

Exploring the Exciting World of AI, ML, and Data Science

By: Ali and Umair
(Remote Data Scientists at
UTechIISc, Hong Kong)

Today's Agenda

- ❖ Artificial Intelligence
- ❖ Types of Artificial Intelligence
- ❖ Practical use of Artificial Intelligence
- ❖ Machine Learning
- ❖ Neural Networks and Deep Learning
- ❖ Data Science
- ❖ Takeaways
- ❖ Conclusion

Questions?

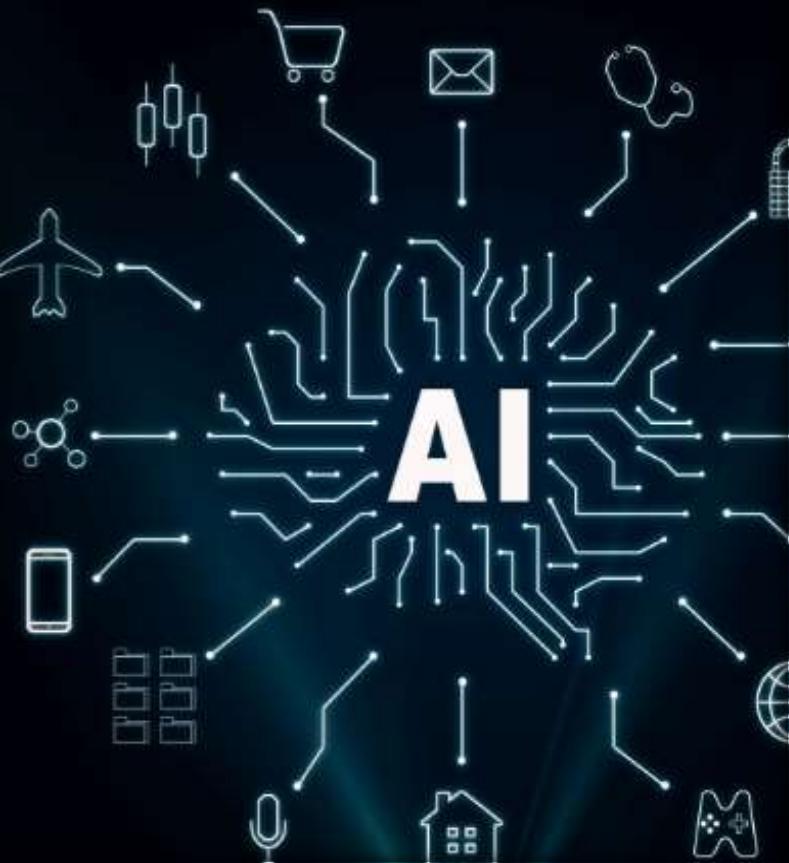
- What are your thoughts on:
 - ❖ Artificial Intelligence
 - ❖ Machine Learning
 - ❖ Deep Learning
 - ❖ Data Science?

What Is AI or Artificial Intelligence

Artificial intelligence or AI is the branch of computer science that studies machine intelligence.

EXAMPLES OF APPLICATIONS

- Search engines (Google)
- Content recommendations (Netflix, YouTube)
- Self-driving vehicles
- Automatic language translation
- Facial recognition
- Computer games
- Spam filters



Types of Artificial Intelligence

- This AI is categorized into three fields which are as follows:
 - Artificial Narrow Intelligence (ANI).
 - Artificial General Intelligence (AGI).
 - Artificial Super Intelligence (ASI).

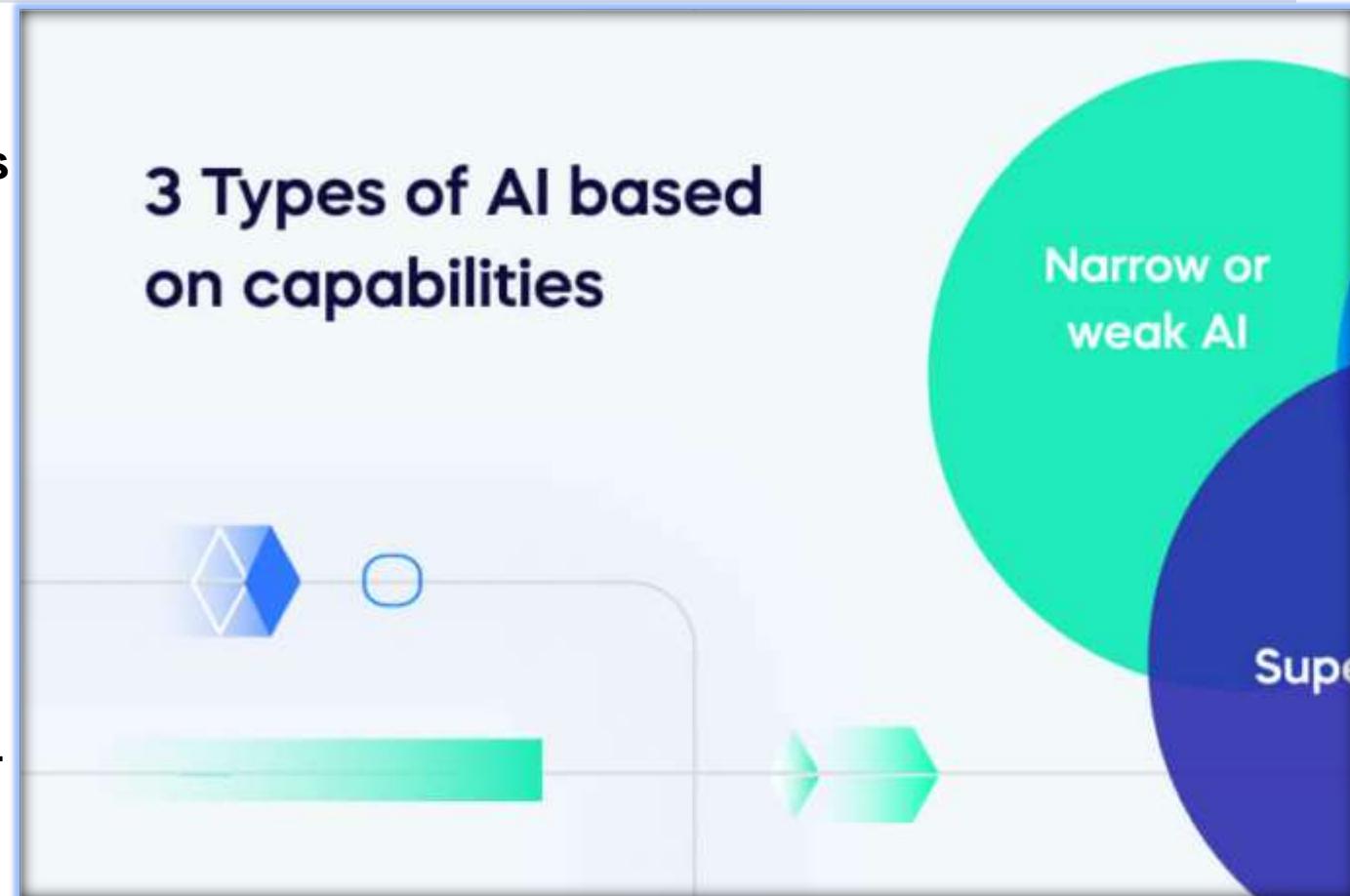


Fig.1. Types of AI

Artificial Narrow Intelligence (ANI)

- This is one of the most ordinary forms of AI that is currently easily available and accessible in the market.
- These AI systems are programmed in a way that can **solve a single complication**.
- As the name narrow suggests that it has some narrow capabilities like **spam email filtering**, suggesting a product or item



Fig.2. Spam email filtering

Artificial General Intelligence (AGI))

- It is defined as an AI that has a **human-level of cognitive tasks**,
- across a broad variety of domains such as:
- language filtering, image clearing, computational functioning, **chess-playing systems**, and many more.

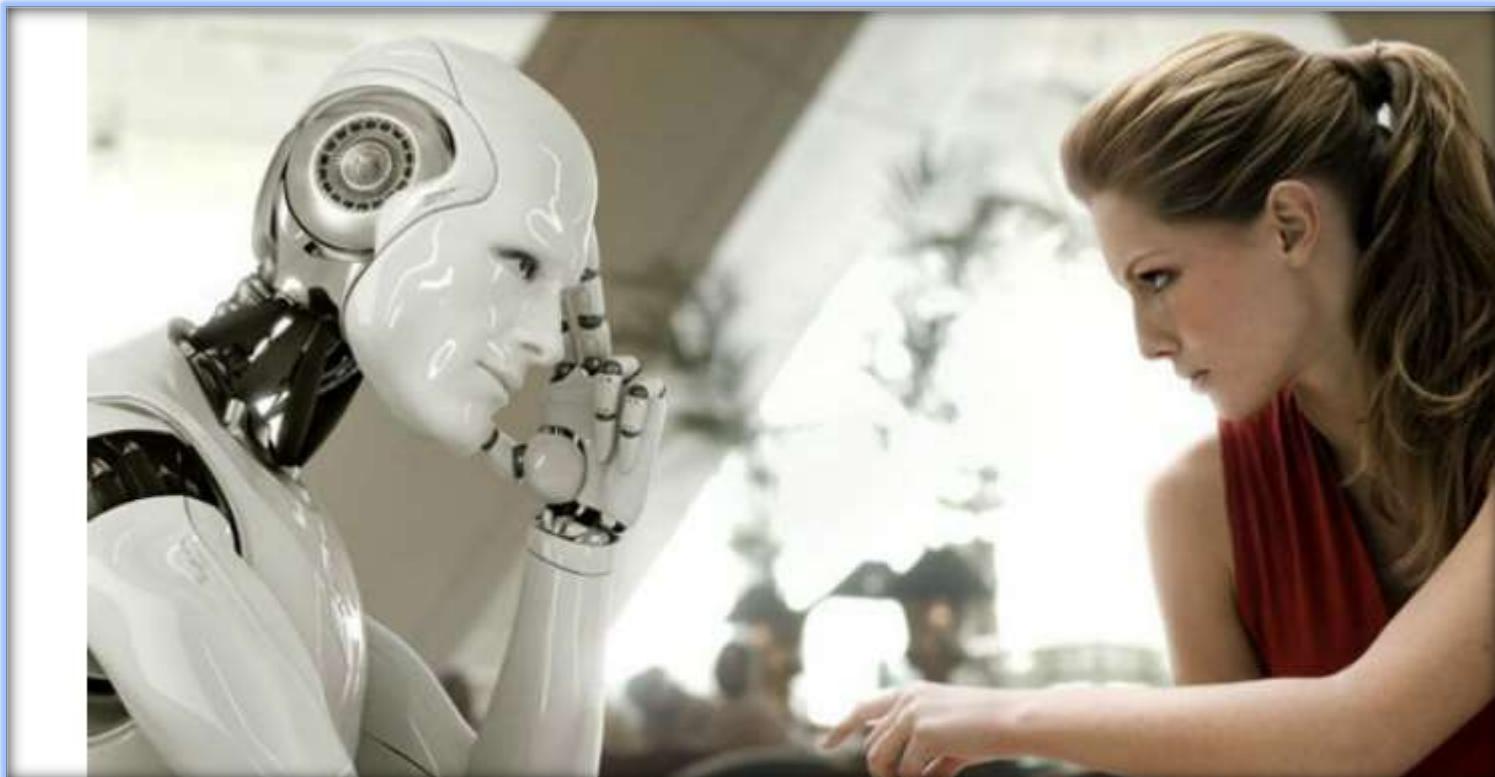


Fig.3. Chess-playing systems

Artificial Super Intelligence (ASI)

- We are entering into the **science-fiction colony**, but ASI is likely to be the reasoning development from AGI.
- If ASI will be created then it will be able to cross all human abilities.
- This may include things like **decision making, taking logical decisions**. Also, things like making better art and making better **emotional connections**.

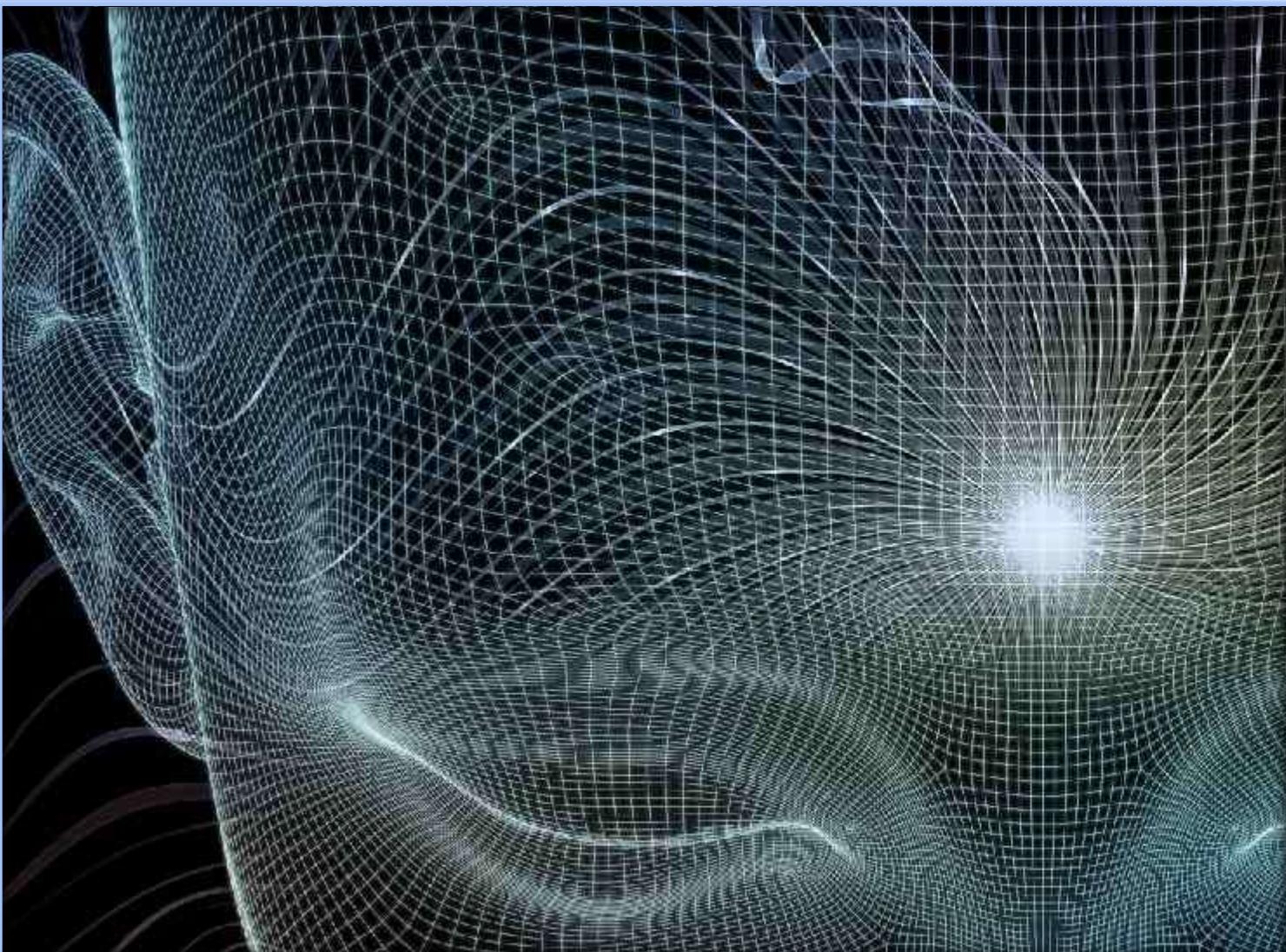


Fig.4. ASI have all human abilities.



Practical Uses of AI

Let us now explore practical uses of AI.

Google's AI-powered Predictions.

- We all know that while traveling, **Google Maps** can examine the rate of movement of traffic at any instant of time. But, this is possible only with the help of AI.
- Maps can easily integrate with user-reported road incidents like jams and accidents

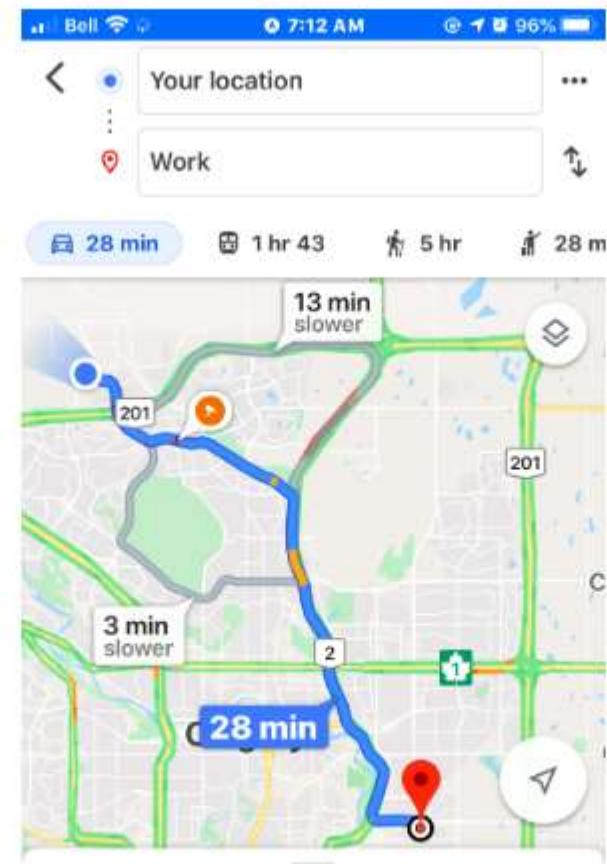


Fig.5. Google Maps uses AI

Practical Uses of AI

□ AI in Spam Filtering.

- You will think that email inboxes do not have the use of AI, but this technology is mostly operating in the email i.e. **spam filter**.

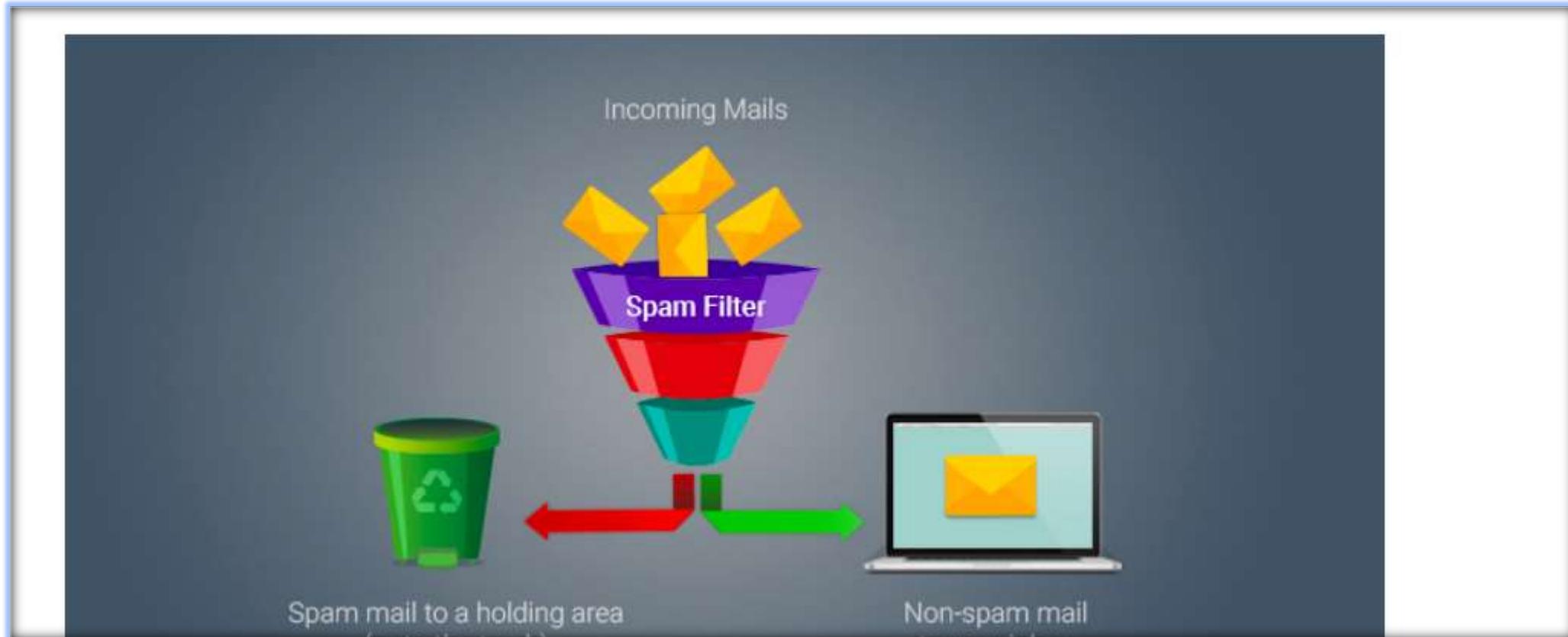


Fig.6. AI in Spam Filtering

Practical Uses of AI

□ Plagiarism Checker.

- As content writers, we regularly use tools like **Turnitin**, small SEO tools, plagiarism detectors, and many more to check the plagiarism of any article.

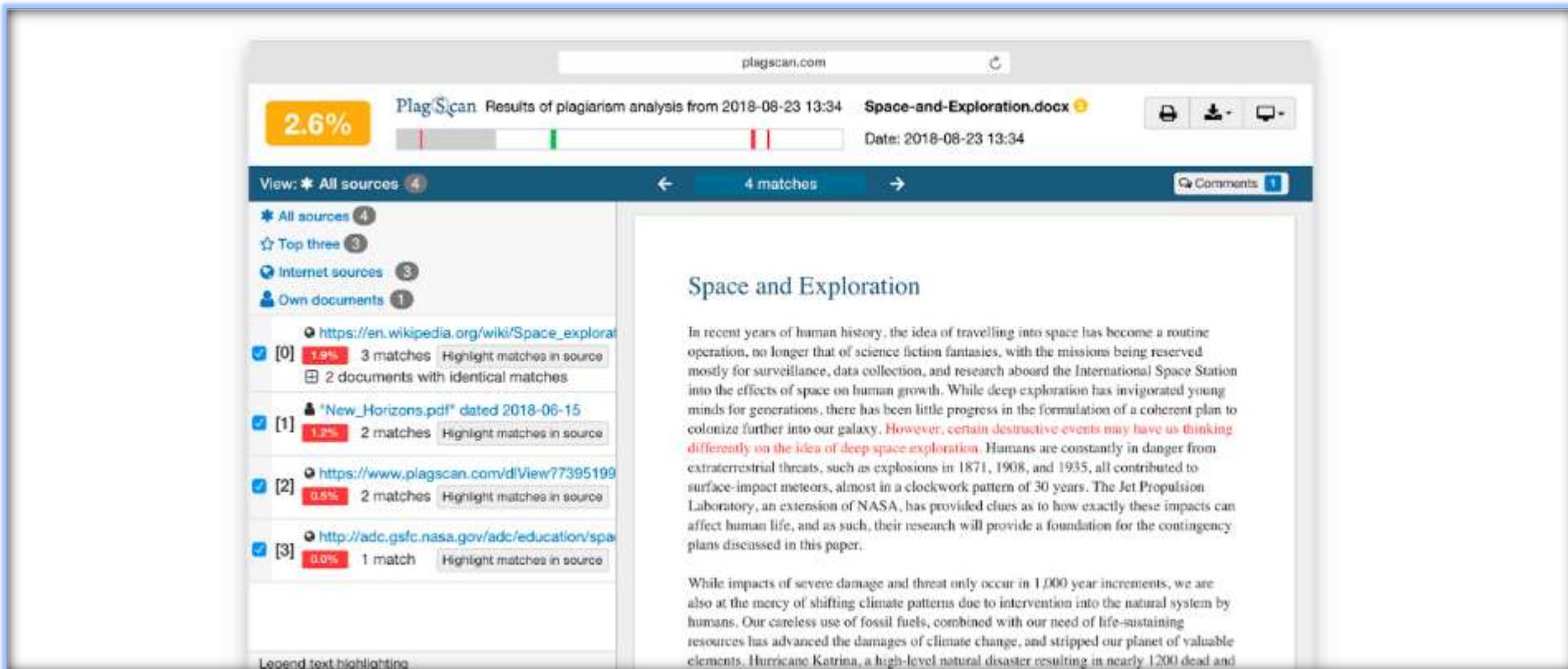


Fig.7. AI use in Plagiarism

Practical Uses of AI

□ Fraud Prevention.

- AI has come into use for making systems that learn what types of **payments are unethical**.

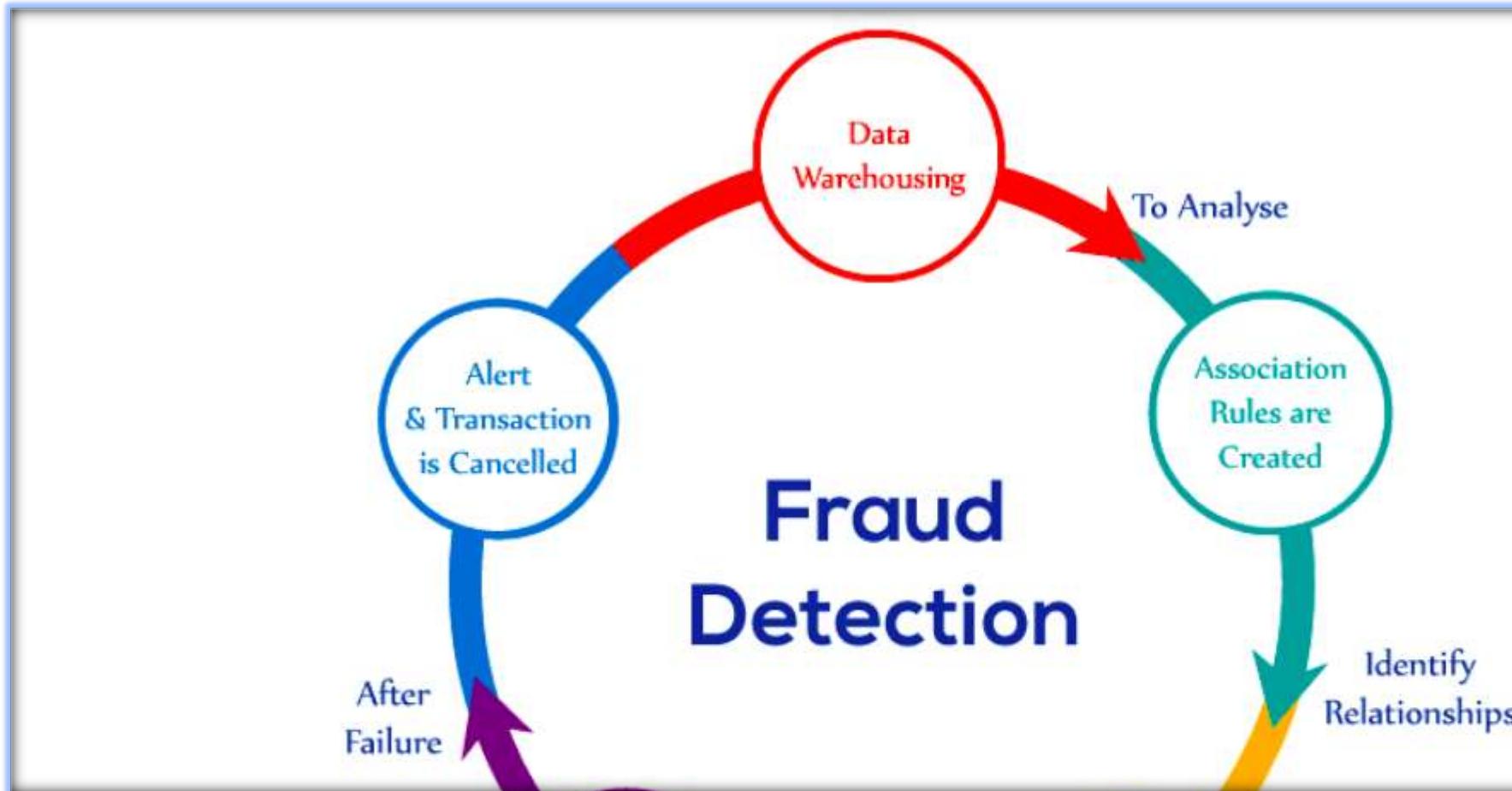


Fig.8. AI use in Fraud Detection

Practical Uses of AI

□ AI in Healthcare.

- AI can offer significant enhancements in all regions of healthcare.



Fig.9. AI use in Healthcare

Role of AI in Healthcare



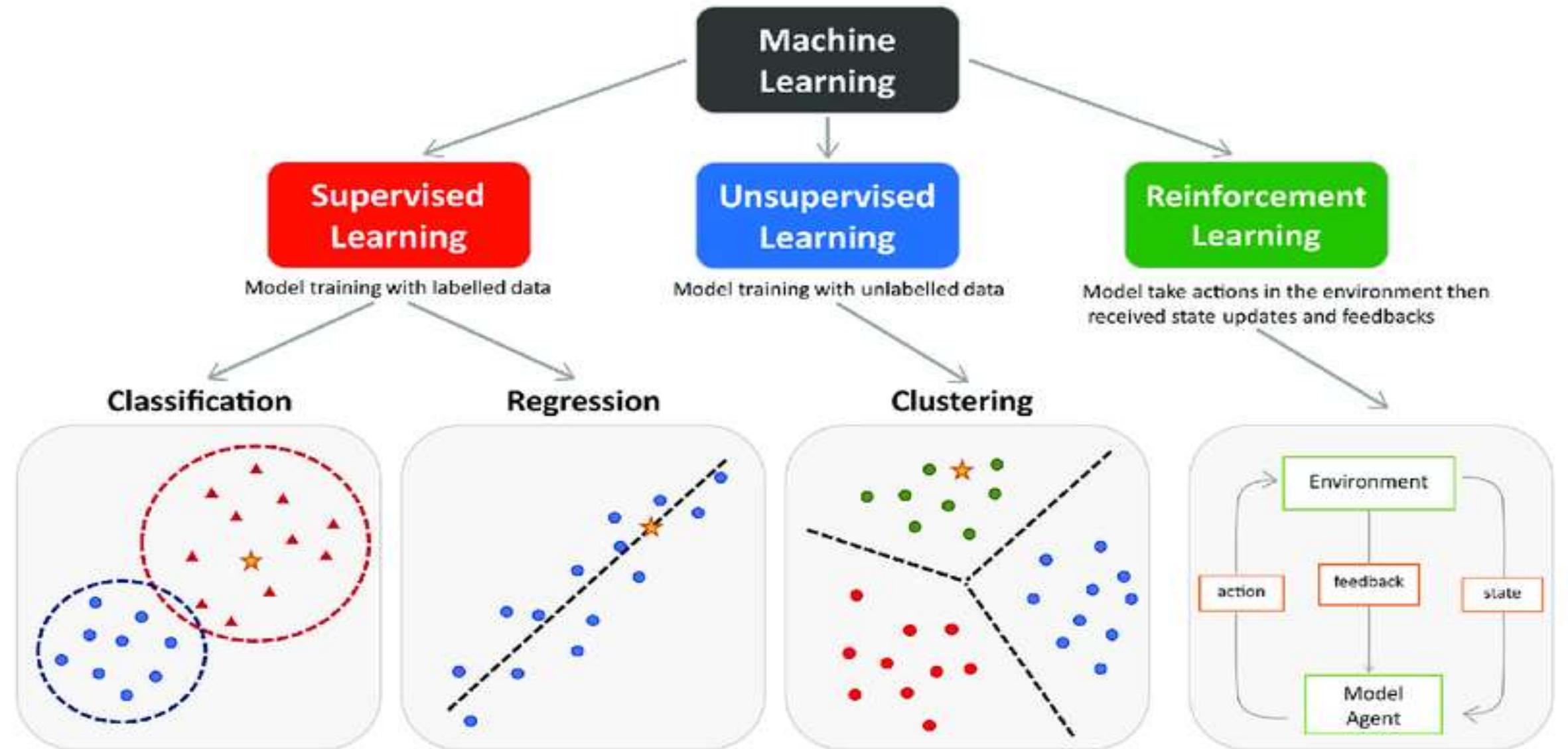
What is Machine Learning?

- Machine Learning, often abbreviated as ML, is a subset of artificial intelligence (AI) that focuses on the development of computer algorithms that improve automatically through experience and by the use of data.
- In simpler terms, machine learning enables computers to learn from data and make decisions or predictions without being explicitly programmed to do so.



Fig.10. Machine Learning

Types of Machine Learning



How Does Machine Learning Work?

- Understanding how machine learning works involves delving into a step-by-step process that transforms raw data into valuable insights.

Let's break down this process:

- **Step 1: Data collection**
- **Step 2: Data preprocessing**
- **Step 3: Choosing the right model**
- **Step 4: Training the model**
- **Step 5: Evaluating the model**
- **Step 6: Hyperparameter tuning and optimization**
- **Step 7: Predictions and deployment**

1

PROJECT PREP

Understanding the
Business Problem.

Set Project
Objectives.

2

DATA PREPARATION

Data Collection

Data Analysis

Data
Preprocessing

Feature
Engineering

3

MODELLING

Model Training



Evaluation



Hyperparamete
Tuning

What is Artificial Neural Network?

The term "Artificial Neural Network" is derived from Biological neural networks that develop the structure of a human brain.

Similar to the human brain that has neurons interconnected to one another, artificial neural networks also have neurons that are interconnected to one another in various layers of the networks.

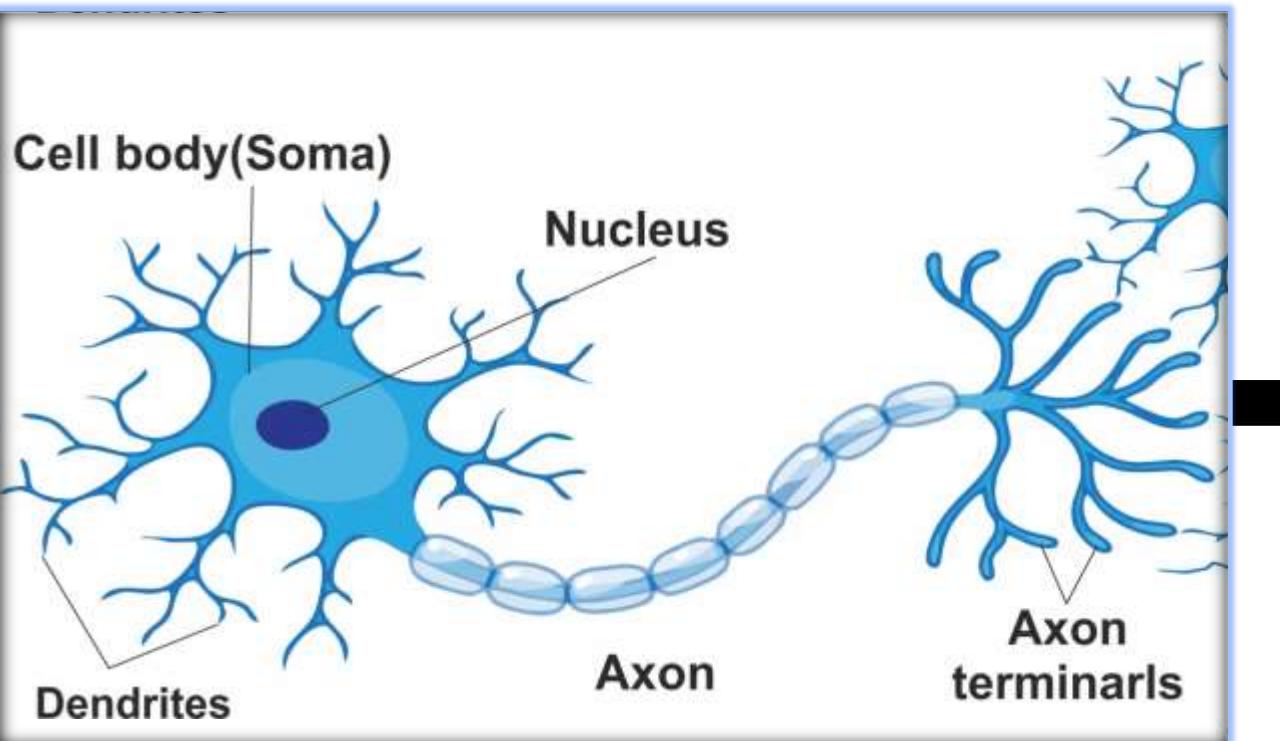


Fig.11. Artificial Neural Network

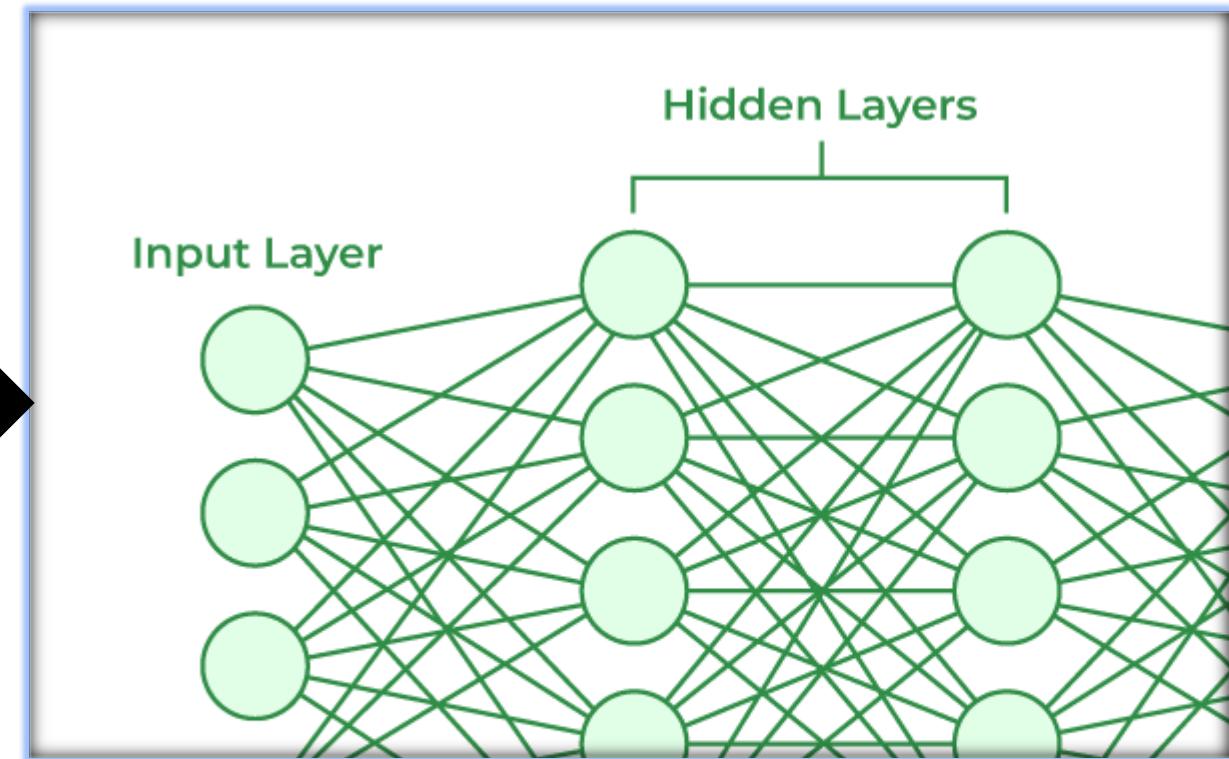


Fig.12. Biological Neural Network

Artificial neurons vs Biological neurons

Biological Neural Network	Artificial Neural Network
Dendrites	Inputs
Cell nucleus	Nodes
Synapse	Weights
Axon	Output

Biological neurons to Artificial neurons



Fig.13. Biological neurons to Artificial neurons

What is Deep Learning?

- Deep Learning (DL), a subfield of ML, specializes in training Artificial Neural Networks (ANNs) to autonomously learn and make predictions or decisions, eliminating the need for explicit programming instructions. It is inspired by the structure and function of the human brain's neural networks..

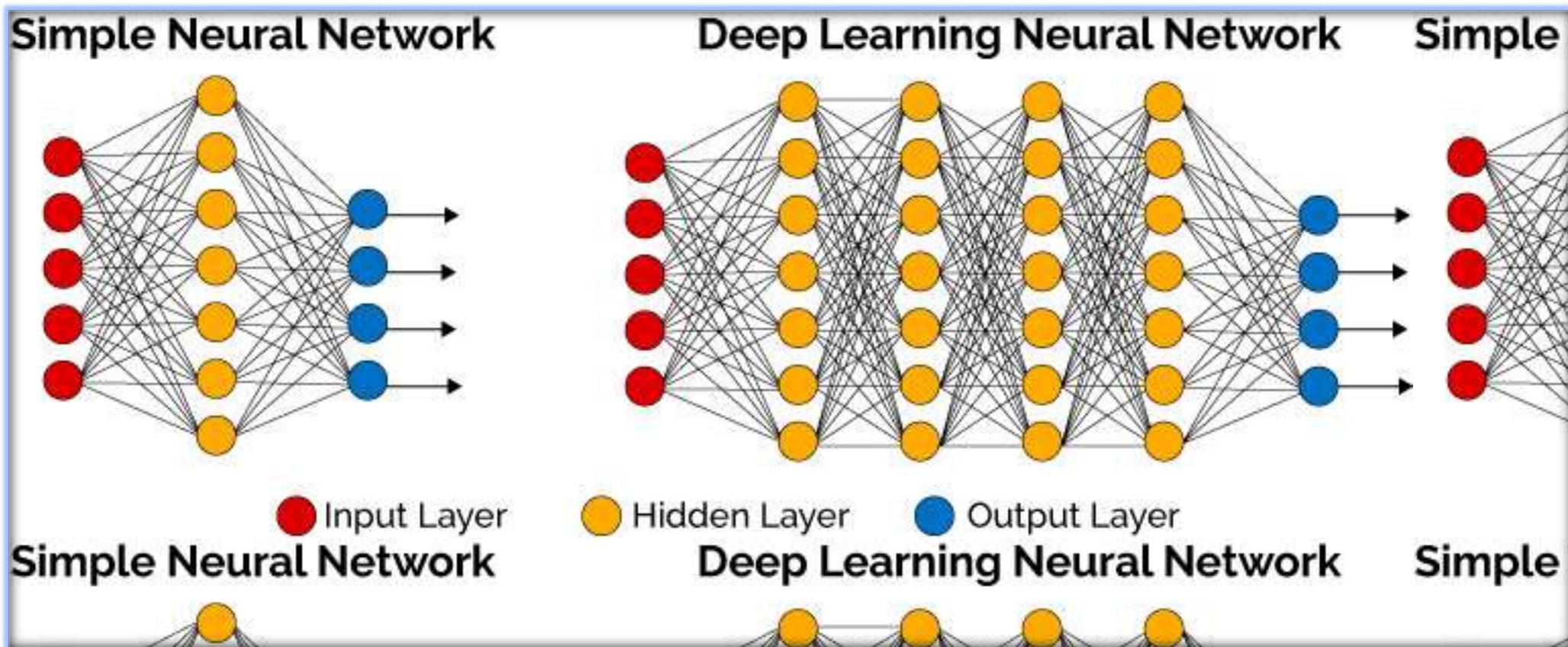
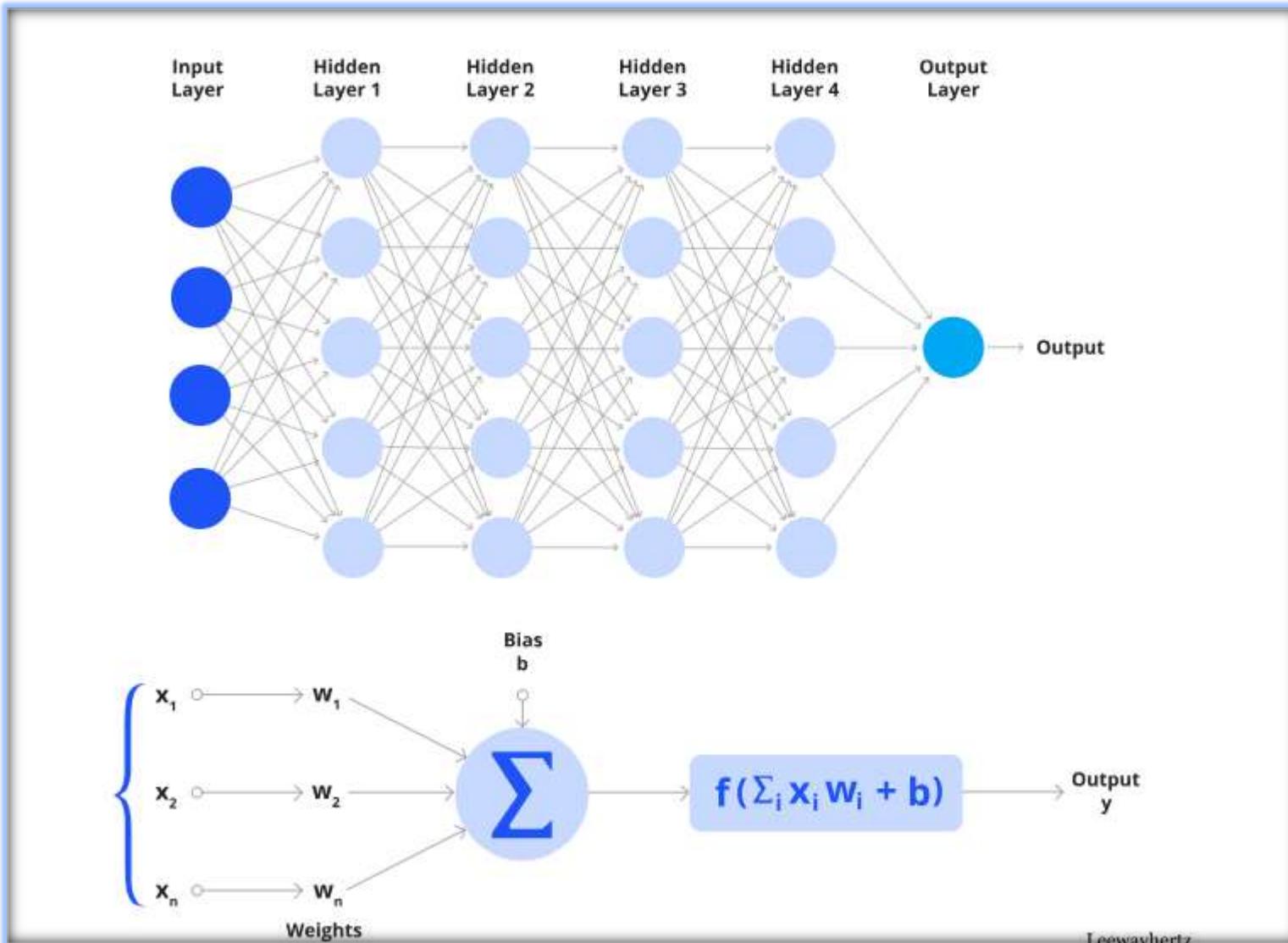


Fig.14. Deep Learning Neural Network

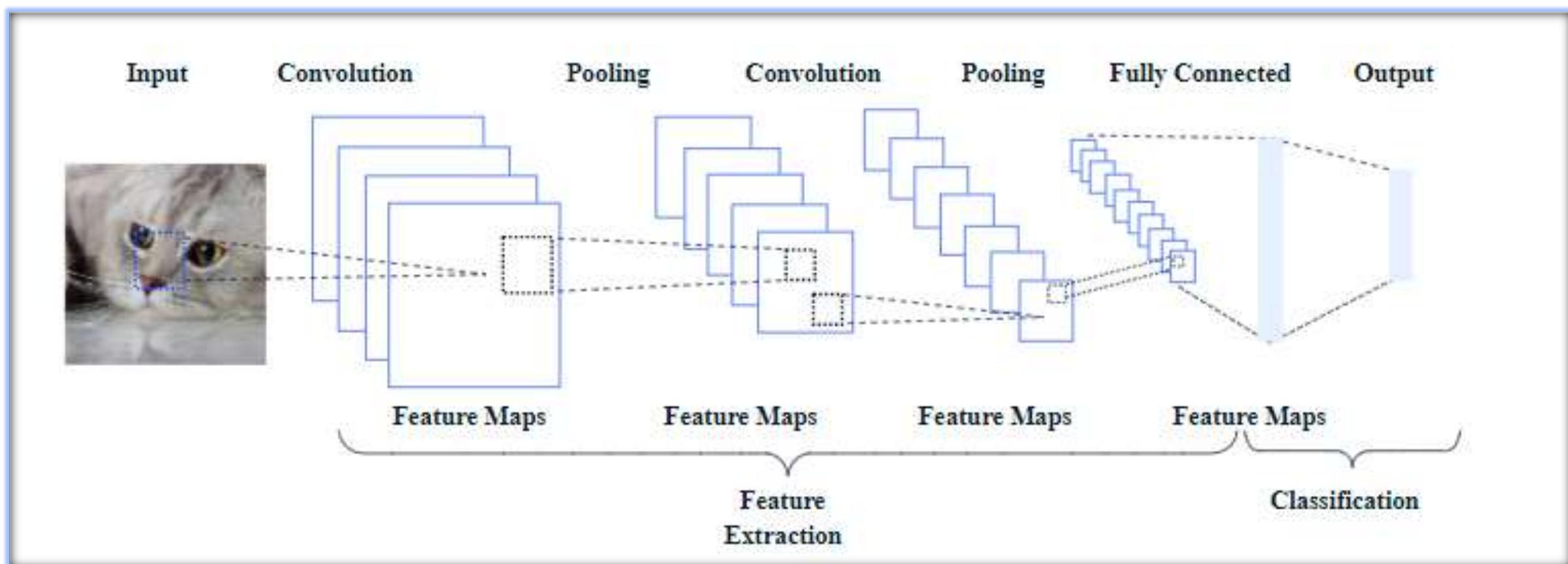
Deep learning models

□ Classic Neural Networks or Multilayer Perceptrons (MLPs).



Deep learning models

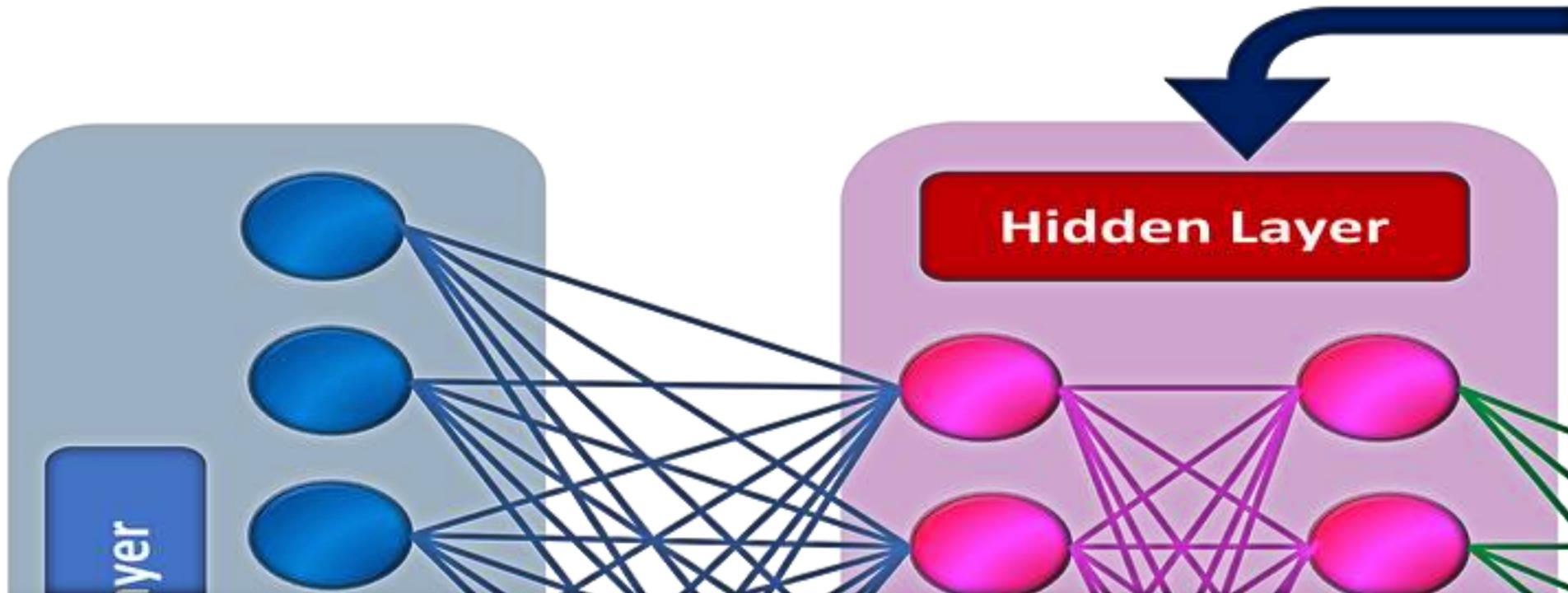
□ Convolutional Neural Networks (CNNs)



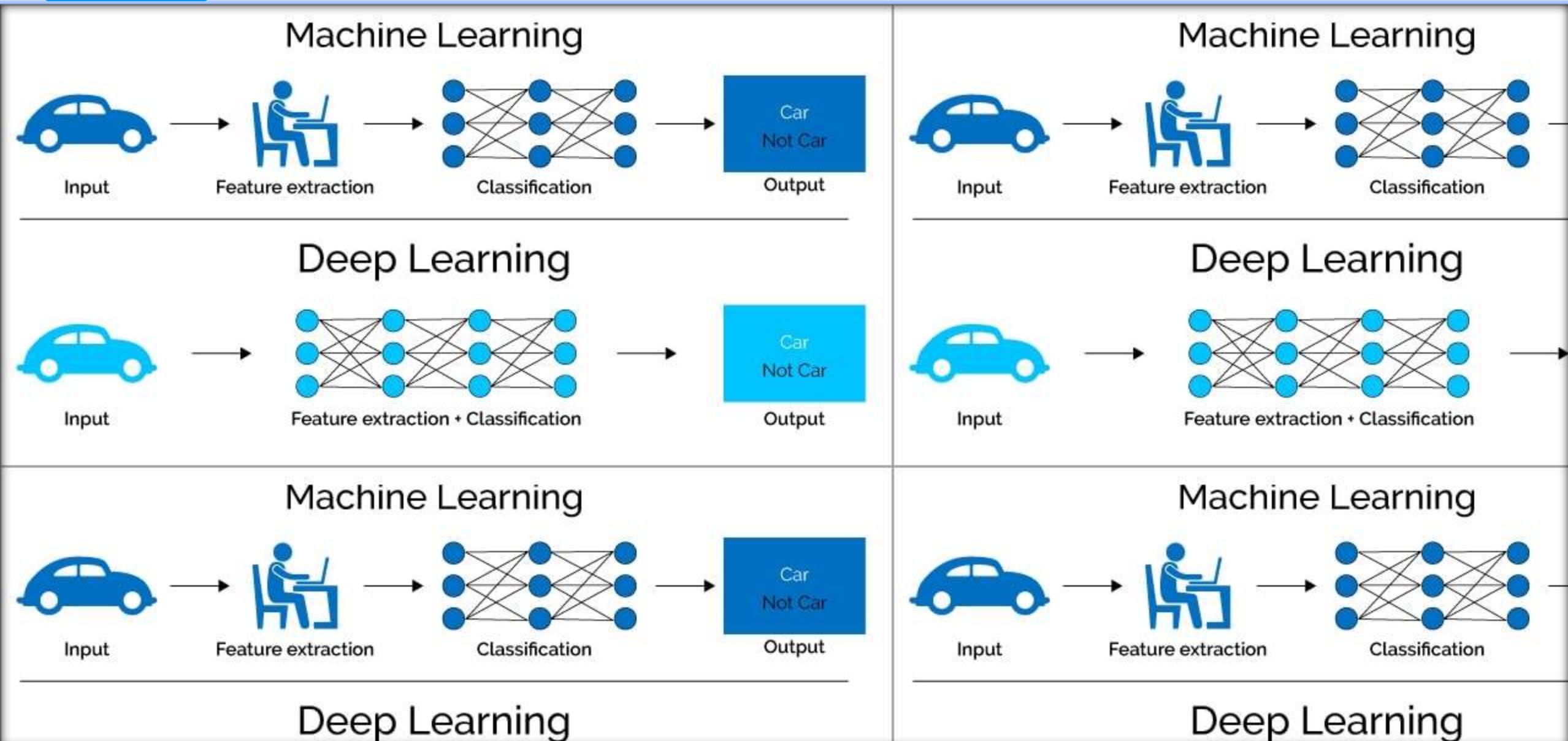
Deep learning models

□ Recurrent Neural Networks (RNNs)

Recurrent Neural

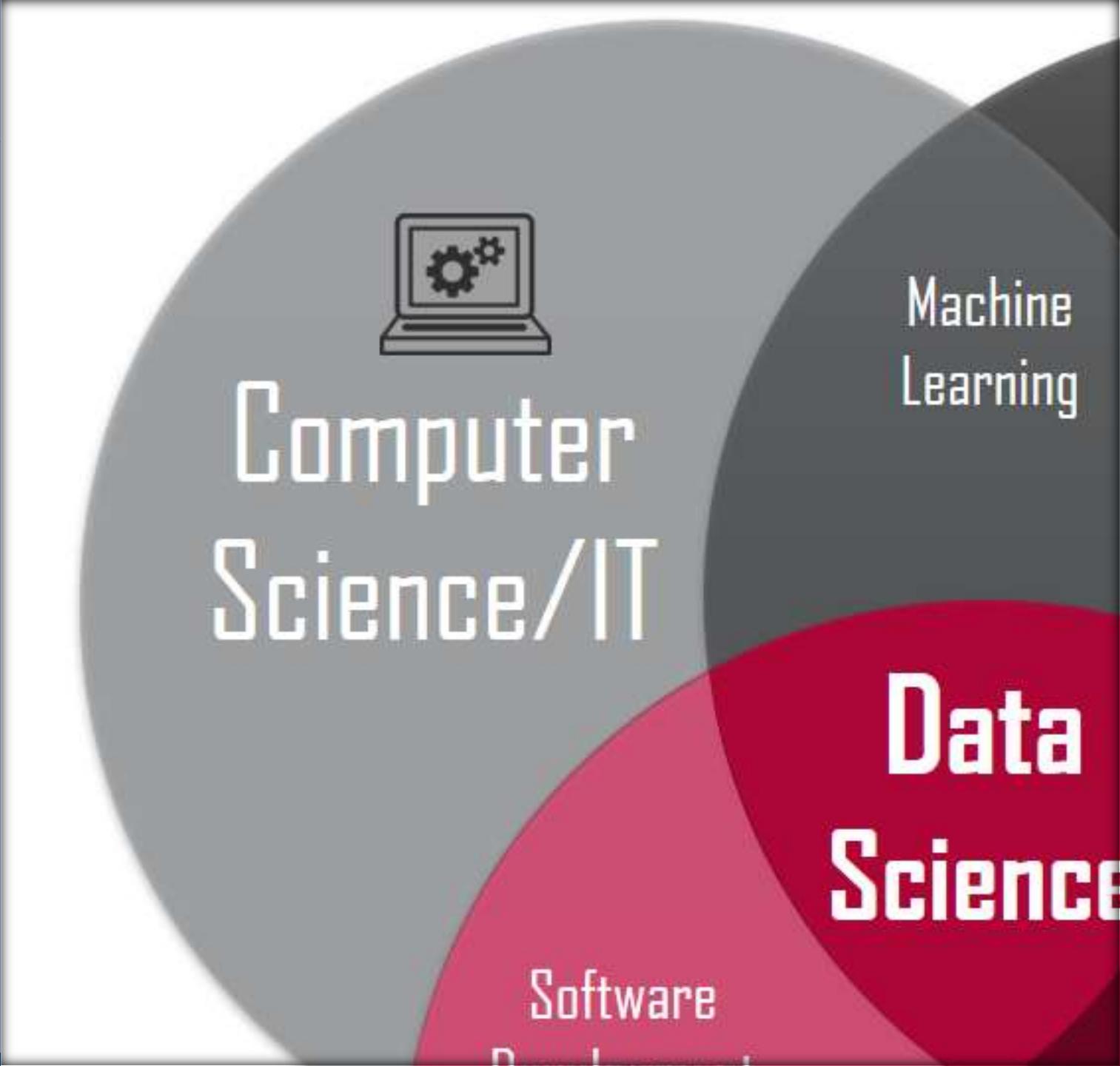


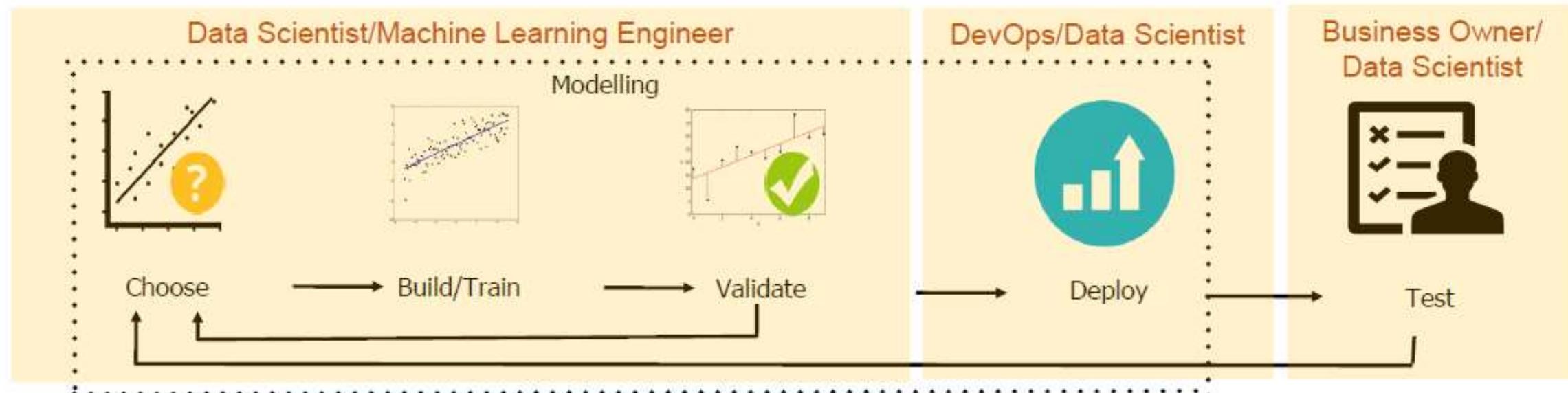
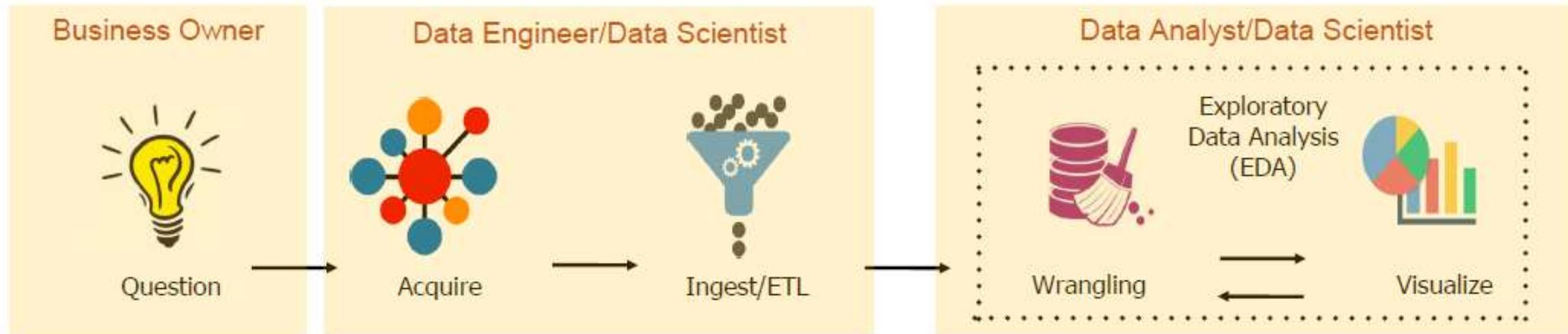
Deep Learning vs Machine Learning



What Is Data Science?

- Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from data in various forms, both structured and unstructured data.
- **Discover patterns and trends in datasets to get insights.**
- Improve the quality of data or product offerings by utilising ML techniques and DL models.





Business
Owner/
Data Scientist/
Data Analyst



The Relationship Between AI, ML, DL, and DS

-  Artificial Intelligence (AI) sets the stage for machines that can simulate human intelligence
-  Machine Learning (ML) evolves from AI, giving machines the ability to learn and grow from experience..
-  Deep Learning (DL), nestled within ML, drives machines to understand and operate on a level akin to human intuition
-  Data Science (DS) leverages ML and sometimes DL to analyze and interpret complex data, extract insights, and support decision-making.

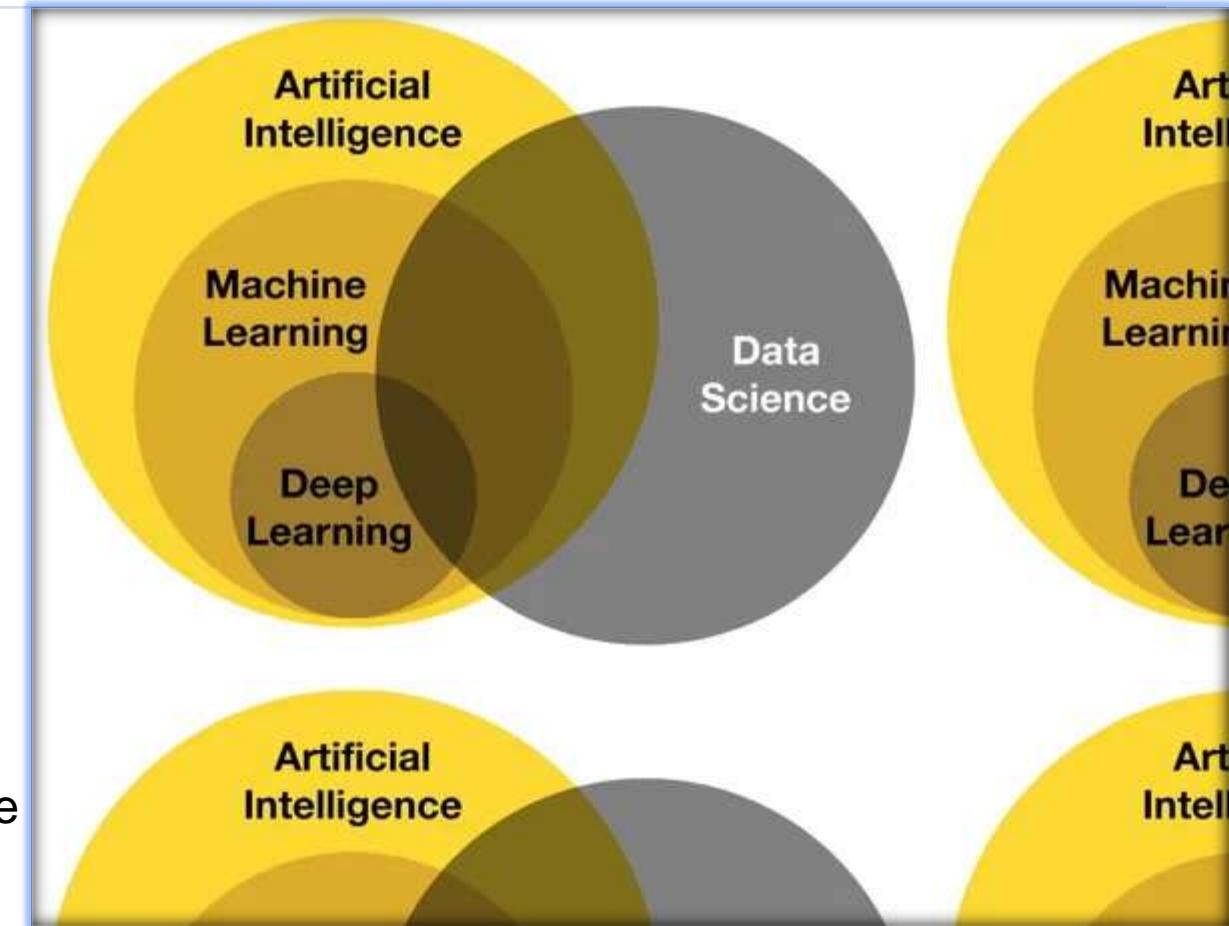
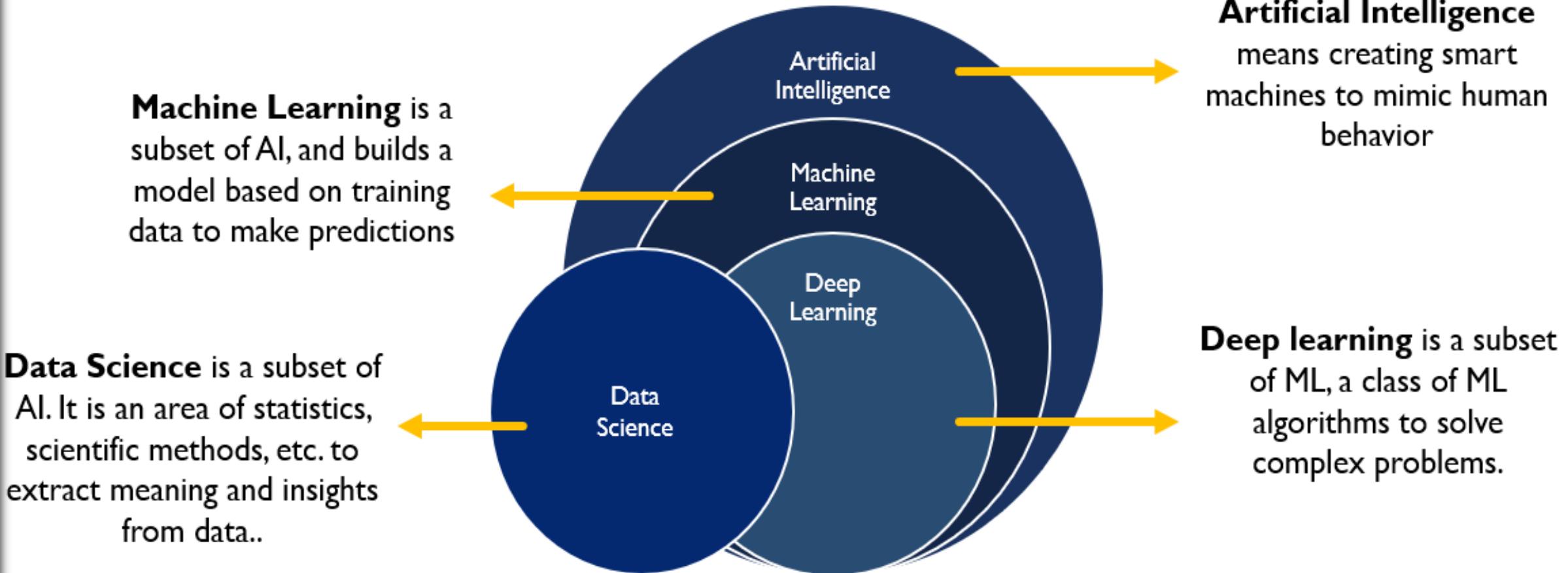


Fig.14. Relationship Between AI, ML, DL, and DS

Recap



Key Takeaways

□ Types of AI:

- Ranging from narrow AI (specialized tasks) to general AI (human-level cognitive abilities) and super AI (beyond human capabilities).

□ Applications:

- AI is used in numerous real-world scenarios such as predictive search algorithms (Google), recommendation systems (Netflix), facial recognition (Facebook), and various practical uses like spam filtering, fraud detection, and healthcare.

□ Machine Learning:

- Focuses on developing algorithms that enable computers to learn from data and make decisions without explicit programming.

□ Deep Learning:

- Specializes in training artificial neural networks to learn autonomously, inspired by the human brain's structure.

□ Data Science:

- An interdisciplinary field that combines these technologies to discover patterns, improve data quality, and enhance product offerings.

Conclusion:

- The world of AI, ML, and Data Science is rapidly evolving and becoming integral to many facets of society.
- AI sets the stage for machines to simulate human intelligence, ML enables machines to learn from experience, DL drives machines to operate on a level akin to human intuition, and DS uses these technologies to analyze data and extract valuable insights.

ANY
COLLECTION