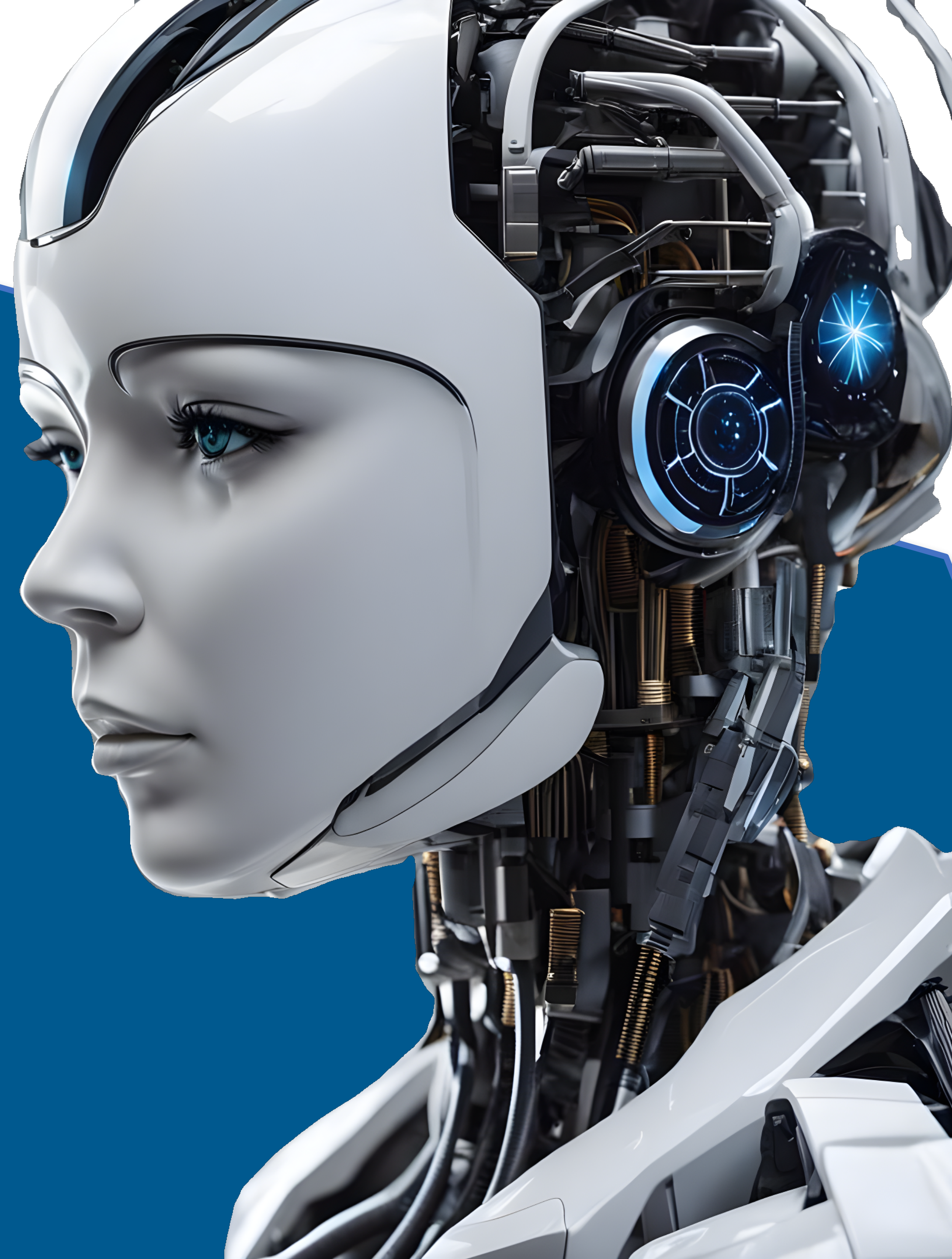




Tishk International University
IT Department
Course Code: IT-344/A



Introduction to Machine Learning

Introduction to Machine Learning

Lecture 2

Spring 2024

Hemin Ibrahim, PhD

hemin.ibrahim@tiu.edu.iq

Outline



- Introduction to machine learning
- History of machine learning
- How does a machine learn?
- Types of learning

Objectives



- Define the concept of machine learning and its significance in various fields.
- Trace the historical development and evolution of machine learning from its origins to the present day
- Explain the fundamental concept of learning in the context of machine learning.
- Differentiate between various types of learning paradigms in machine learning, including supervised, unsupervised, and reinforcement learning.

**Human can learn from past experience
and make decision of its own**

Human can learn from past experience and make decision of its own



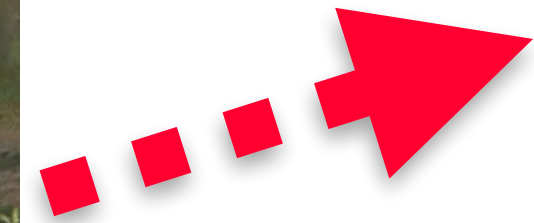
What is this object?



Intro to Machine Learning



What is this object?





He is human and he can learn fast..

BUT How?

Intro to Machine Learning



He is human and he can learn fast..

BUT How?



Intro to Machine Learning



Cell phone



Cell phone



Cell phone

Show him:



Printer



Printer



Printer

Intro to Machine Learning



What is this object?



Cell phone



Cell phone



Cell phone



Printer



Printer



Printer



**As human, not just learn to recognize, we even can
analyze**

What about a machine?



What about a machine?

What about a machine?



Machines:

- follow instructions
- can perform an arithmetic operations such as: Addition, Subtraction, Multiplication, Division.
- print
- compare
- plotting a chart

What about a machine?



**We desire machines to act like humans,
to **learn** things.**

What about a machine?



But How?!!!!

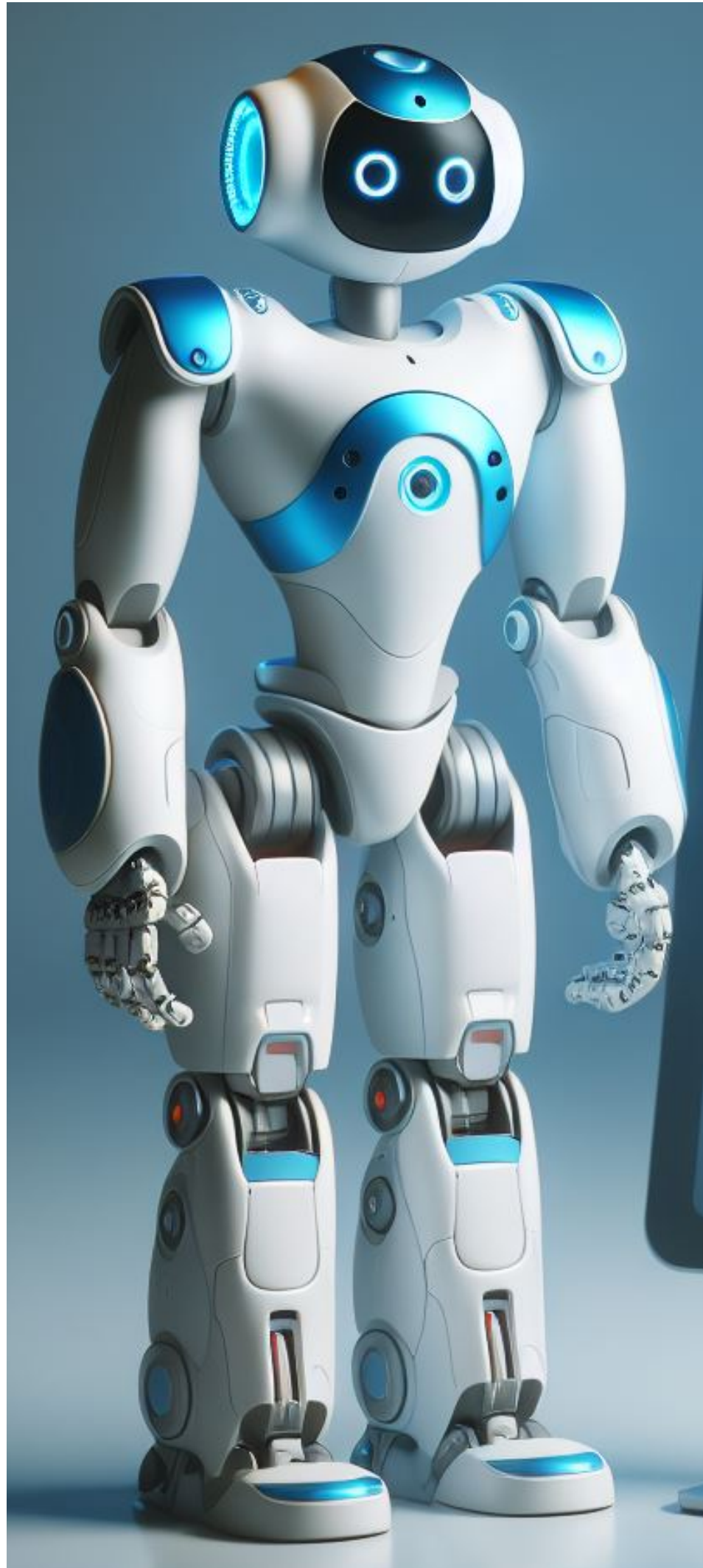
Just like, what we did to human (Tarzan)



We need to provide experiences to the machine.

What about a machine?

We need to provide experiences to the machine.



Cell phone



Cell phone



Cell phone



Printer



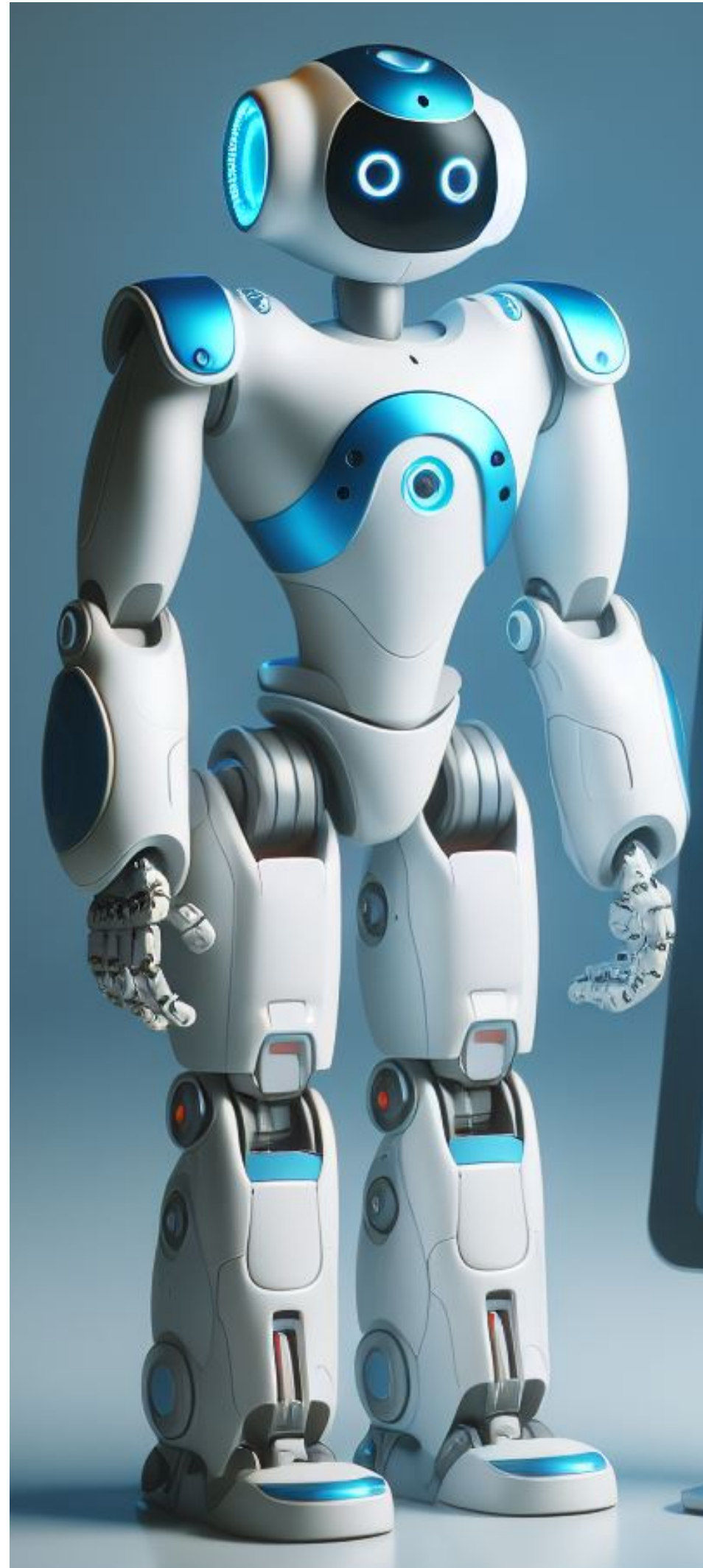
Printer



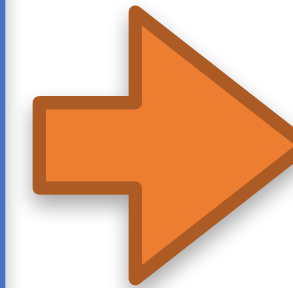
Printer

What about a machine?

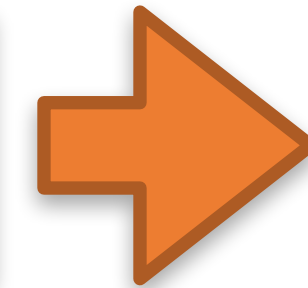
We need to provide experiences to the machine.



Dataset



ML Algorithms



Intelligence

What is machine learning?



What is machine learning?

Alan Turing

Alan Turing was the first person to do a lot of research in the area he named Machine Intelligence.

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO THE ENTSCHEIDUNGSPROBLEM

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

The “computable” numbers may be described briefly as the real numbers whose expressions as a decimal are calculable by finite means. Although the subject of this paper is ostensibly the computable *numbers*, it is almost equally easy to define and investigate computable functions of an integral variable or a real or computable variable, computable predicates, and so forth. The fundamental problems involved are, however, the same in each case, and I have chosen the computable numbers for explicit treatment as involving the least cumbrous technique. I hope shortly to give an account of the relations of the computable numbers,

Alan Turing

Alan Turing was the first person to do a lot of research in the area he named Machine Intelligence.

VOL. LIX. No. 236.]

[October, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY



I.—COMPUTING MACHINERY AND INTELLIGENCE

BY A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning

Alan Turing

Alan Turing was the first person to do a lot of research in the area he named Machine Intelligence.

to make a 'thinking machine' more human by dressing it up in such artificial flesh. The form in which we have set the problem reflects this fact in the condition which prevents the interrogator from seeing or touching the other competitors, or hearing their voices. Some other advantages of the proposed criterion may be shown up by specimen questions and answers. Thus:

Q : Please write me a sonnet on the subject of the Forth Bridge.

A : Count me out on this one. I never could write poetry.

Q : Add 34957 to 70764

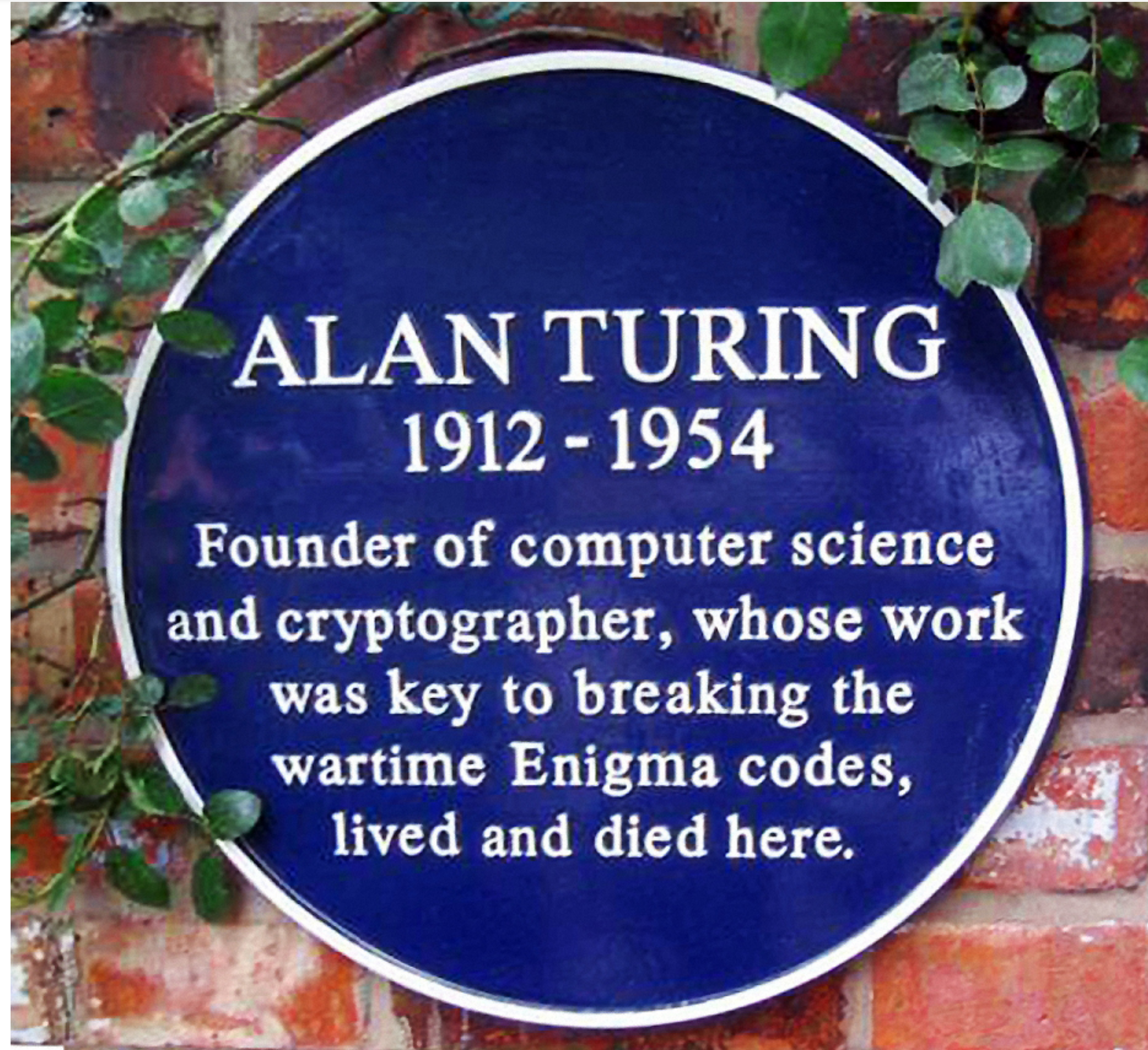
A : (Pause about 30 seconds and then give as answer) 105621.

Q : Do you play chess ?

A : Yes.

Alan Turing

Alan Turing was the first person to do a lot of research in the area he named Machine Intelligence.



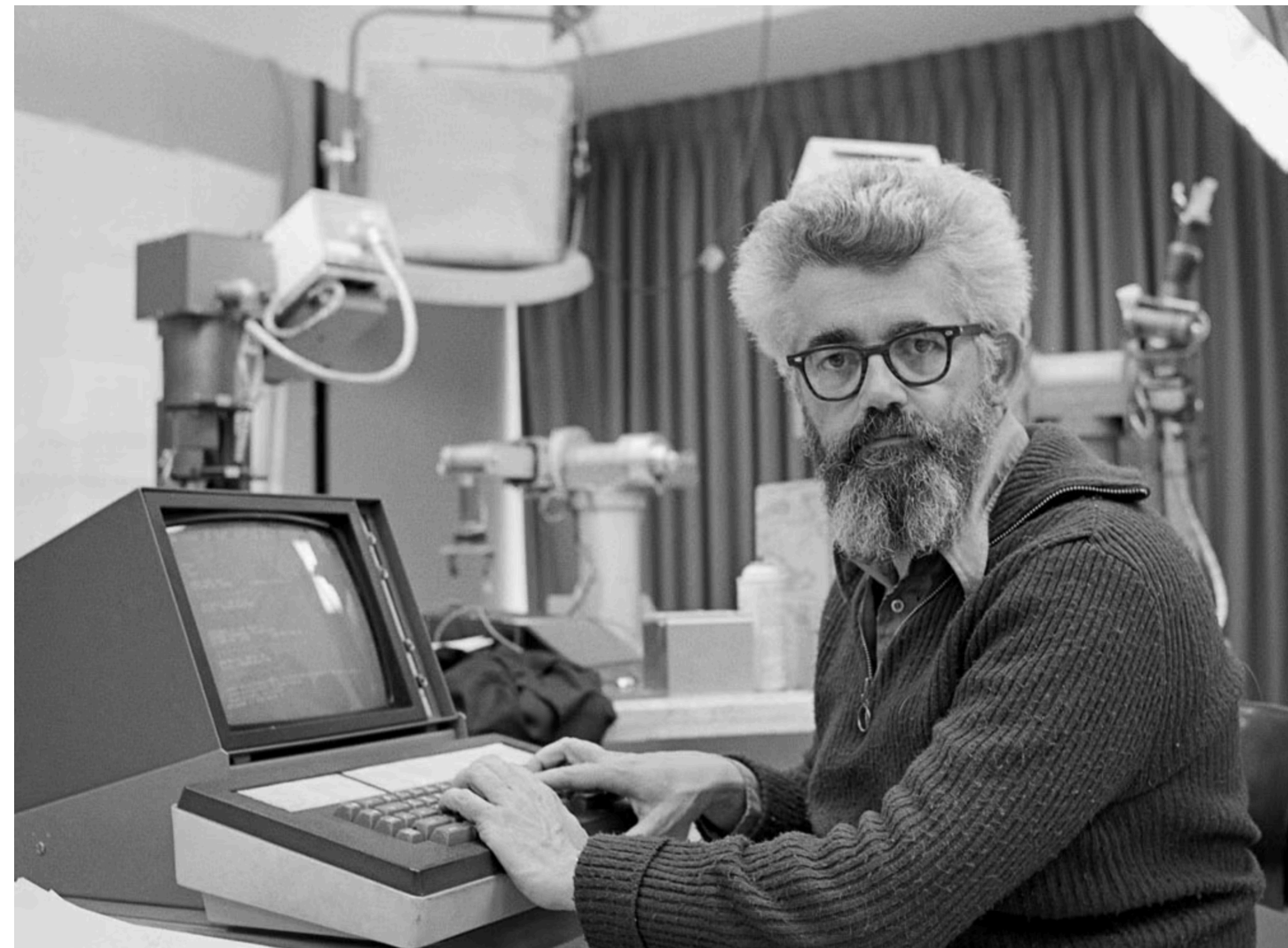
Artificial Intelligence (AI) - 1956

Artificial Intelligence (AI) research became an academic discipline in 1956, marking its official founding.



Artificial Intelligence (AI) - 1956

John McCarthy introduced the term "Artificial Intelligence" during the Dartmouth Workshop in 1956.



John McCarthy



McCarthy at a conference in 2006

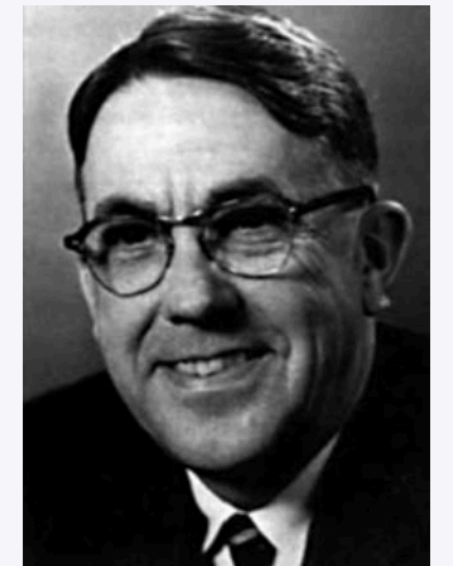
Born	September 4, 1927 Boston, Massachusetts, U.S.
Died	October 24, 2011 (aged 84) Stanford, California, U.S.
Alma mater	Princeton University , California Institute of Technology
Known for	Artificial intelligence , Lisp , circumscription , situation calculus

Machine Learning (ML) - 1959

Arthur Samuel, an IBM employee and pioneer in computer gaming and artificial intelligence, coined the term "machine learning" in 1959.



Arthur Lee Samuel



Born December 5, 1901
[Emporia, Kansas](#)

Died July 29, 1990 (aged 88)
[Stanford, California](#)

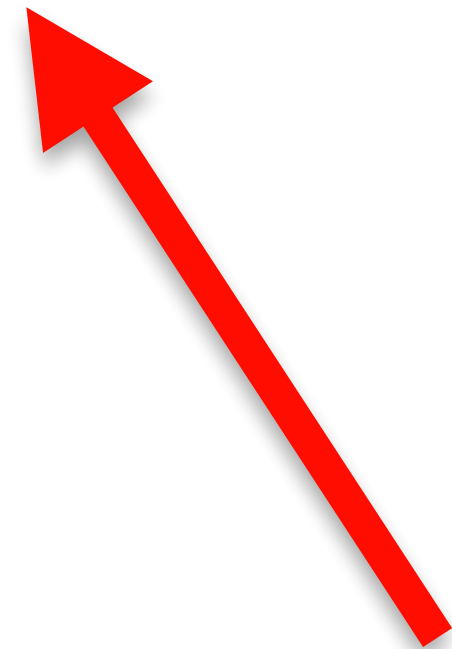
Citizenship [United States](#)

Alma mater [MIT](#) (Master 1926)
[College of Emporia](#) (1923)

Known for Samuel [Checkers](#)-playing Program
[Alpha–beta pruning](#) (an early implementation)
Pioneer in [Machine Learning](#)^[2]
[TeX](#) project (with [Donald Knuth](#))

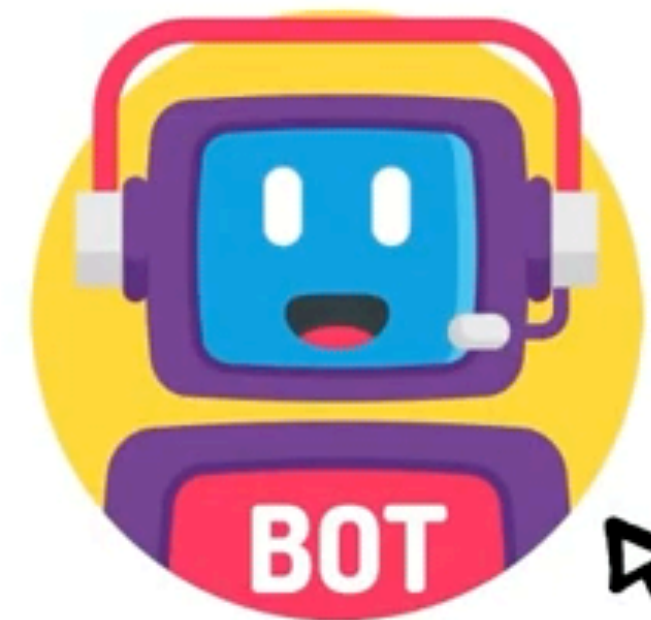
Machine Learning (ML) - 1959

“Field of study that gives computers the ability to learn without being explicitly programmed”



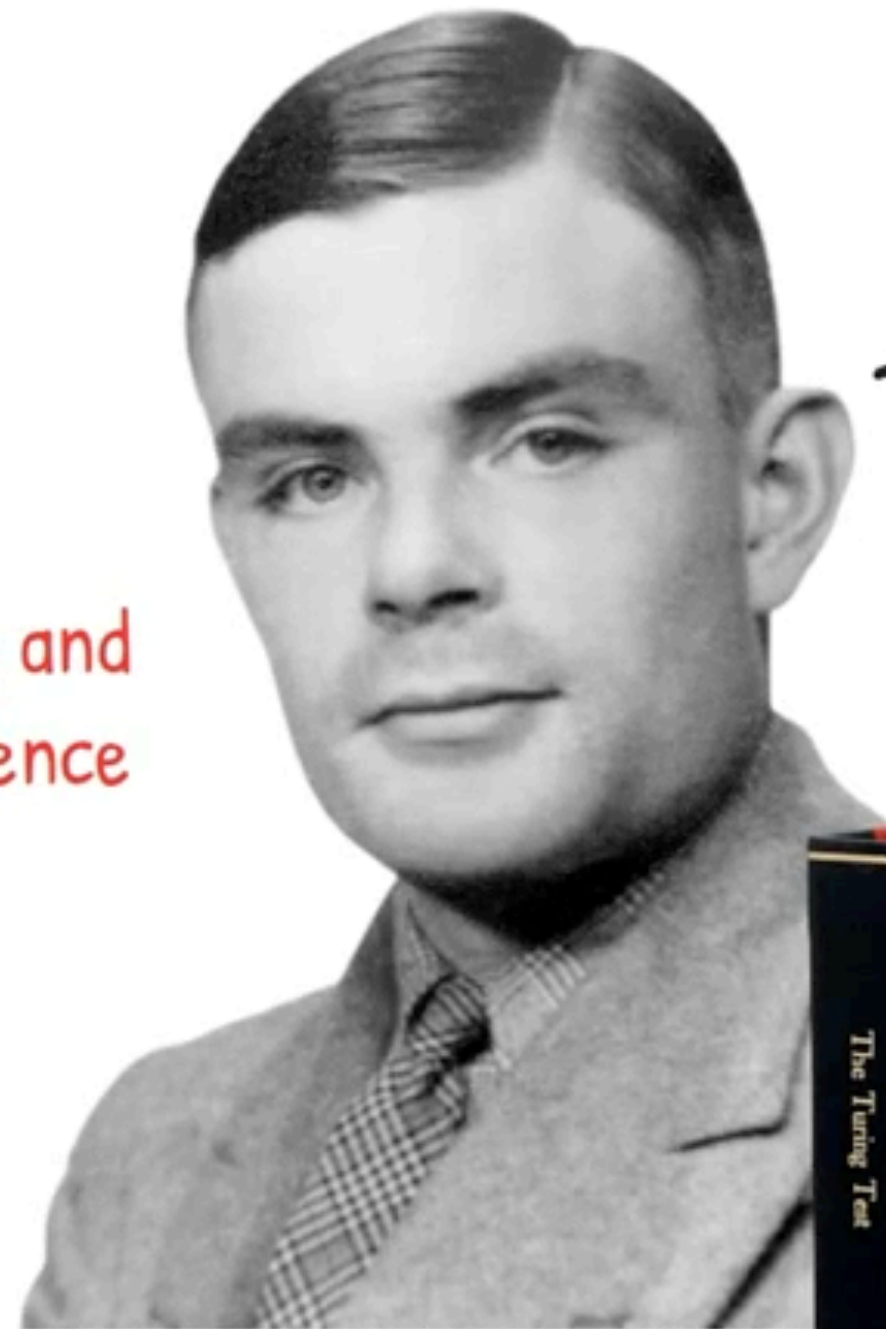
History of machine learning - 1966

Eliza



1950s

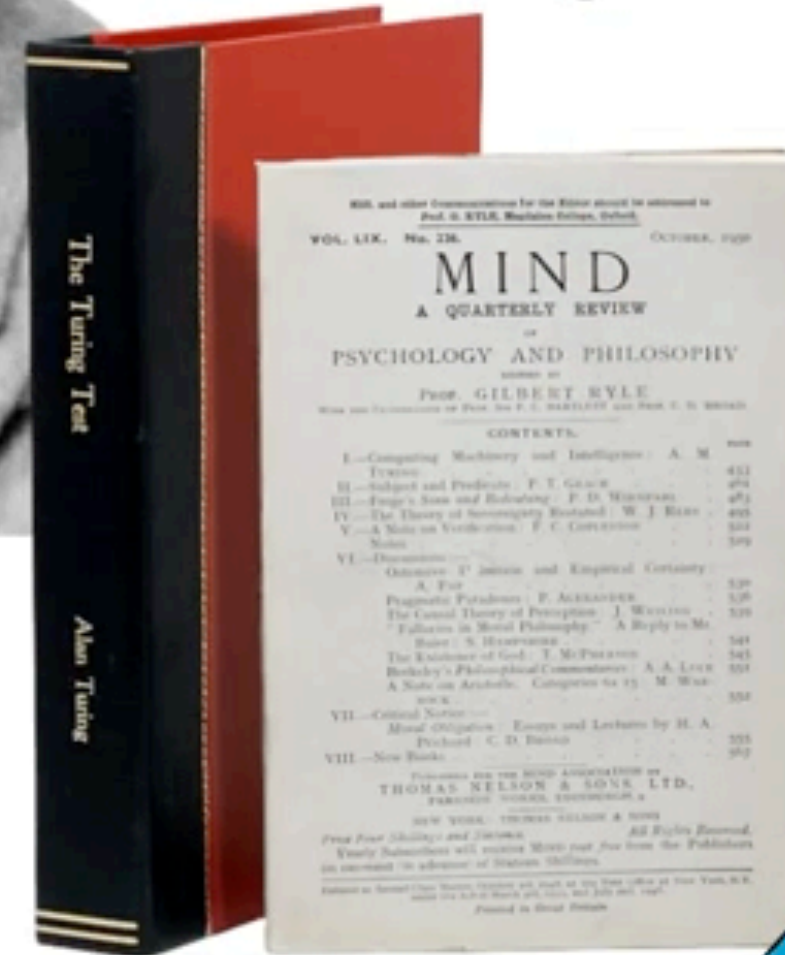
Capable of thinking and possessing intelligence



Intelligent?



Impersonate



1950



History of machine learning - 1997

Deep Blue was a chess-playing expert system



History of machine learning - Now



amazon

Google

Microsoft



SAMSUNG



amazon alexa



What is AI, ML and Deep learning



Artificial Intelligence

Creating machines that can mimic human behavior/cognition.

Or

A System that think or act like human or rationally.

Machine Learning

ML (Subset of AI) is a concept that describes the process of a set of generic algorithms analyzing your data, and providing you with interesting data without writing any specific codes for your problem.

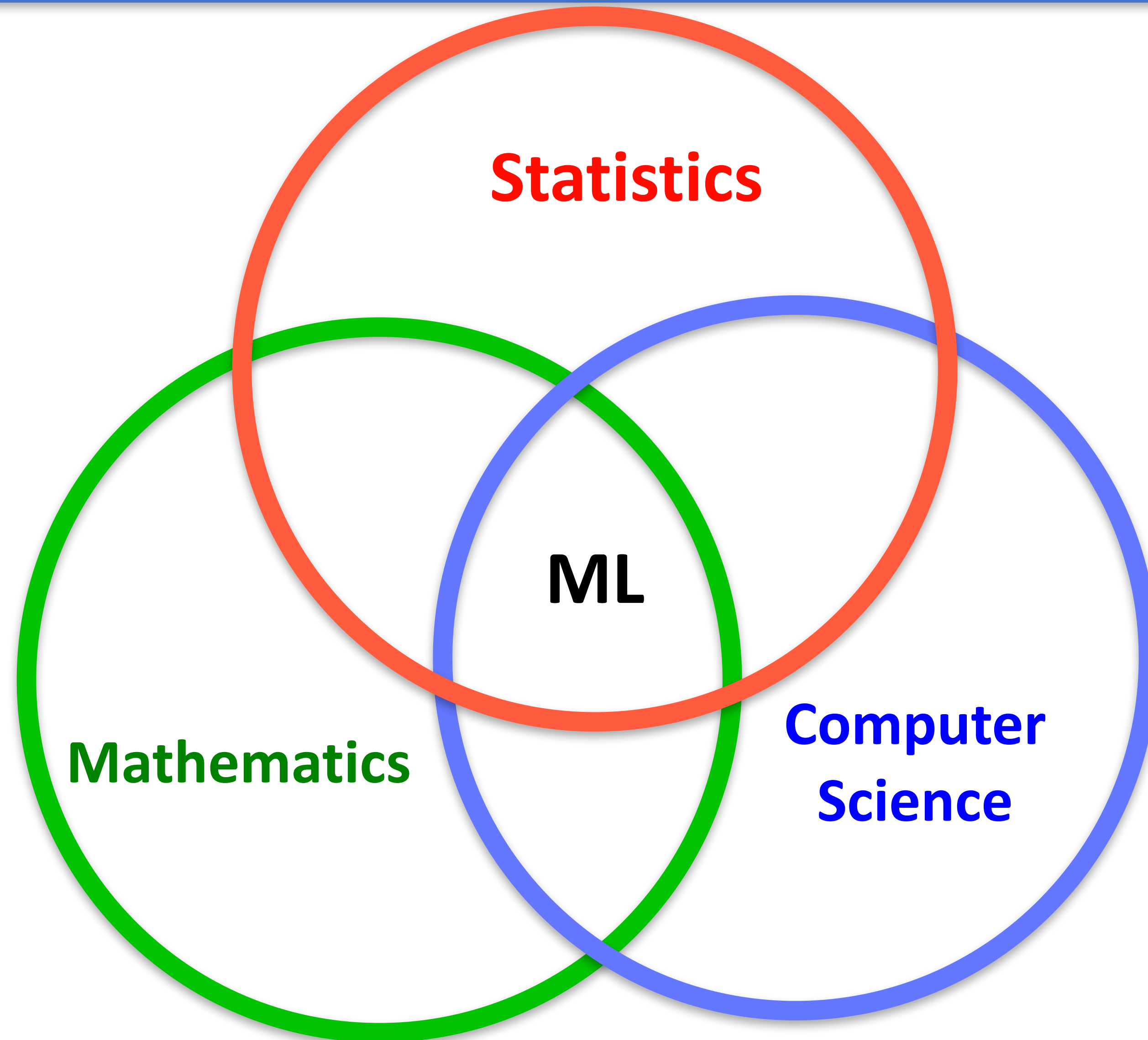
Deep learning

Deep Learning is a specialized subset of machine learning that involves neural networks with many layers.

Or

Uses a complex algorithms to train model

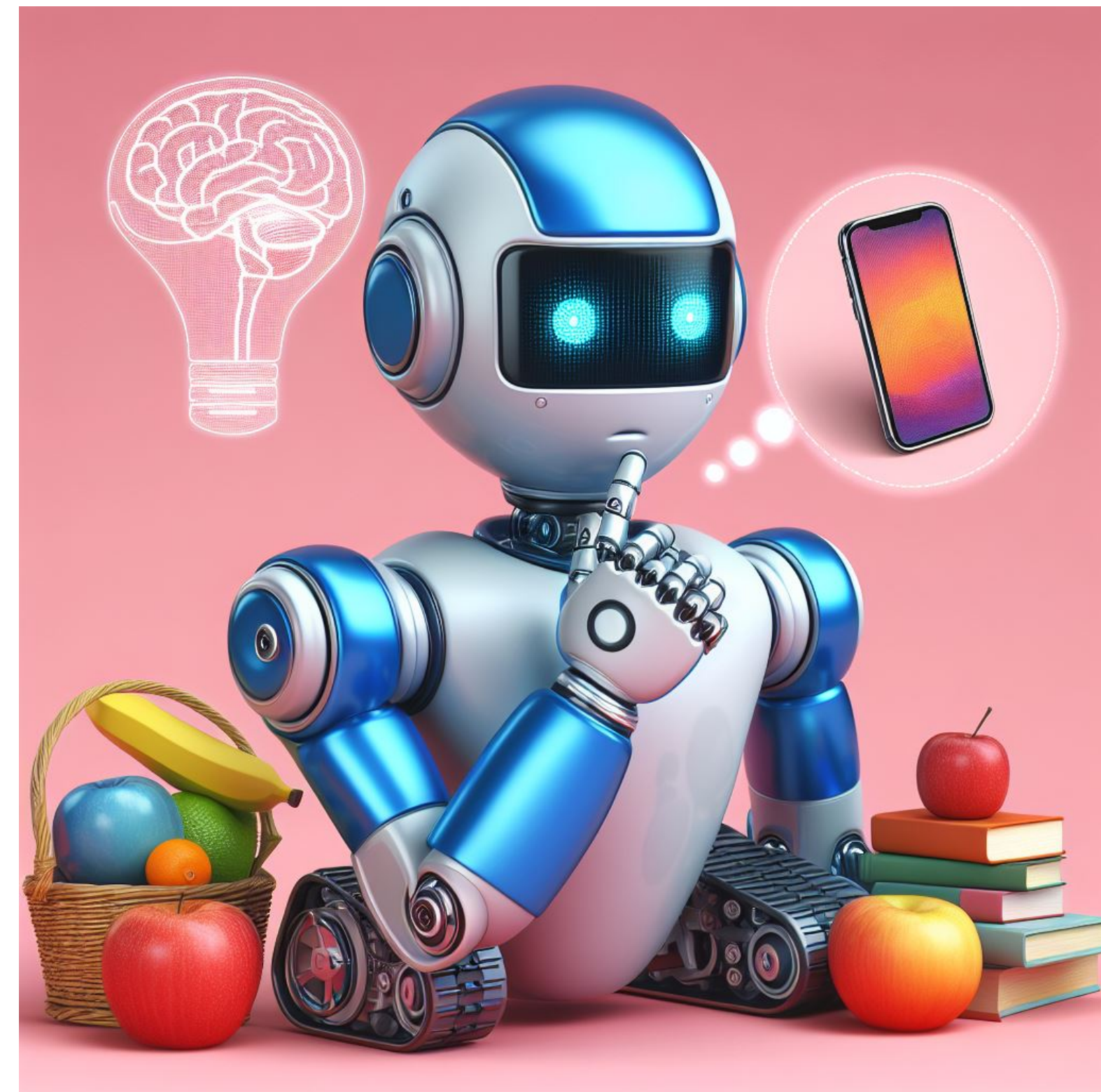
Machine Learning



Challenges Addressed by Machine Learning Today



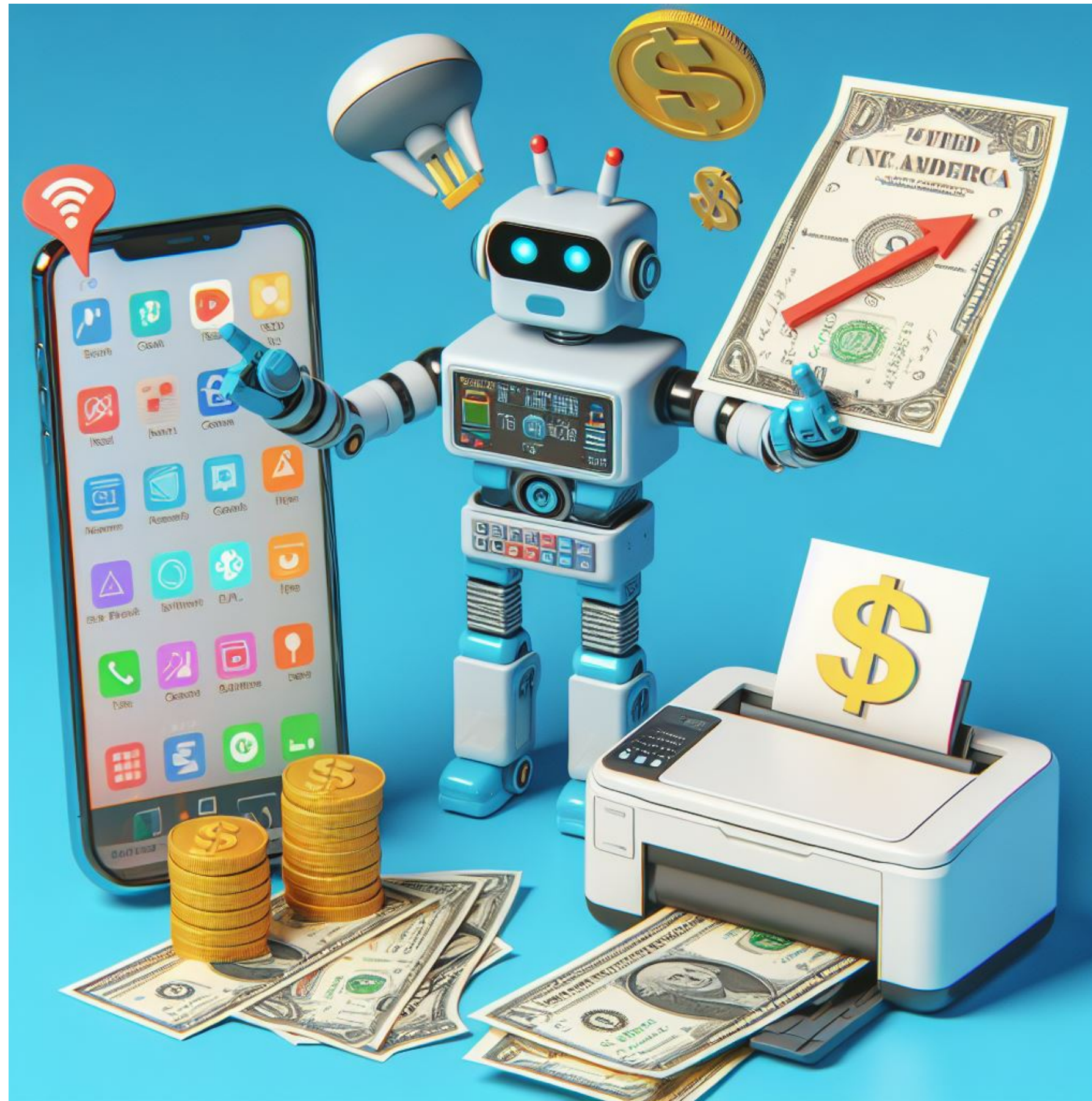
Recognize objects



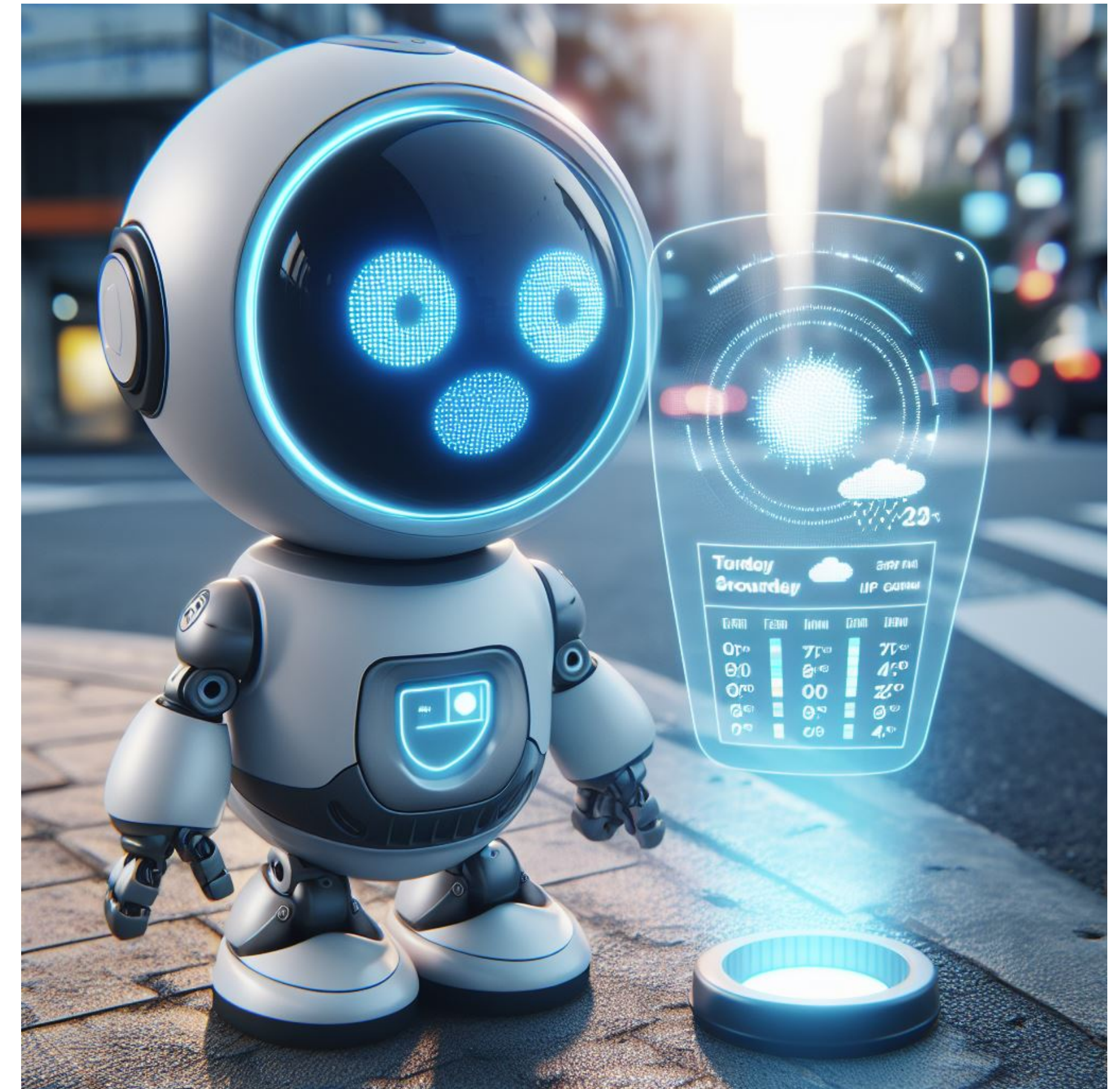
Challenges Addressed by Machine Learning Today



Predict



Future price

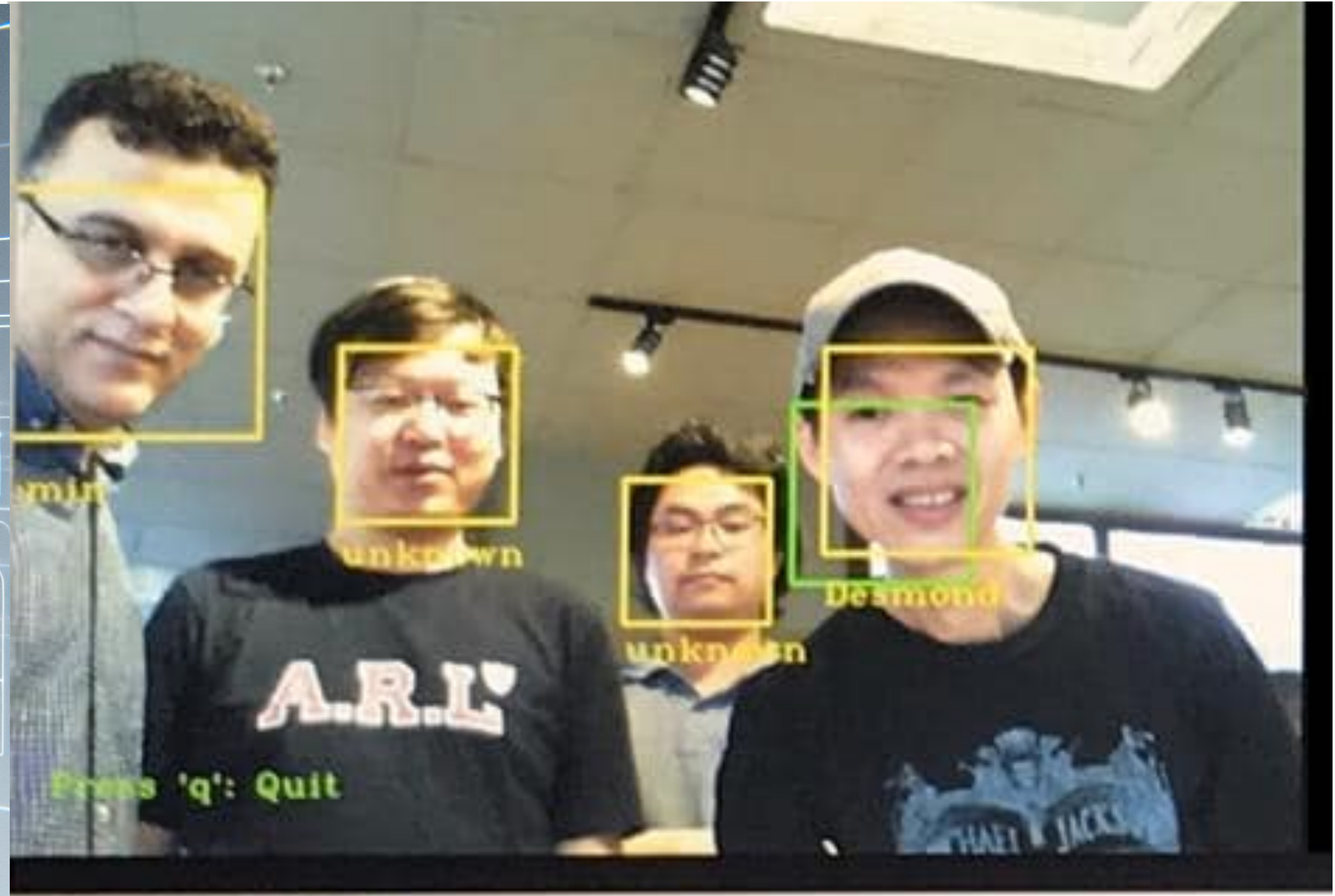
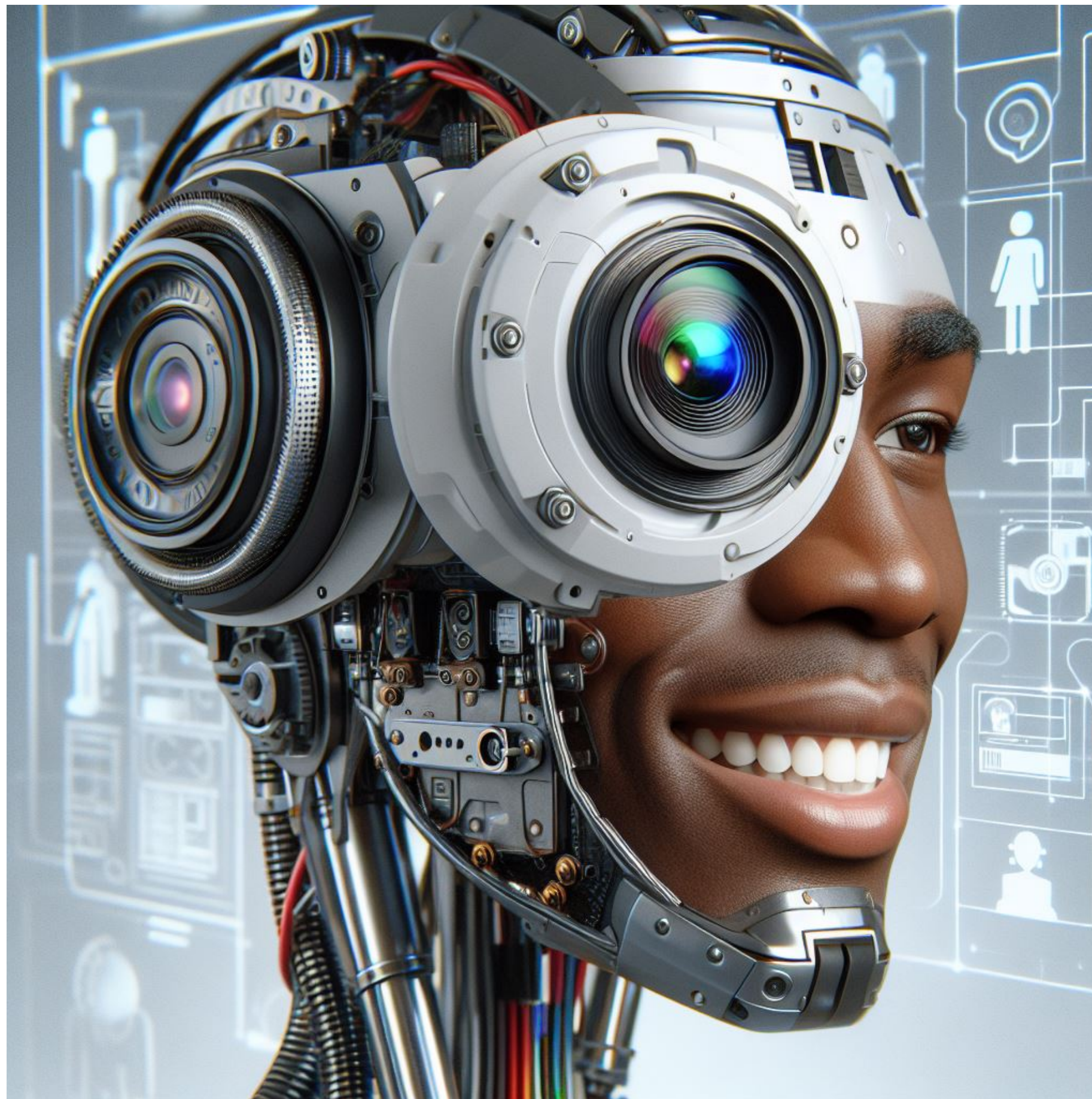


Weather

Challenges Addressed by Machine Learning Today



Face recognition





Violence detection

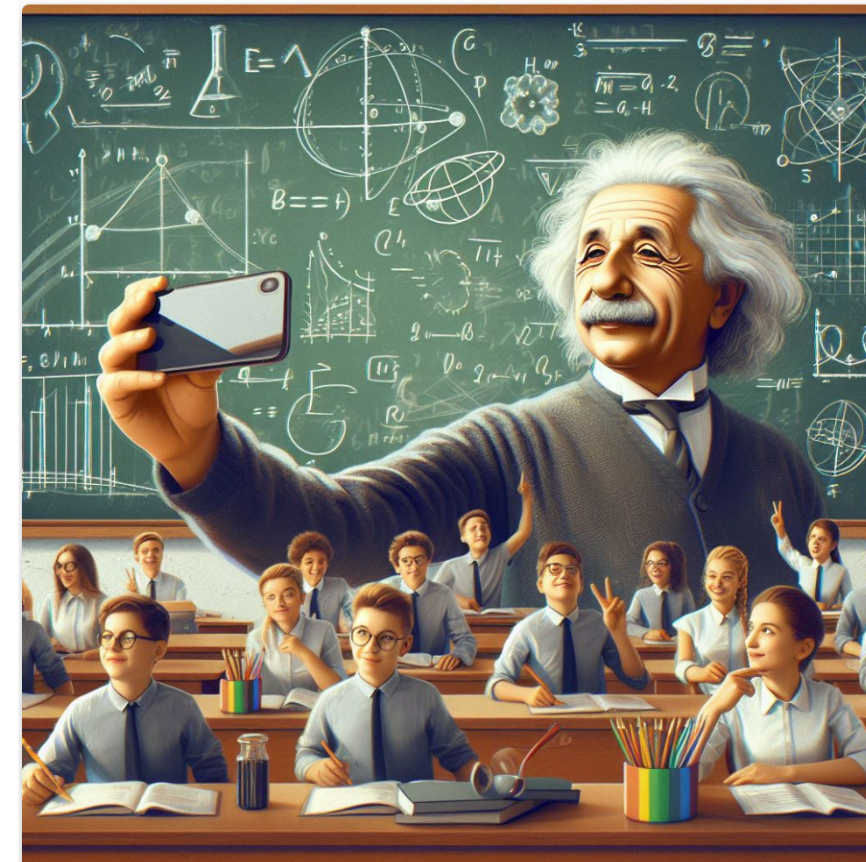
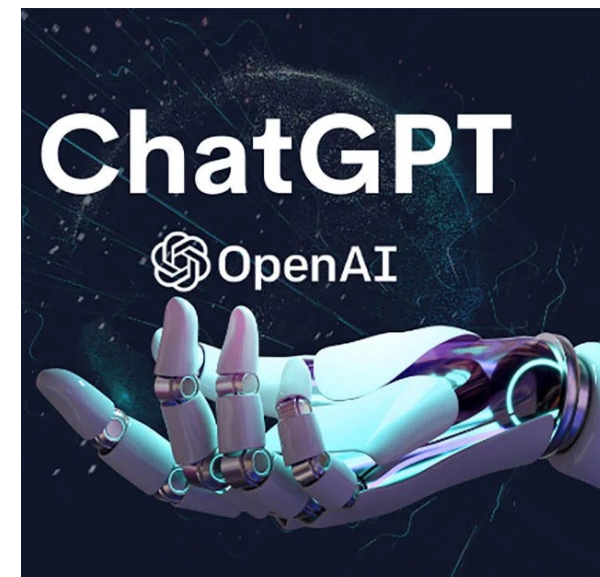


Autonomous Checkout

Challenges Addressed by Machine Learning Today



- Generate text
- Check grammar
- Generate images
- Therapy
- Medical Surgery
- Translate
- Read
- Check spam
- Self-driving
- ...

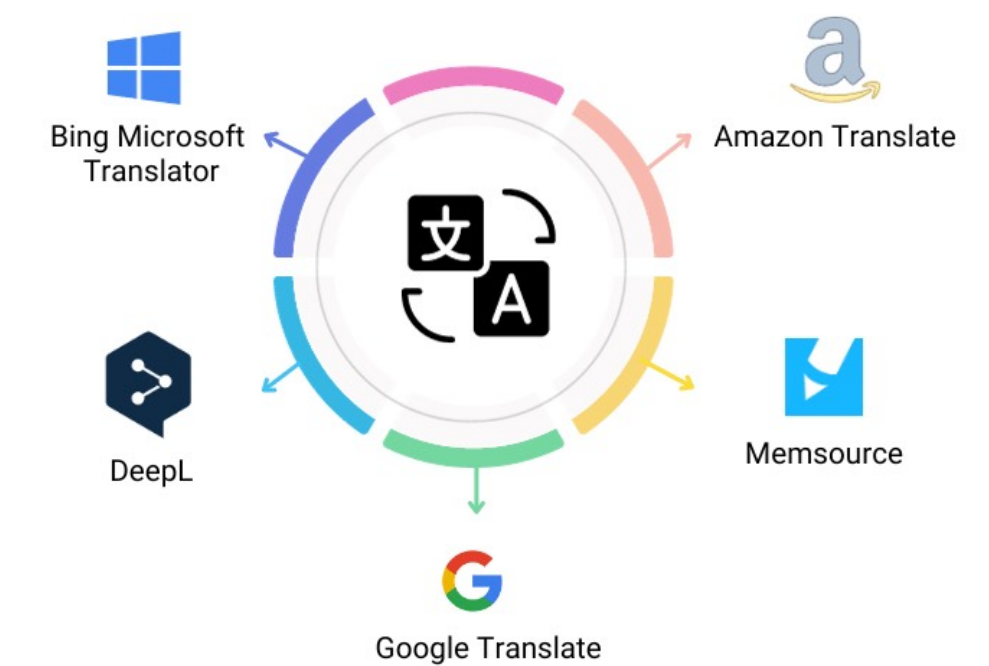


einstein takes a selfie photo with his students

Download Copy Create design Edit Image

Report Image

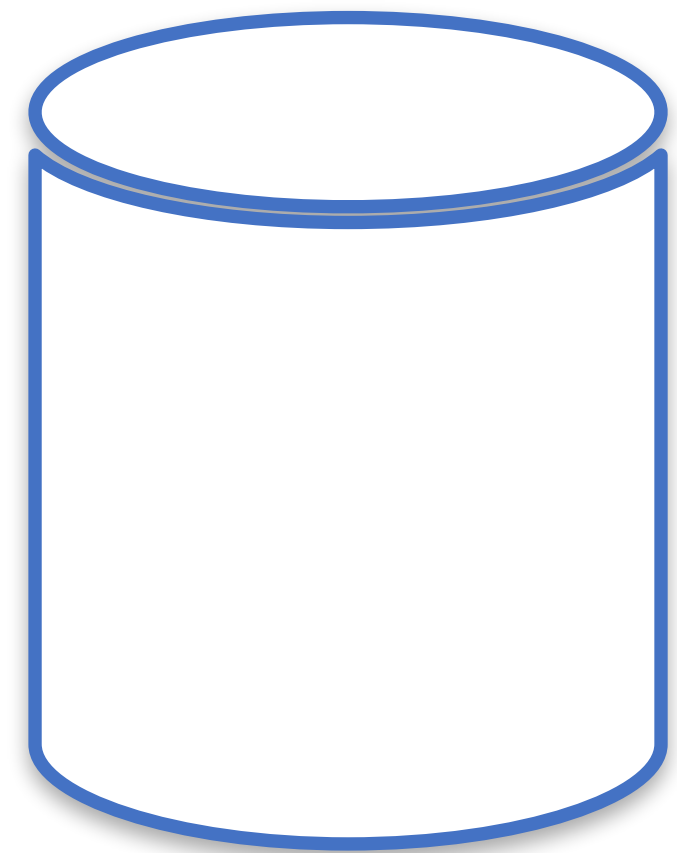
Content credentials
Generated with AI · February 12, 2024 at 9:14am



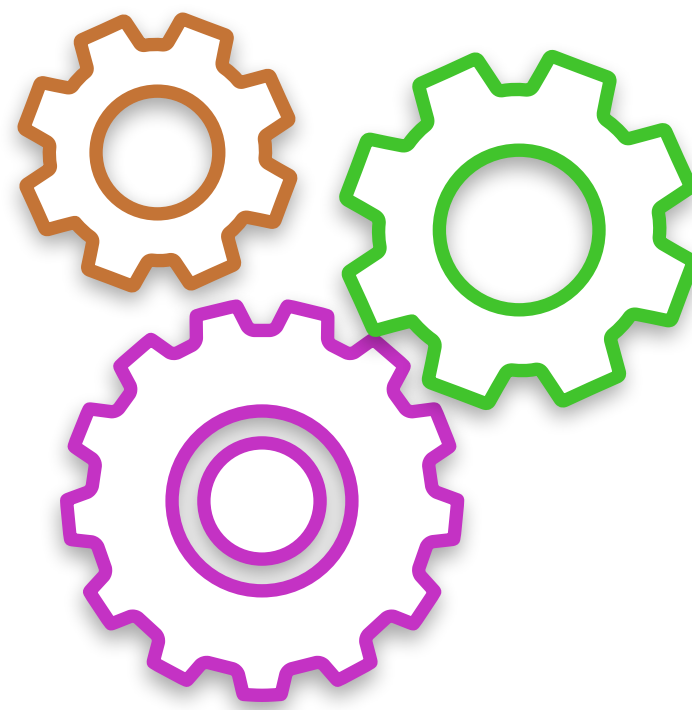
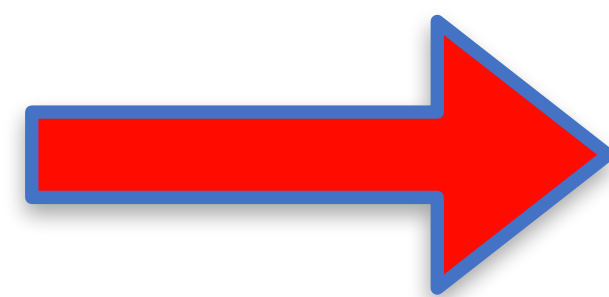
How does a machine learn?



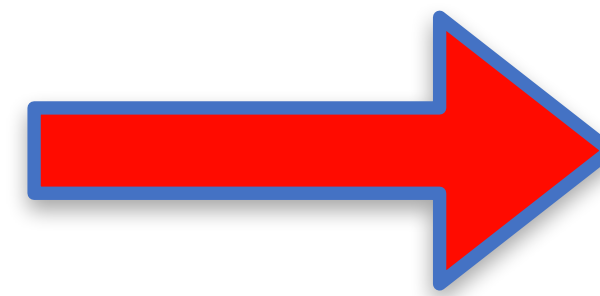
An **algorithm** **learns** patterns from **data**, which a final model will use to make predictions.



Data



ML Algorithms



Predictive model

How does a machine learn?



An algorithm **learns** patterns from **data**, which a final model will use to make predictions.



Text



Audio



Video



Image

Types of Learning



- Supervised learning
- Unsupervised learning
- Semi-supervised learning
- Reinforcement learning

Supervised Learning

Samples

Labels

Samples

Labels



Pepper



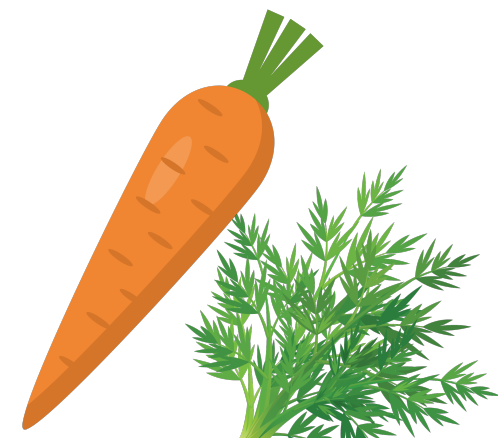
broccoli



Pepper



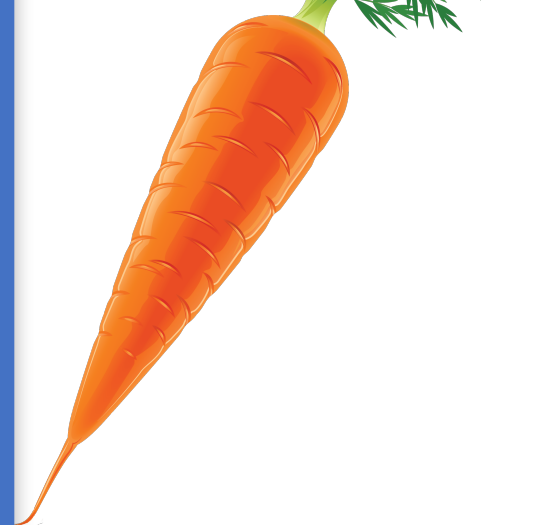
broccoli



carrot



onion



carrot







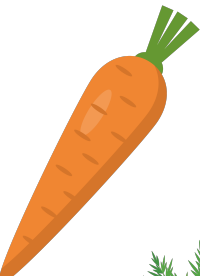

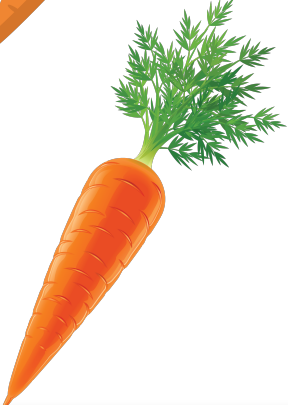

onion

→ Training Dataset

Supervised Learning



Training Dataset

Samples	Labels	Samples	Labels
	Pepper		broccoli
	Pepper		broccoli
	carrot		onion
	carrot		onion

New Sample

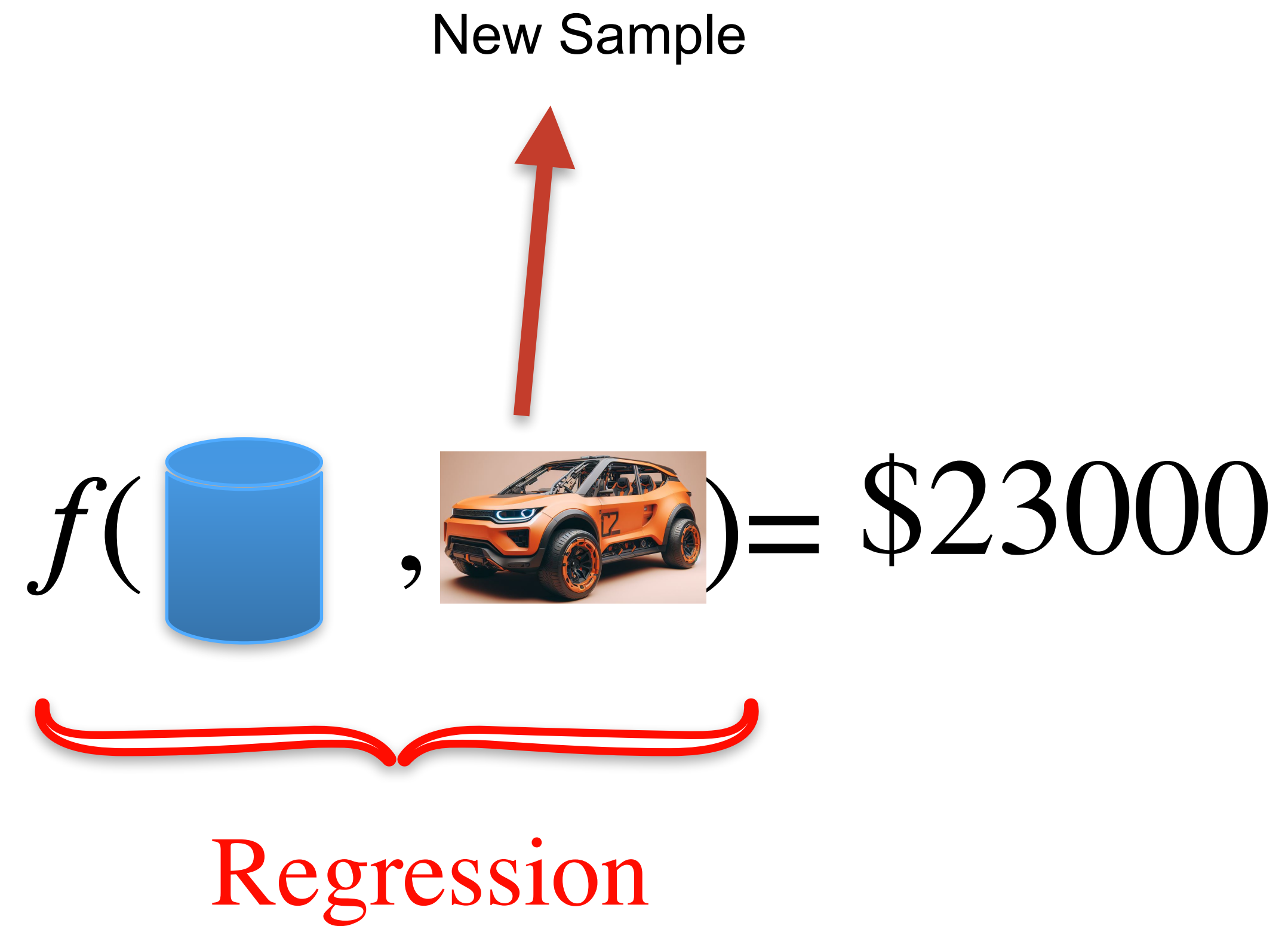
$$f(\text{Database}, \text{New Sample}) = \text{broccoli}$$

Classification

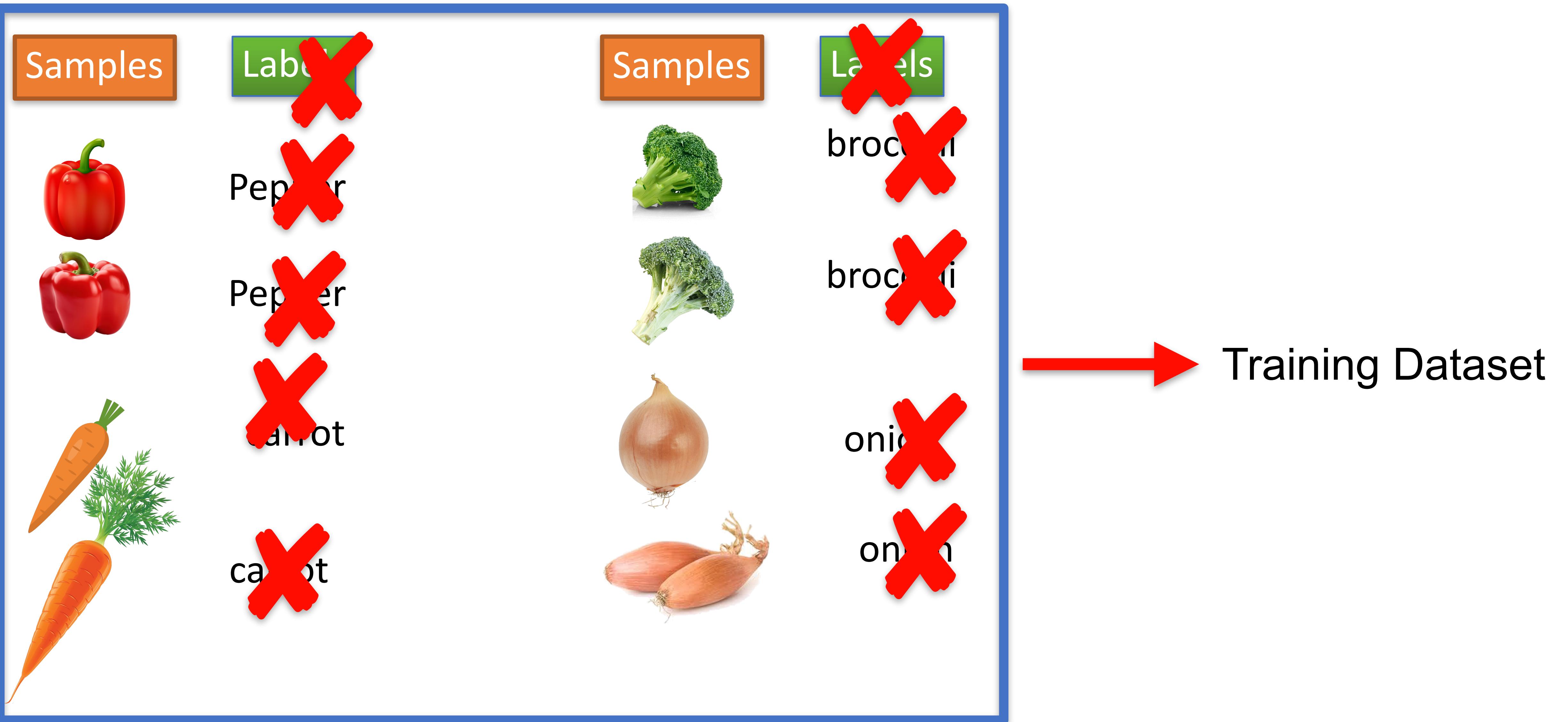
Supervised Learning



Dataset



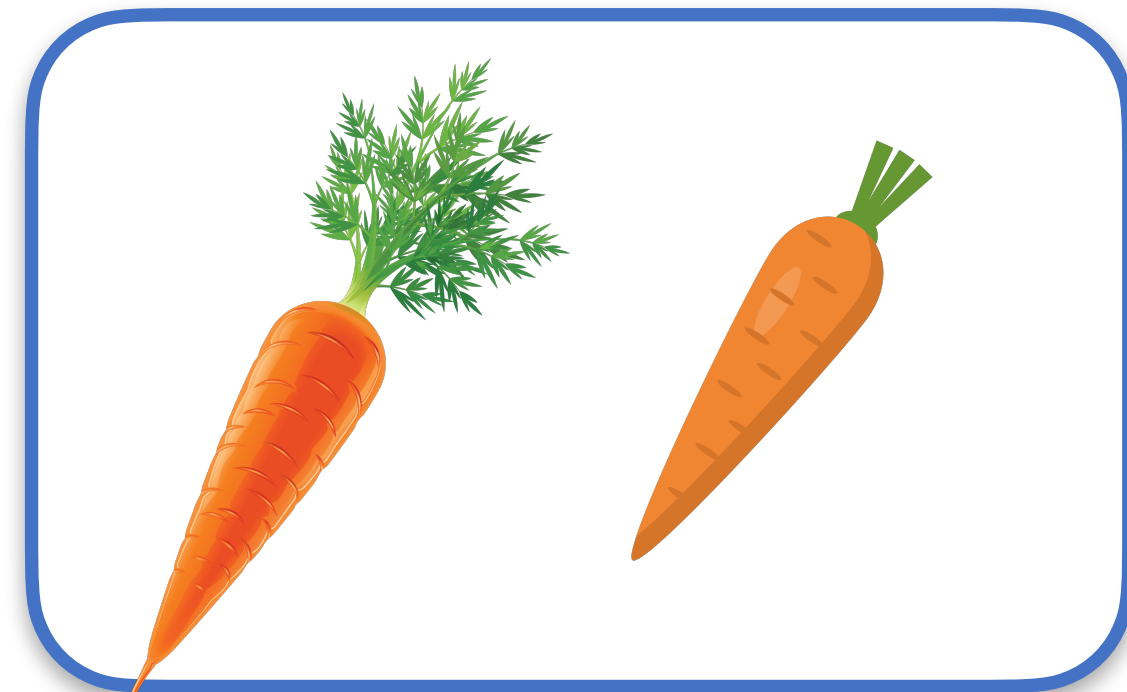
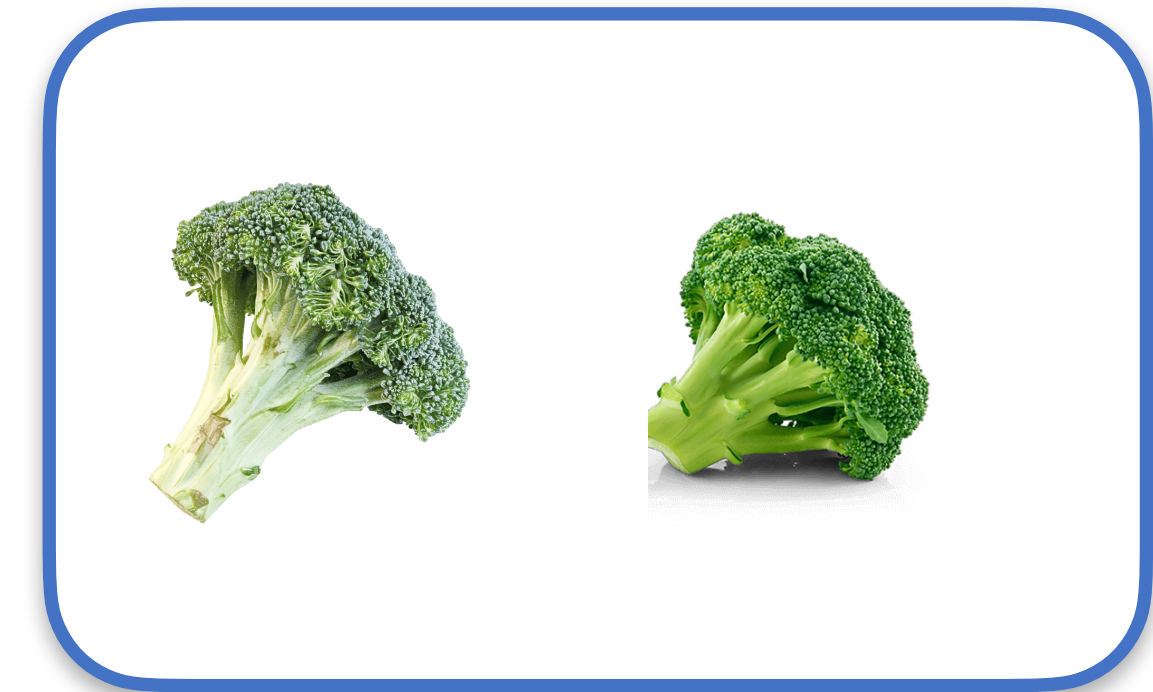
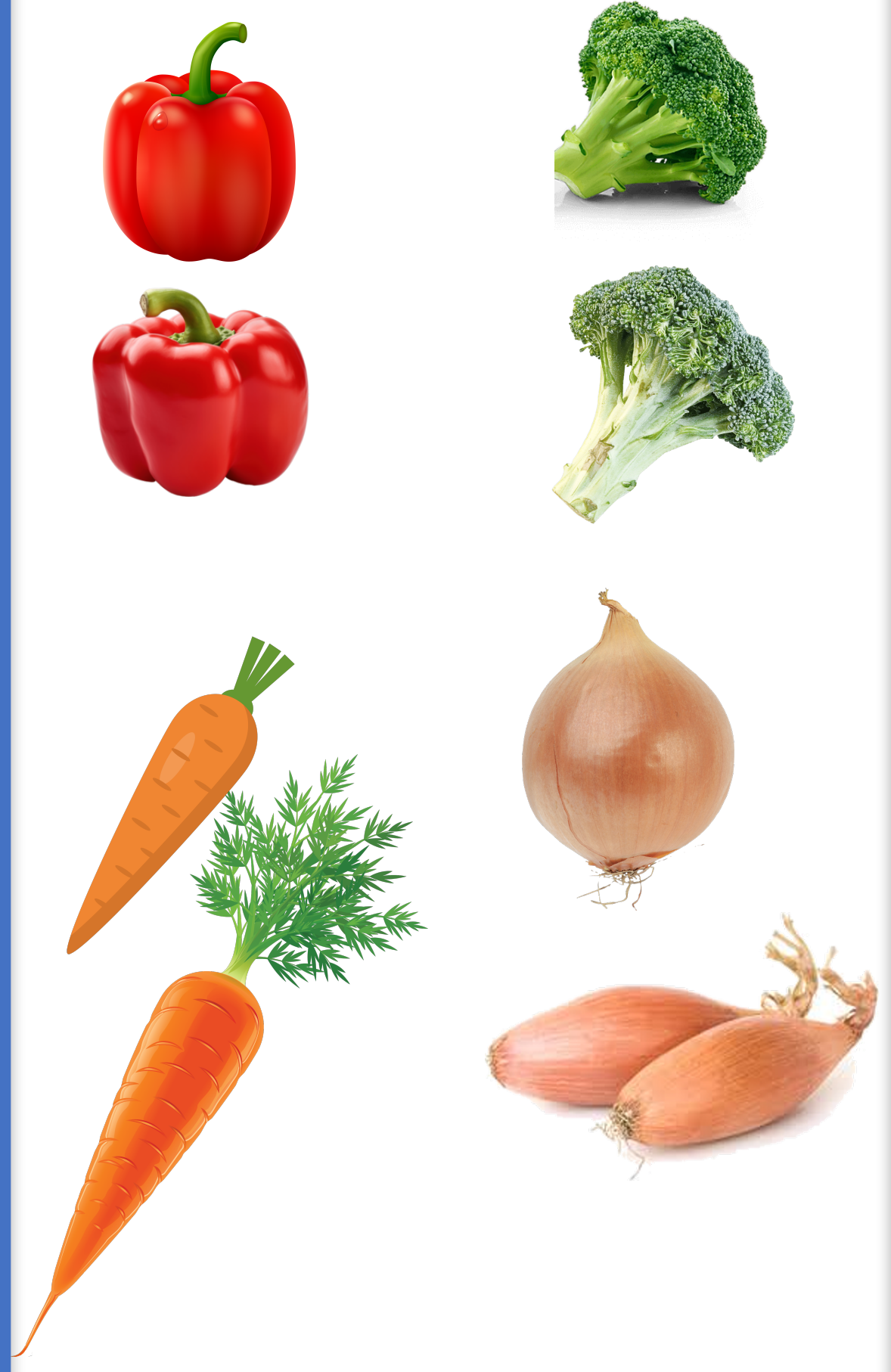
Unsupervised Learning



Unsupervised Learning

Samples

Samples



Clustering

Semi-supervised Learning

Samples

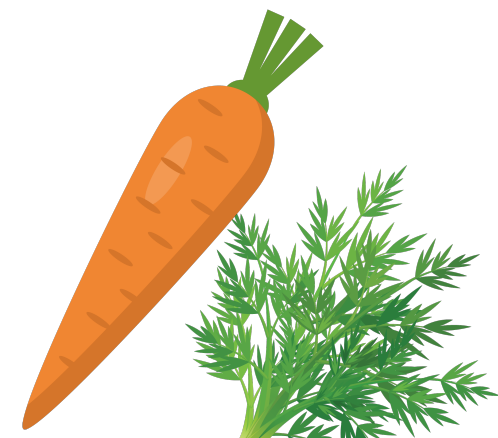
Labels



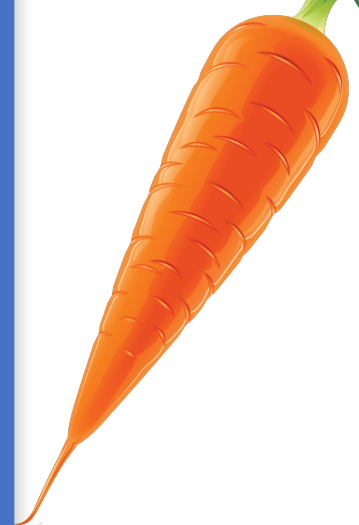
~~Pepper~~



Pepper



~~Carrot~~



carrot

Samples

Labels



broccoli



broccoli



~~onion~~



~~onion~~

Reinforcement Learning



Reinforcement Learning is a type of machine learning where an agent learns to make decisions by interacting with an environment.

Example:

Autonomous cars: navigate through traffic, traffic rules, and make decisions in complex driving scenarios.

Robotics: walking and learn through trial and error

Thank You

