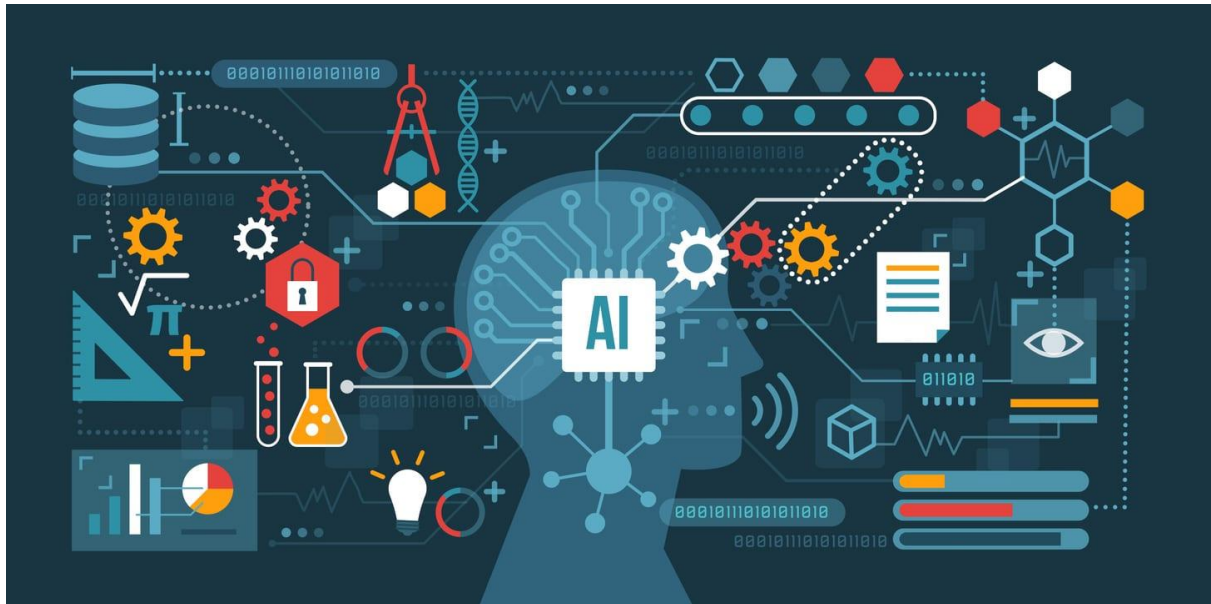# Introduction to AI And ML

1. What is artificial intelligence?

AI, or artificial intelligence, refers to the simulation of human intelligence processes by machines, specifically computer systems. It involves the development of computer programs and algorithms that enable machines to perform tasks that would normally require human intelligence, such as understanding natural language, recognizing patterns, making decisions, solving problems, and learning from experience.

2. What is machine learning?
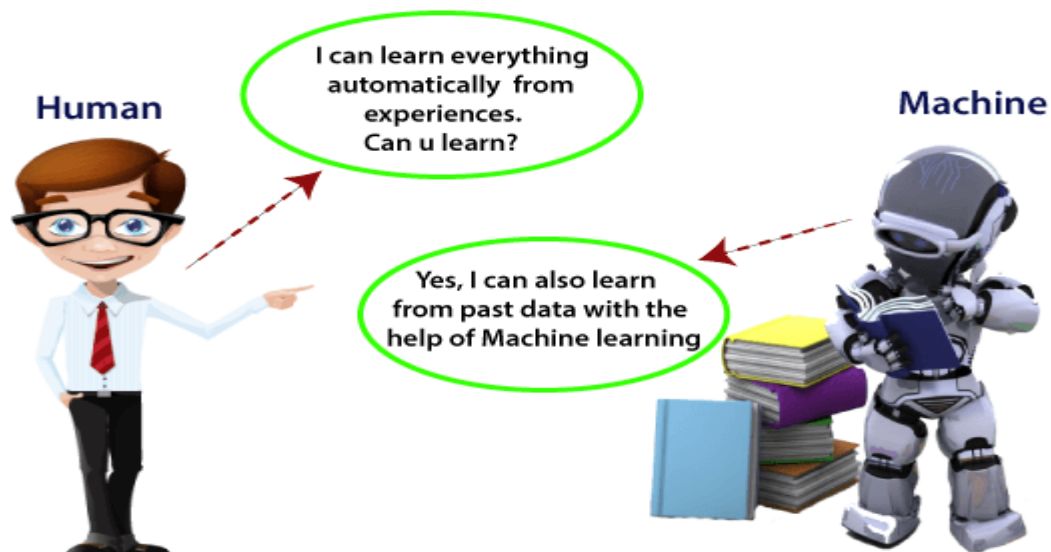
Machine learning is the science of designing algorithms that enable computers to learn patterns from data. Instead of writing explicit instructions, we provide data and let the machine learn from it to improve its performance over time. This concept is inspired by the way humans learn from experience.

3. Key pillars of AI:

AI encompasses several key areas, each focusing on different aspects of intelligent behaviour:
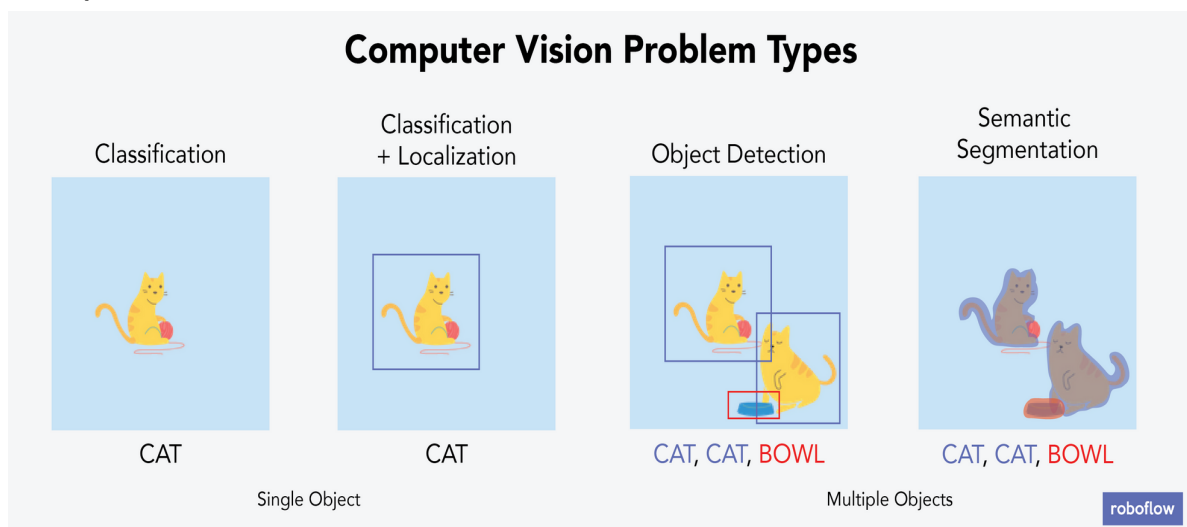
Machine learning: a subset of AI that empowers machines to learn from data and improve their performance over time. It's the driving force behind many AI applications.

Natural language processing (NLP):
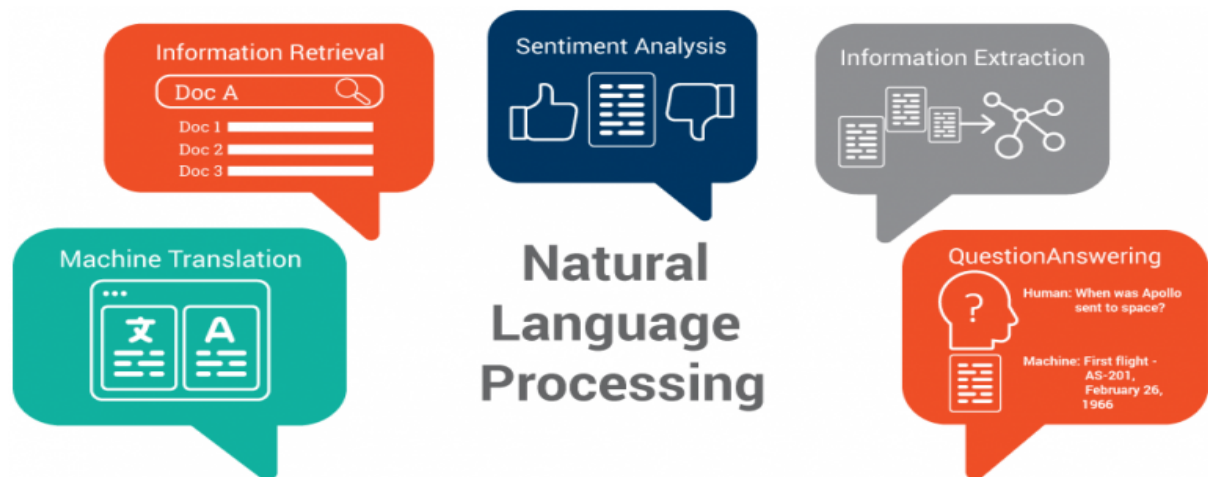
It enables computers to understand, interpret, and generate human language, making interactions more human-like.

Computer vision:

It empowers machines to interpret and understand visual information from the world, enabling tasks like image recognition and object detection.

Robotics:

It combines ai with engineering to design and create intelligent robots that can perform physical tasks autonomously.

4. Types of machine learning:

there are three main types of machine learning:

<u>Supervised learning</u>: in this approach, the algorithm learns from labelled data, where each input data point is associated with a corresponding output label. The goal is to learn a mapping from inputs to outputs.
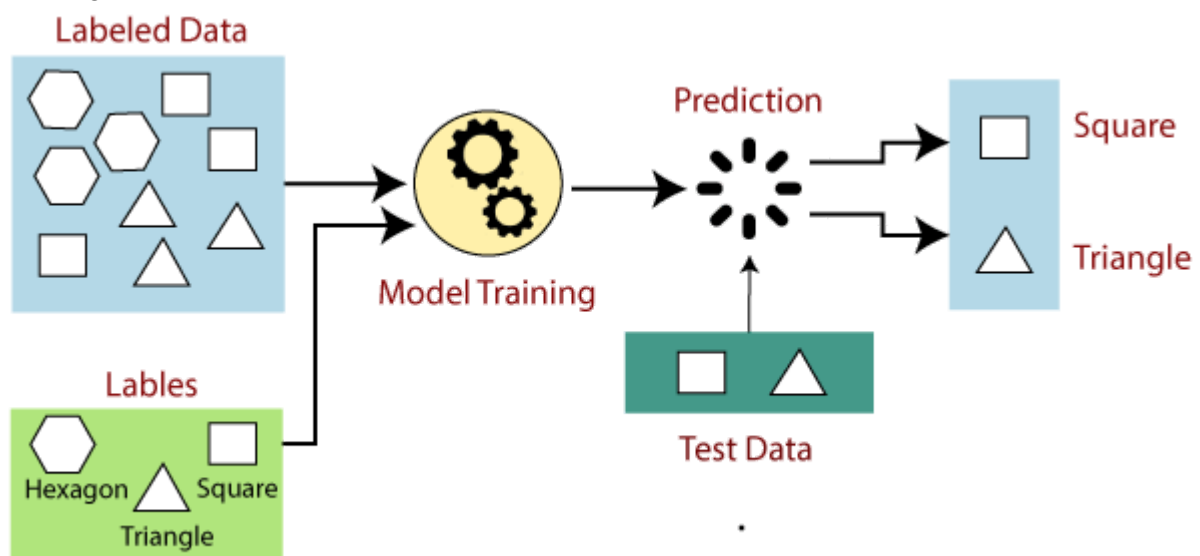

<u>Unsupervised learning</u>: here, the algorithm learns from unlabeled data. It aims to discover hidden patterns or structures within the data, such as clustering similar data points together.

Unsupervised Learning

Unlabelled Data	Machine	Results
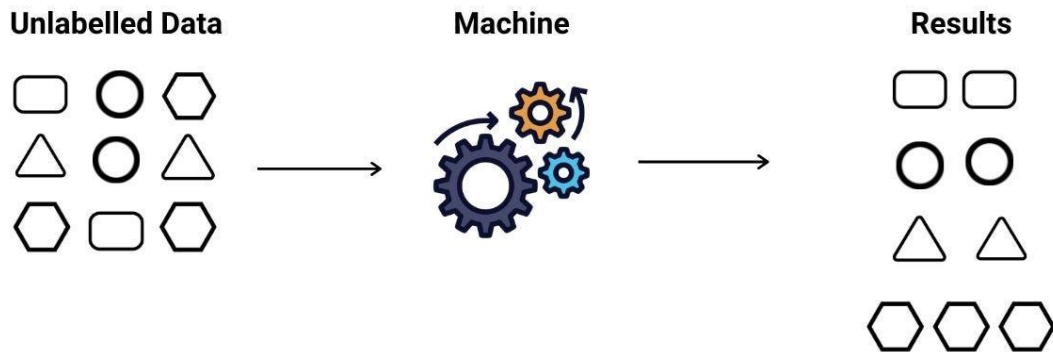
Reinforcement learning: This type involves training agents to make sequences of decisions in an environment to maximise a reward. It's commonly used in robotics, game playing, and autonomous systems.

environment

agent

actions

rewards

observations
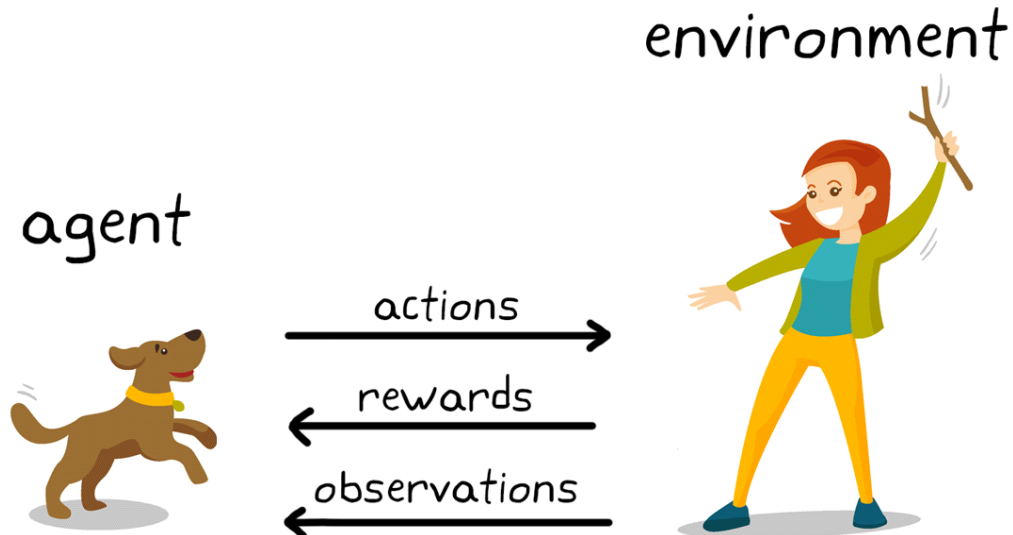
5. Machine learning process:
the typical machine learning process involves several key steps:

Data Collection: gathering relevant data for your problem from various sources.

Data Preprocessing: cleaning, transforming, and organising the data to make it suitable for analysis.

Feature Extraction: selecting or engineering the relevant features (input variables) that will help the algorithm learn effectively.

Model Selection: choosing an appropriate machine learning algorithm based on the nature of your problem and data.
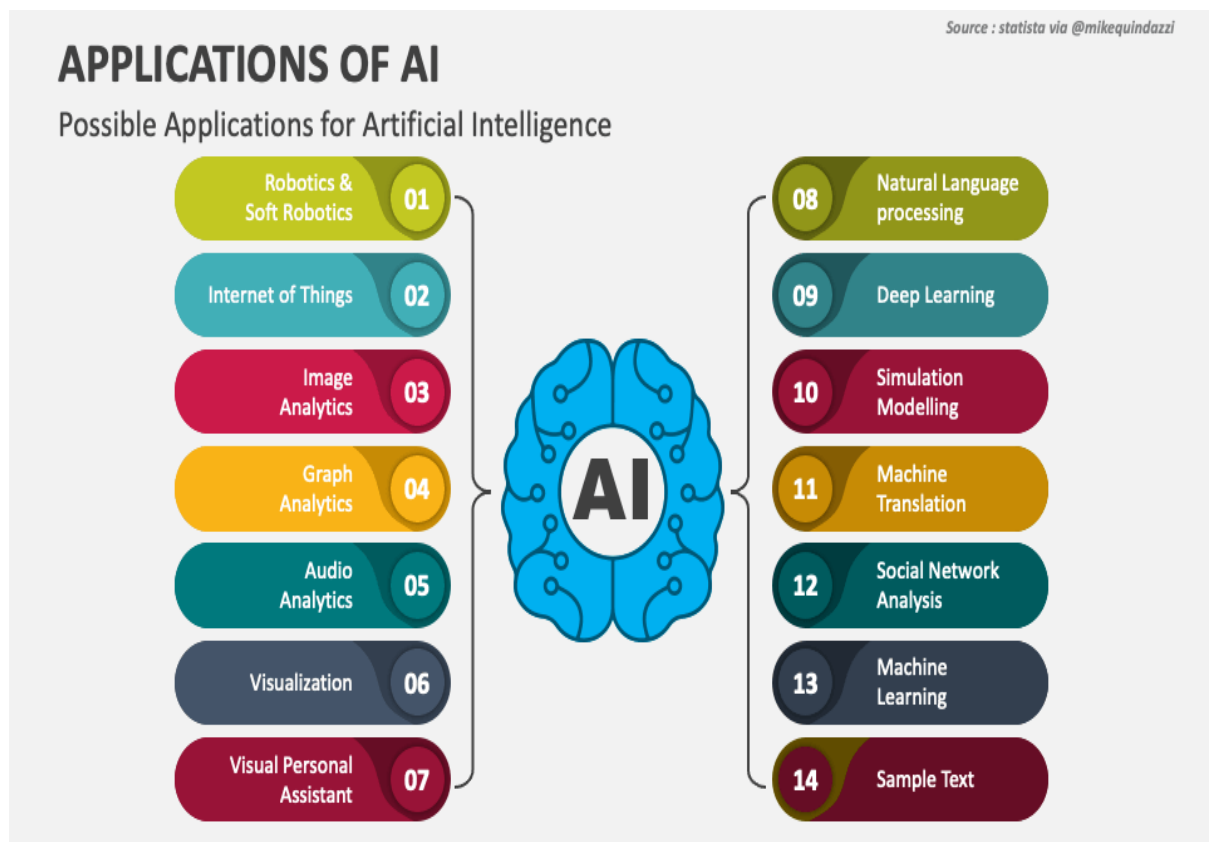
Training: feeding the algorithm with labelled data to learn the underlying patterns.

Evaluation: assessing the model's performance on unseen data to ensure it generalises well.

Tuning: adjusting hyperparameters to optimise the model's performance.

Prediction/Inference: using the trained model to make predictions or decisions on new, unseen data.

6. Applications of machine learning:

APPLICATIONS OF AI

Possible Applications for Artificial Intelligence

Source : statista via @mikequindazzi

01 Robotics & Soft Robotics	08 Natural Language processing
02 Internet of Things	09 Deep Learning
03 Image Analytics	10 Simulation Modelling
04 Graph Analytics	11 Machine Translation
05 Audio Analytics	12 Social Network Analysis
06 Visualization	13 Machine Learning
07 Visual Personal Assistant	14 Sample Text

AI

machine learning has a wide range of applications:

Natural Language Processing (NLP):Nlp is a subfield of AI that focuses on enabling computers to understand, interpret, and generate human language in a way that is both meaningful and contextually relevant. It involves bridging the gap between human communication and machine understanding. Here's a brief explanation of nlp and its applications:

- ## Machine translation: nlp powers machine translation services like google translate, enabling the automatic translation of text from one language to another.

- ## Chatbots and virtual assistants: nlp-driven chatbots and virtual assistants like siri and alexa can understand and respond to human language, providing information, performing tasks, and engaging in natural conversations.

- ## Text summarization: nlp can generate concise summaries of lengthy texts, making it easier for users to quickly grasp the main points of an article, research paper, or document.

healthcare: AI, including machine learning and data analysis, has made significant inroads into the healthcare sector, leading to transformative advancements. Here's a brief overview of healthcare applications:

- ## Predicting disease outcomes: by analysing patient data, medical history, and various risk factors, AI models can predict the likelihood of diseases such as diabetes, heart disease, and certain types of cancer. Early detection enables timely intervention and treatment.

- ## Medical image analysis: ai algorithms can analyse medical images, such as x-rays, mris, and ct scans, to identify abnormalities, tumours, fractures, and other medical conditions. This assists radiologists in making accurate diagnoses.

- ## Drug discovery: ai speeds up the drug discovery process by analysing massive datasets to identify potential drug candidates. Machine learning models can predict the effectiveness and potential side effects of new drugs, saving time and resources.

finance: fraud detection, stock market prediction, credit risk assessment.

image and speech recognition: recognizing objects, faces, and spoken language.

autonomous vehicles: self-driving cars that can navigate without human intervention.

recommendation systems: suggesting products, movies, or content based on user preferences.

gaming: creating intelligent opponents and adaptive gameplay.