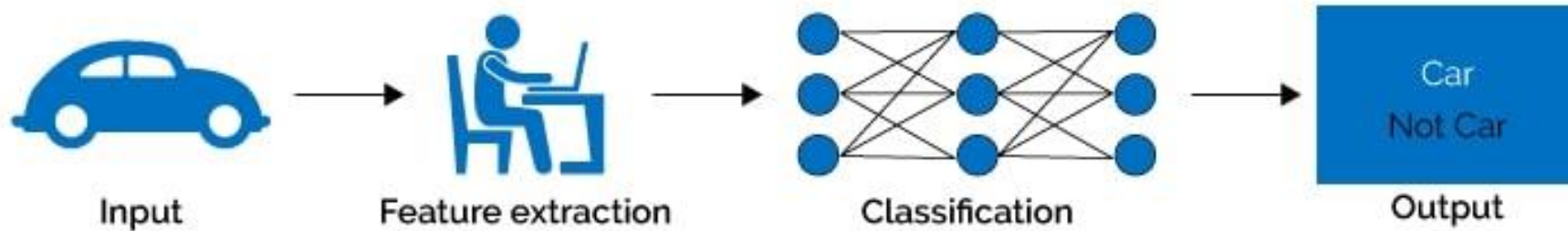
Uses algorithms and learns on its own but may need human intervention to correct errors



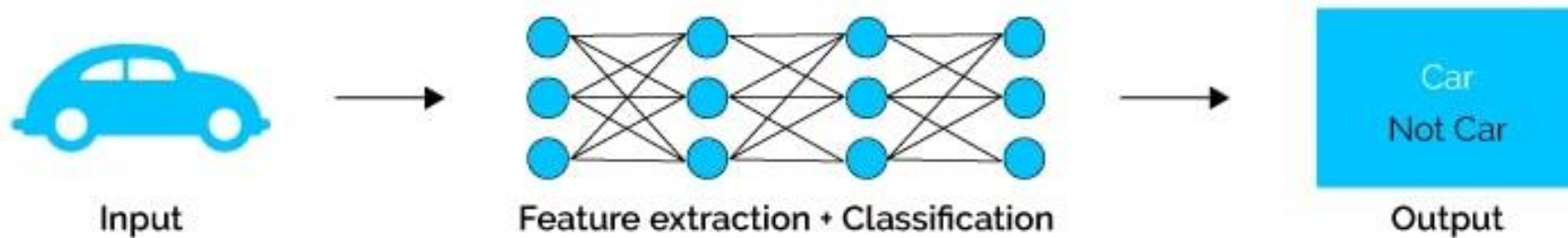
Deep learning

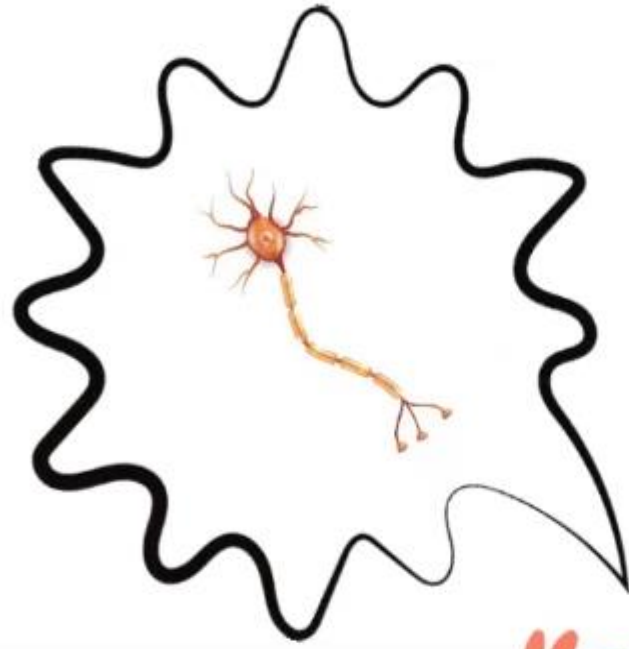
Uses advanced computing, its own neural network, to adapt with little to no human intervention

Machine Learning



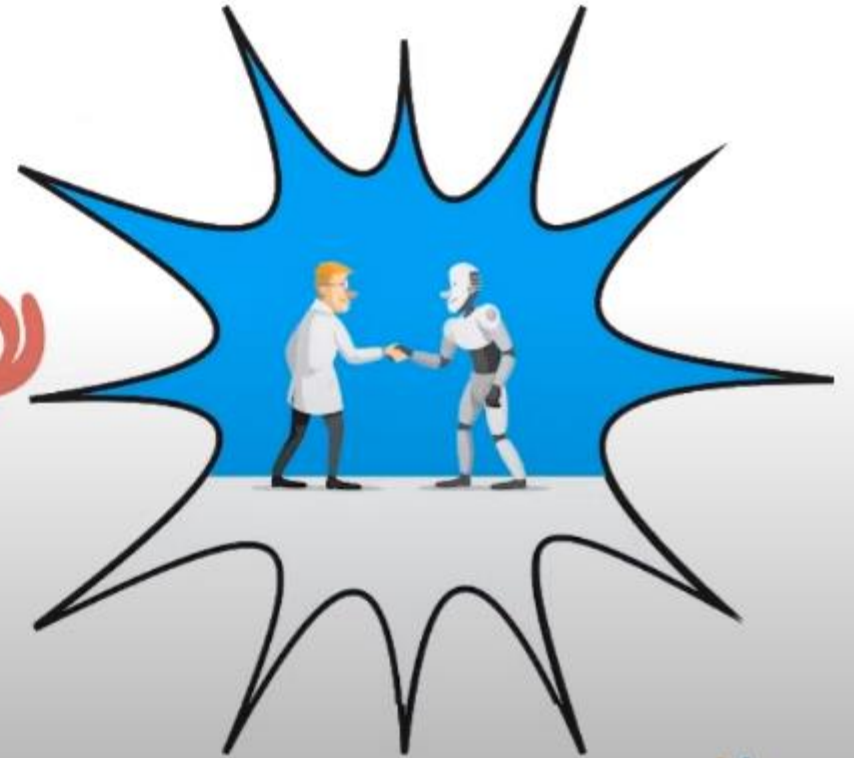
Deep Learning





AND THE SECRET BEHIND
ALL OF MY POWER IS A
NEURON, I'LL GET BACK
TO IT IN SOME TIME!

EVER SINCE THE 1950'S,
SCIENTISTS HAVE BEEN TRYING TO
MIMIC THE FUNCTIONING OF A
NEURON AND USE IT TO BUILD
SMARTER ROBOTS!



IT WAS ONLY AFTER 2000 THAT
HUMANS WERE ABLE TO GIVE
BIRTH TO DEEP LEARNING THAT
WAS ABLE TO SEE AND
DISTINGUISH BETWEEN DIFFERENT
IMAGES AND VIDEOS!



THESE ARE
THE IMAGES
OF 'DOGS'

DEEP LEARNING IS A MACHINE LEARNING TECHNIQUE THAT TEACHES
COMPUTERS TO DO WHAT COMES NATURALLY TO HUMANS: LEARN
BY EXAMPLE



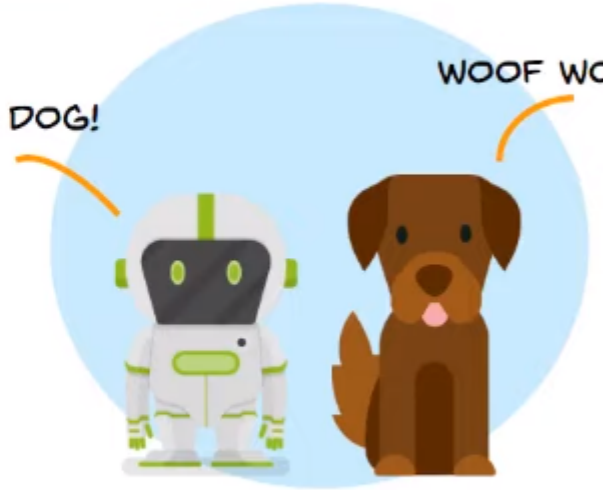
THE ROBOT GETS
TRAINED WITH PHOTOS
AS EXAMPLE!

DEEP LEARNING IS A MACHINE LEARNING TECHNIQUE THAT TEACHES COMPUTERS TO DO WHAT COMES NATURALLY TO HUMANS: LEARN BY EXAMPLE

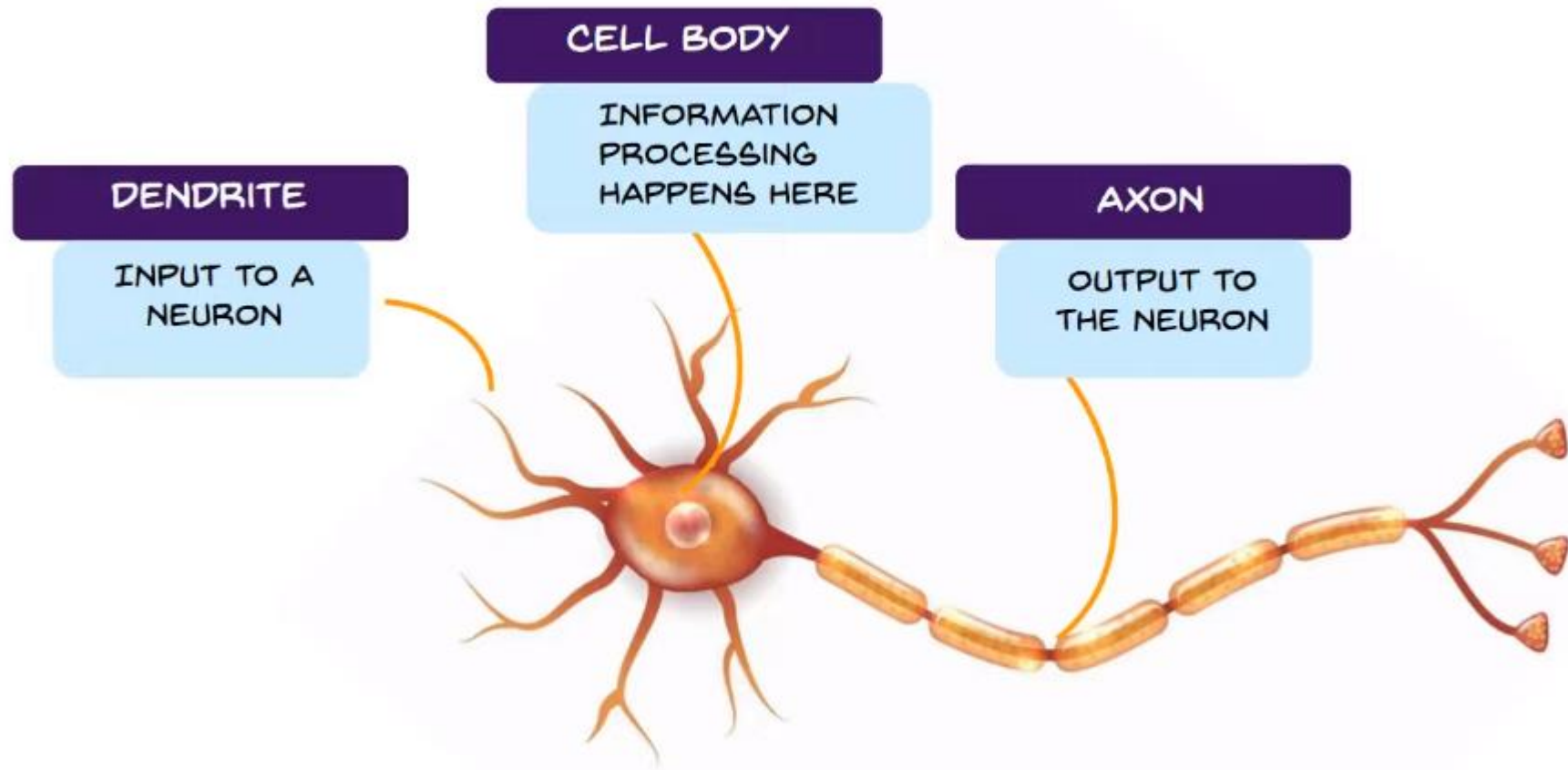
AND IS ABLE TO IDENTIFY THE THING THAT IT SAW IN THE IMAGES!

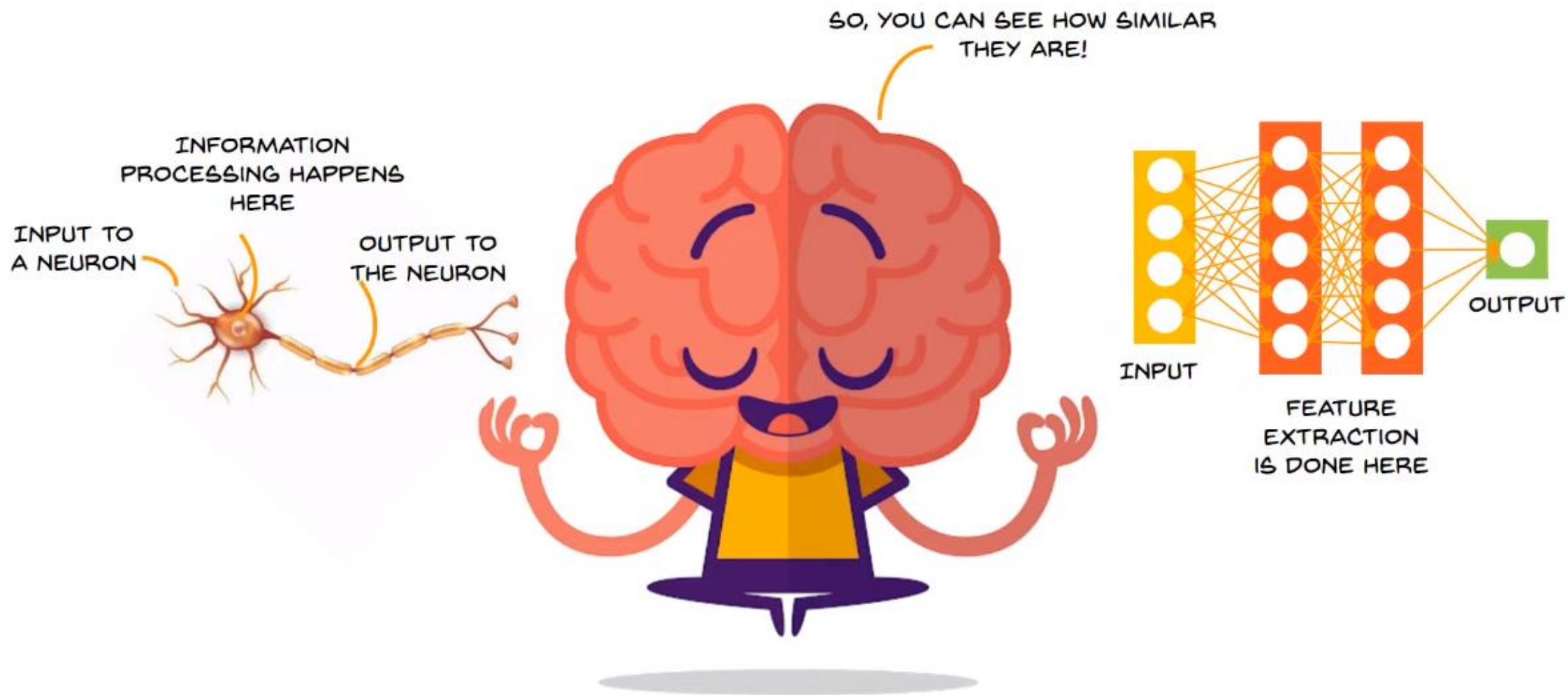


YOU ARE A DOG!



WOOF WOOF

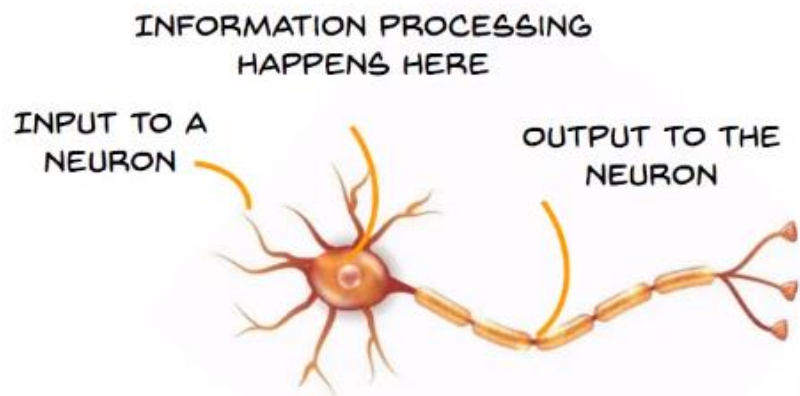




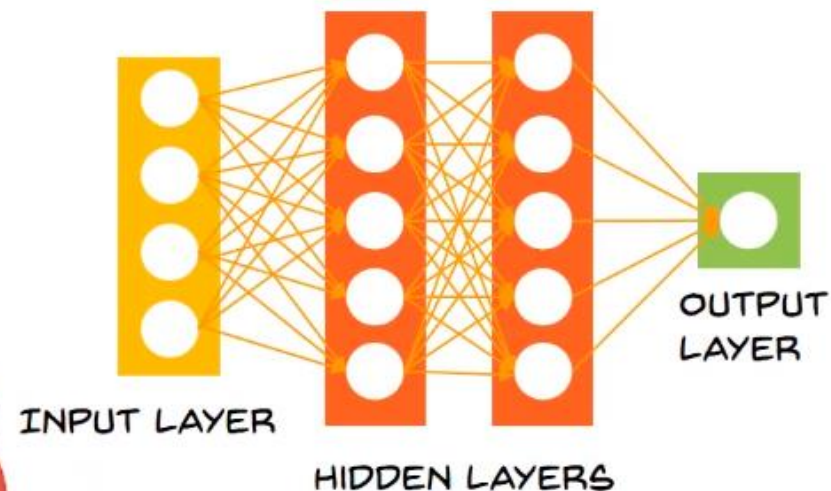
What is Artificial Neural Network?

A NEURAL NETWORK IS A SYSTEM OF HARDWARE AND/OR SOFTWARE PATTERNED AFTER THE OPERATION OF NEURONS IN THE HUMAN BRAIN. NEURAL NETWORKS ALSO CALLED ARTIFICIAL NEURAL NETWORKS IS A WAY OF ACHIEVING DEEP LEARNING

BIOLOGICAL NEURAL NETWORK

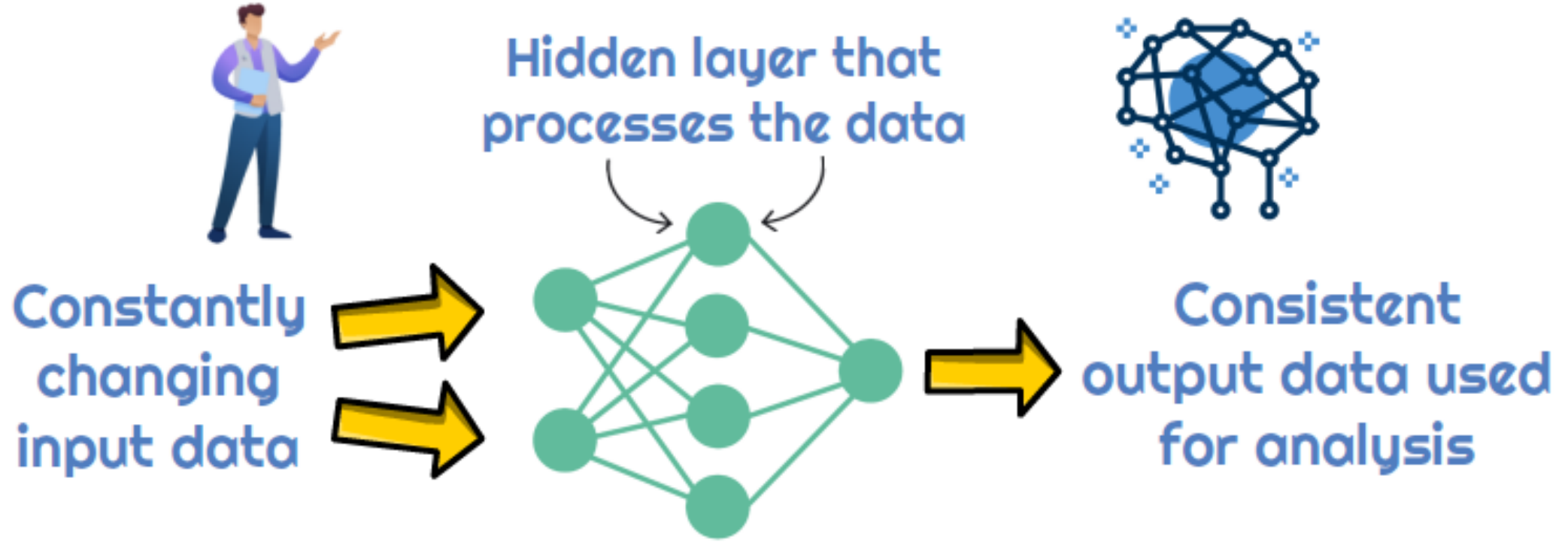


ARTIFICIAL NEURAL NETWORK



Neural Networks

Similar to humans in that a neural network constantly adjusts based on changing inputs or situations.



Use Cases for Neural Networks



Example
use cases

- 1) Pattern recognition
- 2) Forecasting data
- 3) Credit worthiness
- 4) Valuation

Pattern recognition – Neural networks help finance and accounting professional identify patterns in the data they have collected, which allows the professional to make more informed business decisions. For example, sales data by customer could be processed through a neural network and could be used to identify customer purchasing behavior.

Forecasting data – Forecasting is critical for any company. A neural network brings another level of sophistication to forecasting.

Credit worthiness – Neural networks have been used to forecast bankruptcy, which helps banks assess a company's credit worthiness when applying for a loan.

Valuation – Valuation models for every industry can be more accurate and sophisticated with the use of neural networks.

Application of ANN

HANDWRITING RECOGNITION

NEURAL NETWORK IS USED TO
CONVERT HANDWRITTEN CHARACTERS
INTO DIGITAL CHARACTERS THAT THE
SYSTEM CAN RECOGNIZE





STOCK EXCHANGE PREDICTION

THERE ARE MANY FACTORS THAT EFFECT THE STOCK MARKET. NEURAL NETWORK CAN EXAMINE A LOT OF FACTORS AND PREDICT THE PRICES ON A DAILY BASIS HELPING THE STOCK BROKERS





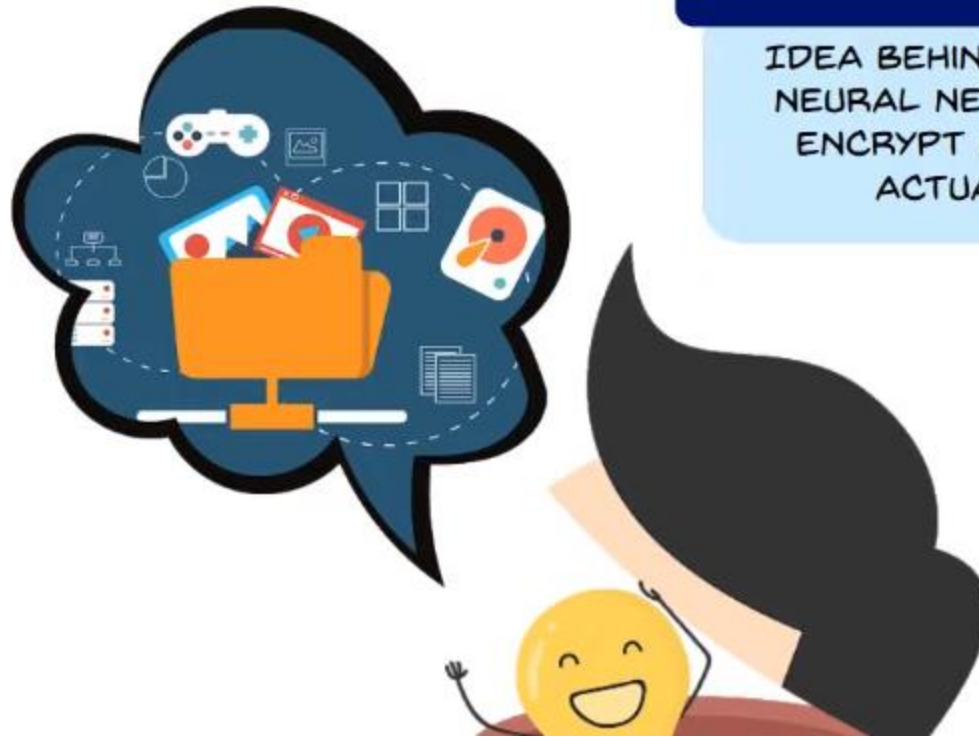
TRAVELLING SALESMAN PROBLEM

IT REFERS TO FINDING THE OPTIMAL PATH TO TRAVEL BETWEEN ALL CITIES IN AN AREA. NEURAL NETWORK HELPS SOLVE THIS PROBLEM PROVIDING HIGHER REVENUE AT A MINIMAL COST

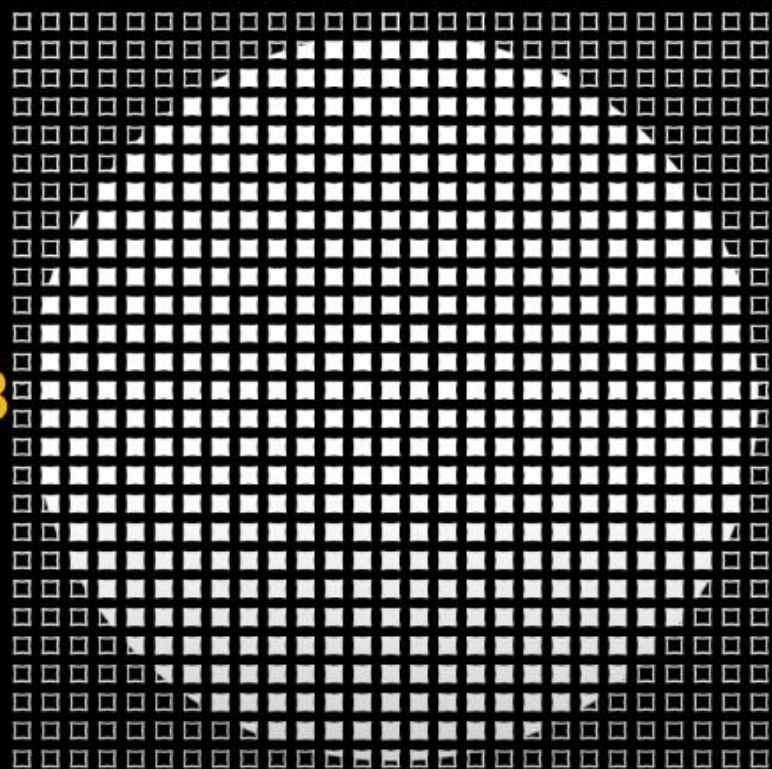


IMAGE COMPRESSION

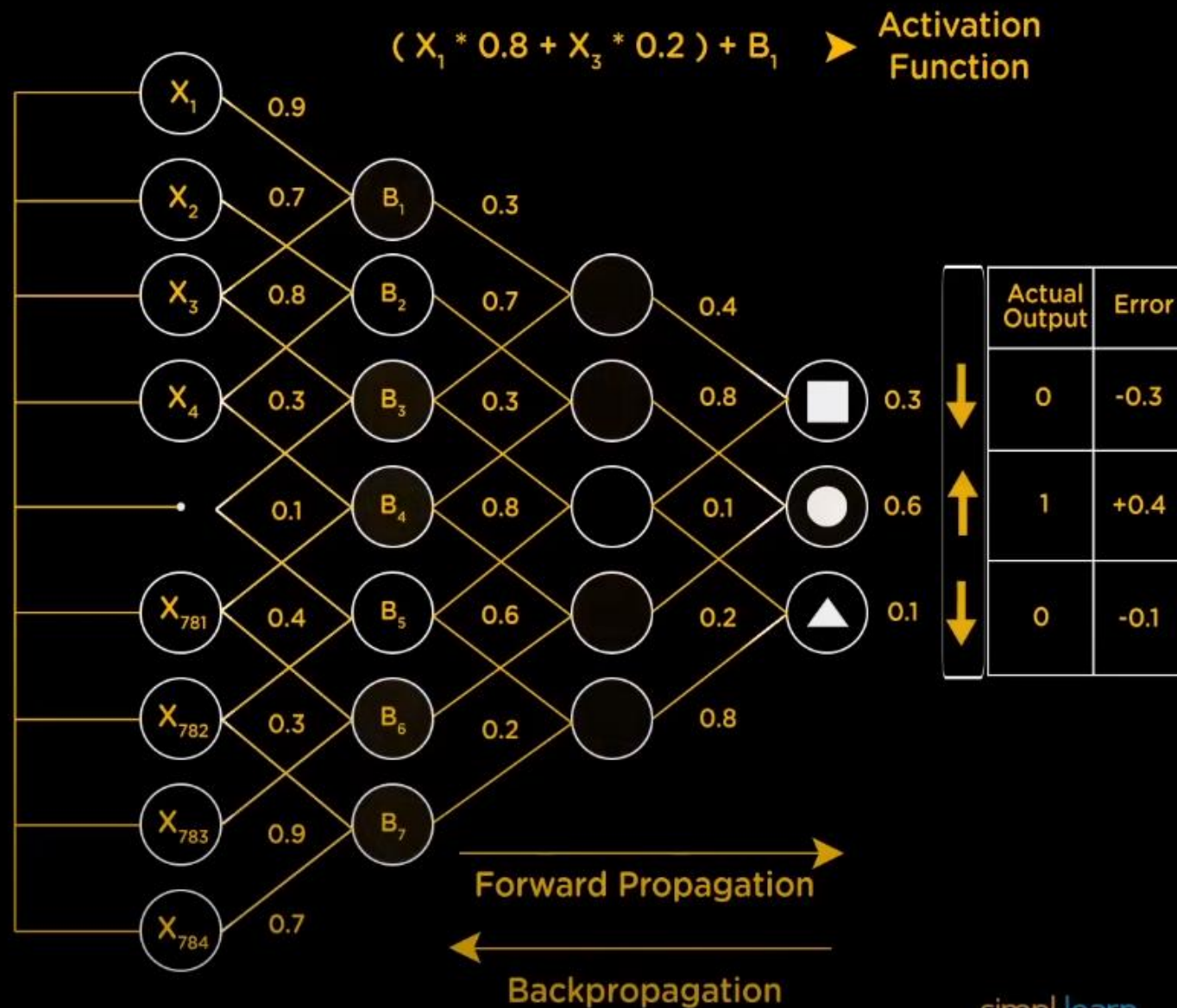
IDEA BEHIND DATA COMPRESSION
NEURAL NETWORKS IS TO STORE,
ENCRYPT AND RE-CREATE THE
ACTUAL IMAGE AGAIN.



28



28

 $28 \times 28 = 784$ Pixels



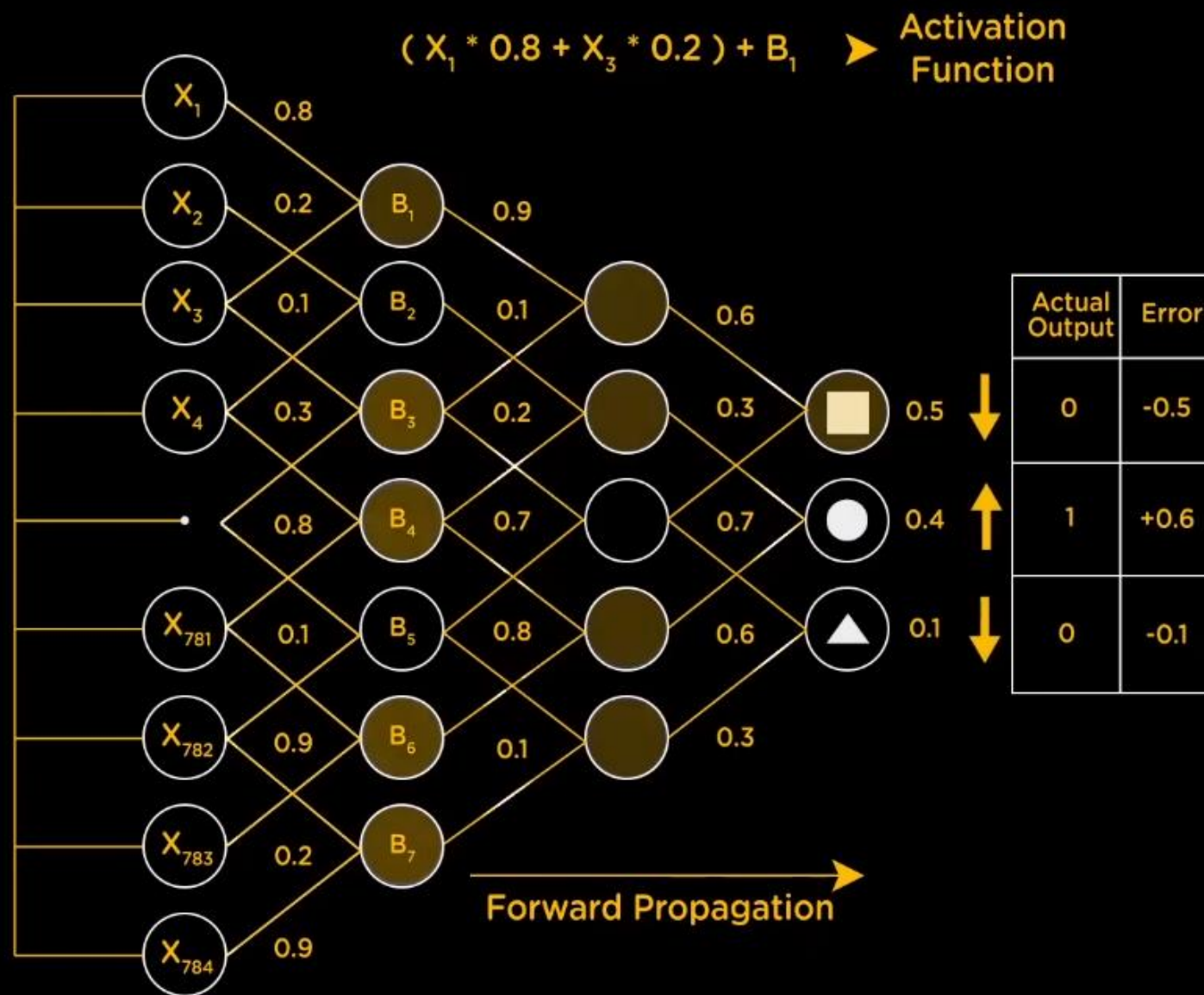
Output Layer



28

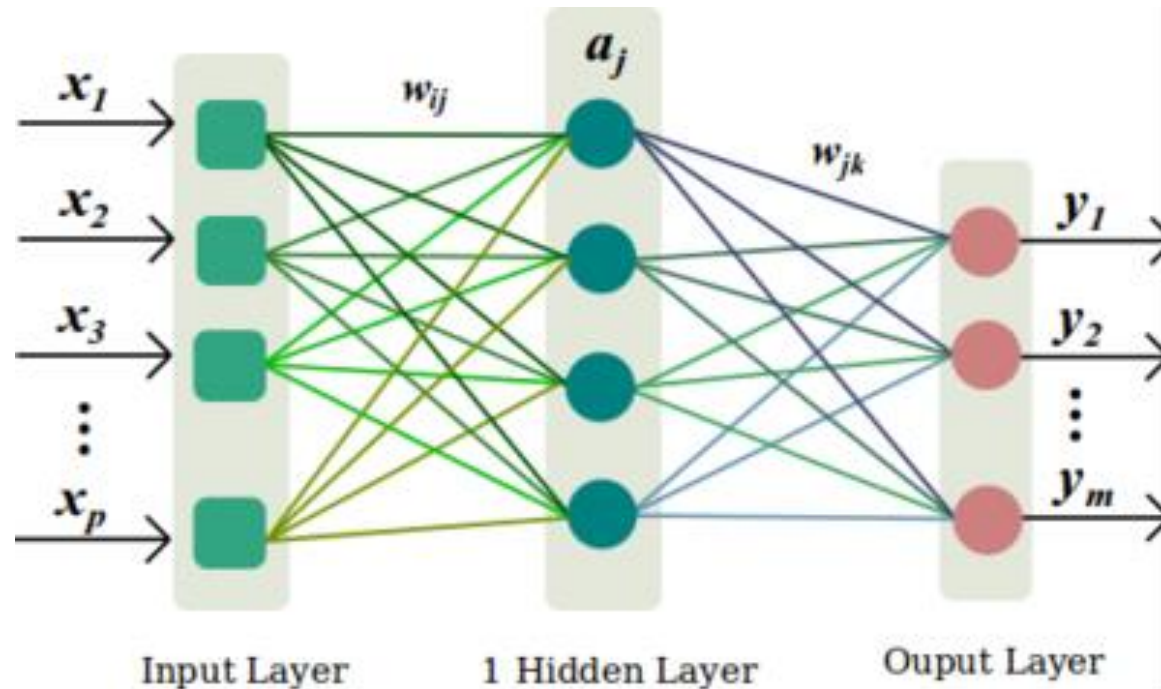
28

28 x 28 = 784 Pixels



Single Hidden-Layer Neural Network

A Single Hidden-Layer Neural Network is an artificial neural network composed of one Neural Network Input Layer, one hidden neural network layer and one Neural Network Output Layer.



Multiple- Hidden-Layer Neural Network

A Multi-Layer Neural Network is an artificial neural network composed of one Neural Network Input Layer, more than one hidden neural network layer and one Neural Network Output Layer.

