Introduction to artificial intelligence.(IAI)
Semester 2
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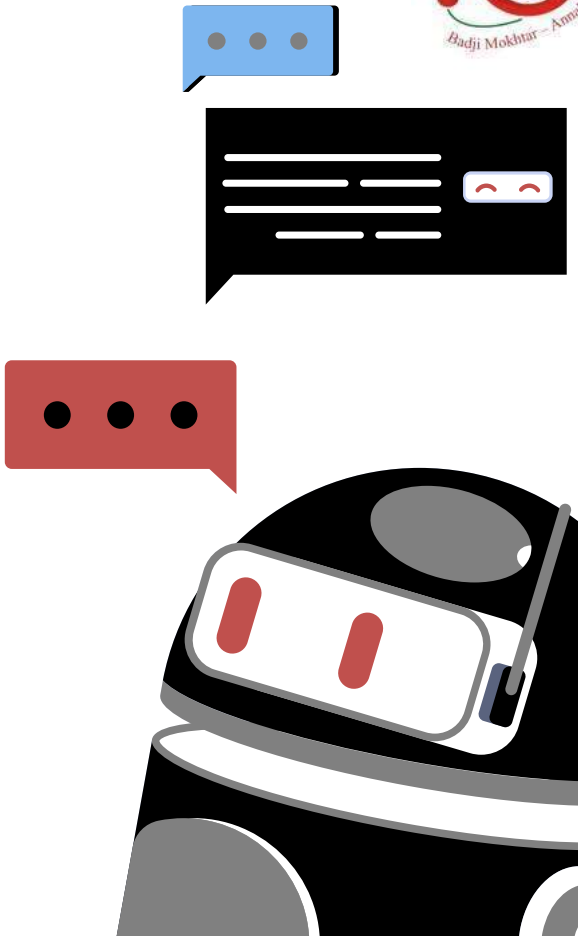
Coeff: 3



presented by : Dr.Amina Debbah

Badji Mokhtar university-ANNABA

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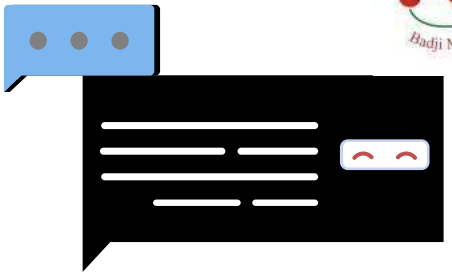
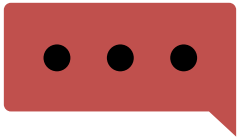
Chapter 1: Introduction





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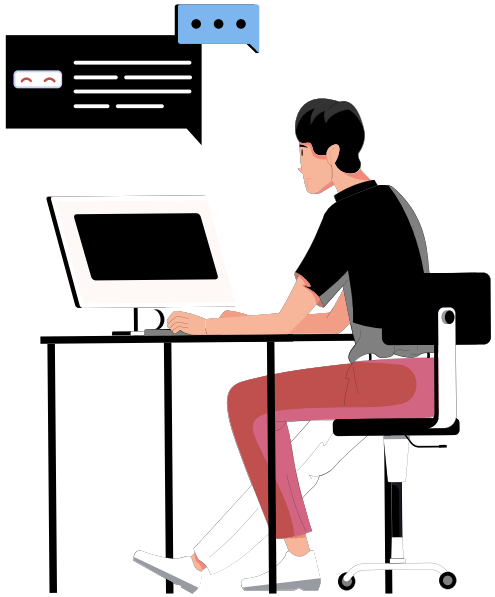
What is artificial intelligence?

(AI)

1. Artificial intelligence: Definition



- Artificial intelligence (AI) is a set of **technologies** that enable computers to perform a variety of **advanced functions**, including the ability to see, understand and translate spoken and written language, analyze data.
- In other words, machines that are programmed to perform certain tasks **automatically** without the need for humans to supervise their work

1. Artificial intelligence : Definition

- Artificial Intelligence (AI) is defined by Marvin Minsky as a science whose objective is to make machines perform tasks that humans accomplish using their intelligence.

- To achieve this, algorithms based on statistical models are used to teach machines how to perform desired tasks.

2. Terminology

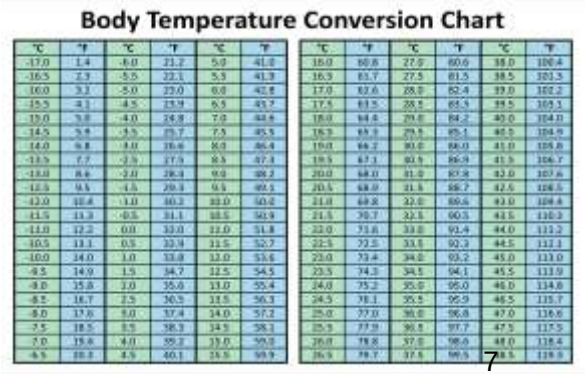
What is Data?

- "Data is just information. For example, pictures, numbers, or words can all be data."

Example: "If you take a photo of a cat, that photo is data. If you write down the temperature every day, those numbers are also data."

- two categories of data :

1. labeled data :
2. unlabeled data



Body Temperature Conversion Chart

°C	°F	°C	°F	°C	°F
-17.0	1.4	-6.0	21.2	5.0	41.0
-16.5	2.3	-5.5	22.1	5.5	41.9
-16.0	3.2	-5.0	23.0	6.0	42.8
-15.5	4.1	-4.5	23.9	6.5	43.7
-15.0	5.0	-4.0	24.8	7.0	44.6
-14.5	5.9	-3.5	25.7	7.5	45.5
-14.0	6.8	-3.0	26.6	8.0	46.4
-13.5	7.7	-2.5	27.5	8.5	47.3
-13.0	8.6	-2.0	28.4	9.0	48.2
-12.5	9.5	-1.5	29.3	9.5	49.1
-12.0	10.4	-1.0	30.2	10.0	50.0
-11.5	11.3	-0.5	31.1	10.5	50.9
-11.0	12.2	0.0	32.0	11.0	51.8
-10.5	13.1	0.5	32.9	11.5	52.7
-10.0	14.0	1.0	33.8	12.0	53.6
-9.5	14.9	1.5	34.7	12.5	54.5
-9.0	15.8	2.0	35.6	13.0	55.4
-8.5	16.7	2.5	36.5	13.5	56.3
-8.0	17.6	3.0	37.4	14.0	57.2
-7.5	18.5	3.5	38.3	14.5	58.1
-7.0	19.4	4.0	39.2	15.0	59.0
-6.5	20.3	4.5	40.1	15.5	59.9

°C	°F	°C	°F	°C	°F
16.0	60.8	27.0	80.6	38.0	100.4
16.5	61.7	27.5	81.5	38.5	101.3
17.0	62.6	28.0	82.4	39.0	102.2
17.5	63.5	28.5	83.3	39.5	103.1
18.0	64.4	29.0	84.2	40.0	104.0
18.5	65.3	29.5	85.1	40.5	104.9
19.0	66.2	30.0	86.0	41.0	105.8
19.5	67.1	30.5	86.9	41.5	106.7
20.0	68.0	31.0	87.8	42.0	107.6
20.5	68.9	31.5	88.7	42.5	108.5
21.0	69.8	32.0	89.6	43.0	109.4
21.5	70.7	32.5	90.5	43.5	110.3
22.0	71.6	33.0	91.4	44.0	111.2
22.5	72.5	33.5	92.3	44.5	112.1
23.0	73.4	34.0	93.2	45.0	113.0
23.5	74.3	34.5	94.1	45.5	113.9
24.0	75.2	35.0	95.0	46.0	114.8
24.5	76.1	35.5	95.9	46.5	115.7
25.0	77.0	36.0	96.8	47.0	116.6
25.5	77.9	36.5	97.7	47.5	117.5
26.0	78.8	37.0	98.6	48.0	118.4
26.5	79.7	37.5	99.5	48.5	119.3

Terminology

1. Labeled data is a type of data where each piece of information (or data point) comes with a "label" or "answer" that explains what it is or what it represents. These labels help computers learn to recognize patterns and make predictions.

Example:

- A collection of pictures of animals, and each picture has a label saying whether it’s a cat or a dog. The labels help the computer learn what a cat looks like and what a dog looks like.

Terminology

➢ **How Labeled Data is Used ?:**

1.Input: The pictures of animals.

2.Labels: The names of the animals (Cat, Dog, Elephant, Giraffe).

3.Purpose: The computer uses this labeled data to learn how to recognize animals in new, unseen pictures.

picture	label
(Cat image)	Cat
(Dog image)	Dog
(Elephant image)	Elephant
(Giraffe image)	Giraffe

Terminology

2.Unlabeled data: is data that doesn’t have any "answers" or "labels" attached to it. It’s like giving someone a box of mixed toys without telling them what each toy is. The goal is to find patterns or groupings in the data without any guidance.

picture
(Cat image)
(Dog image)
(Elephant image)
(Giraffe image)

Terminology

Example: Imagine you have a dataset of animal pictures, but this time, there are no labels telling you what each animal is. This is an example of unlabeled data:

- **How Unlabeled Data is Used ?**

1. Input: The pictures of animals.

2. Purpose: The computer analyzes the pictures to find patterns or group similar ones together (e.g., grouping all cats together and all dogs together).

Terminology

- **What is a dataset?**
- A dataset is like a collection of information organized in a way that makes it easy to use.
- It is table or a list where each row is a single piece of information (like a person, a house, or a product), and each column describes something about that piece of information (like age, price, or color).

Terminology

Example:

Fruit	Color	Taste
apple	green	weet
bannana	yellow	sweet
lemon	yellow	sour

Terminology

- **What is input and output ?**
- Input is the information you give to a computer, program, or machine to help it do something. It's like giving ingredients to a chef so they can cook a meal.

Example:

- If you're using a program to predict the weather, the input might be data like temperature, humidity, and wind speed.
- In a calculator, the input is the numbers and operations you type in (e.g., 2 + 2).

Terminology

- Output is the result or answer that the computer, program, or machine gives you after processing the input. It's like the meal the chef prepares after you give them the ingredients.

Example:

- If you input weather data into a program, the output might be a prediction like "It will rain tomorrow."
- In a calculator, if you input 2 + 2, the output is 4.

Terminology

- Imagine you have a program that tells you if a fruit is sweet or sour based on its name.
- Input: You give the program the name of a fruit (e.g., “Apple”).
- Output: The program tells you the taste (e.g., “Sweet”).

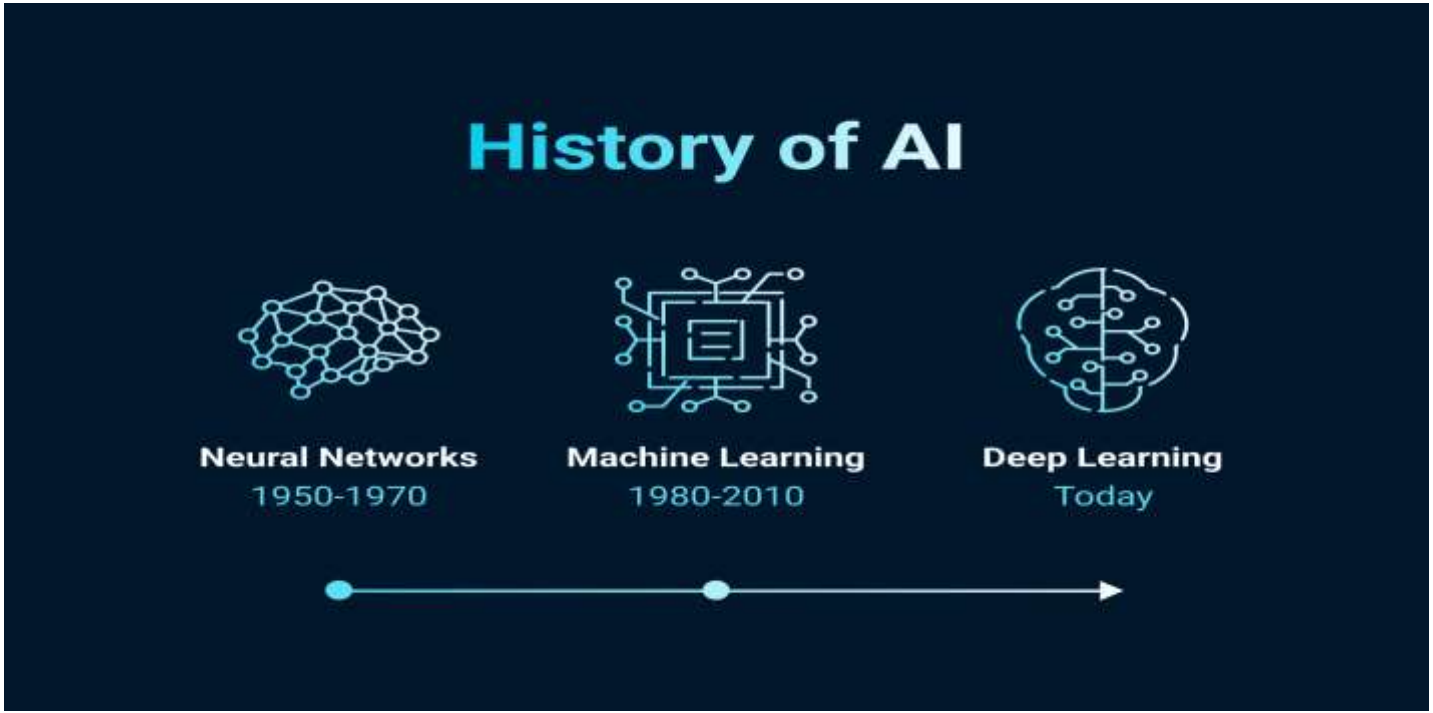
Terminology

- **What is a prediction ?:** A prediction is a guess or estimate about what will happen in the future or what something might be, based on information you already have. Predictions are often made using patterns or rules learned from data.

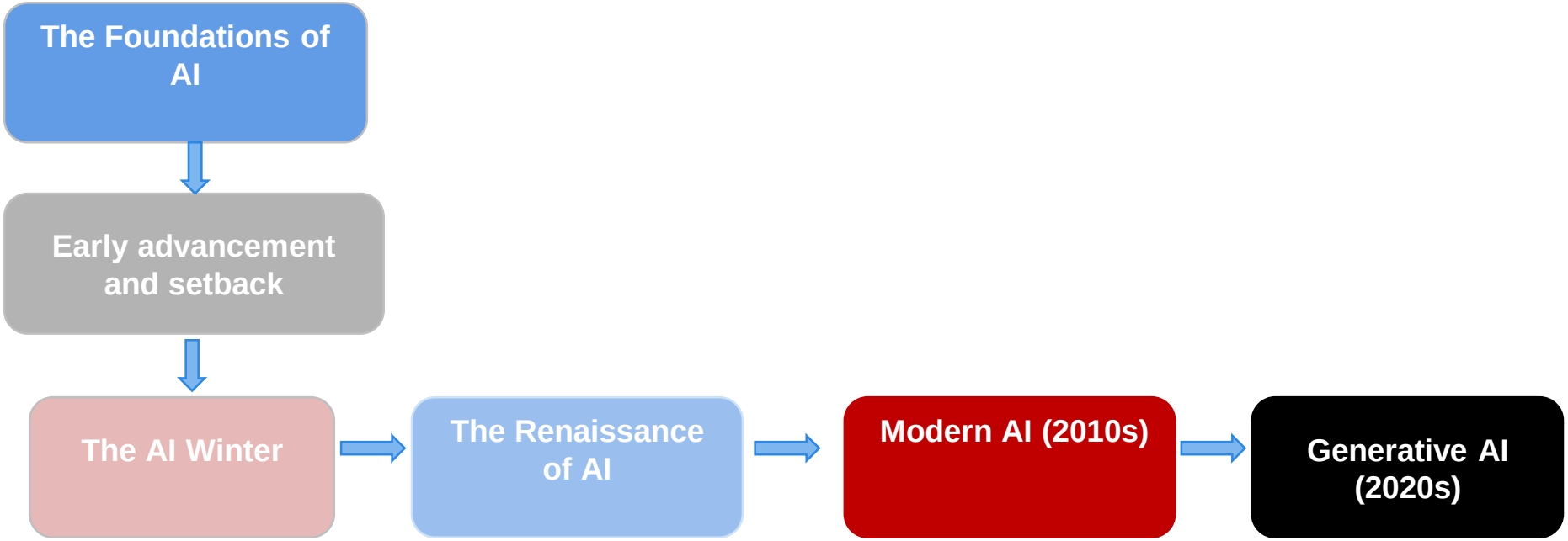
Example:

- If you see dark clouds in the sky, you might predict that it will rain soon.
- A weather app uses data like temperature and wind speed to predict tomorrow’s weather.

Historical developement:

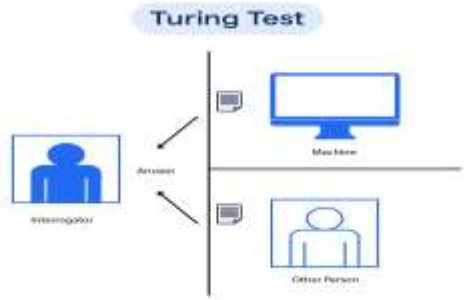


Historical developement:



Historical developement: The Foundations of AI

The Foundations of AI



- 1943: McCulloch and Pitts model the first artificial neuron.
- 1950: Alan Turing publishes 'Computing Machinery and Intelligence,' introducing the Turing Test.

- 1956: Dartmouth Conference - AI officially coined as a field of study.

Historical developement: Early advancements of AI

Early advancement and setback

- 1961: First Industrial Robot (Unimate): Deployed in a General Motors assembly line, showcasing AI in robotics.
- 1966: ELIZA Chatbot: Developed by Joseph Weizenbaum to demonstrate early natural language processing.
- 1967: DENDRAL Expert System: Assisted chemists in identifying molecular structures, pioneering expert systems.
- Late 1960s: Game AI Advances: Programs for checkers and chess highlight strategic problem-solving capabilities.

Historical developement: The AI Winter

The AI Winter

- Expert systems : The 1980s witnessed a revival of AI with the development of expert systems, designed to solve specific problems in domains like medical diagnosis and financial analysis.
- Overhyped expectations lead to disillusionment.
- Funding cuts and limited progress.
- Renewed focus on foundational research.

Historical developement: The Renaissance of AI

The Renaissance of AI

- Improved hardware and algorithms.
- Breakthroughs in machine learning and natural language processing.
- IBM’s Deep Blue defeats chess champion Garry Kasparov (1997).
- 1980s: Rise of expert systems like MYCIN for medical diagnosis and DENDRAL for chemistry.

Historical developement: The Renaissance of AI

- 1997: IBM’s Deep Blue defeats world chess champion Garry Kasparov, showcasing AI's potential in decision-making.

Historical developement: Modern AI (2010s)

Modern AI (2010s)

- 2012: AlexNet wins the ImageNet competition, showcasing deep learning.
- Emerging of Virtual assistants like Siri, Alexa, and Google Assistant.
- AI applications in healthcare, finance, and more.

Historical developement: Generative AI (2010s)

Generative AI (2020s)

- AI creates text, images, music, and videos.
- Large language models like ChatGPT and Bard have revolutionized natural language processing, enabling AI to understand and generate human-like text.
- **AI's impact :**
- Generative AI is transforming various industries, from content creation to customer service, and is poised to have a profound impact on society.

Traditional AI vs. modern AI

- The history of Artificial Intelligence (AI) shows how technology has grown from simple ideas to powerful systems.
- **Traditional AI:** machines followed strict rules created by humans. These systems were useful but not flexible.

- **Modern AI:** machines learn from data and improve themselves without needing all the rules written out. This change happened because of better computers, more data, and smarter algorithms.

Traditional AI vs. modern AI

➢ **Traditional AI:**

❑ Rule-Based Systems:

❑ Machines followed strict, predefined rules created by humans.

❑ Examples: Expert systems, early chess programs.

❑ Limitations:

✓ Not flexible or adaptable to new situations.

✓ Required explicit programming for every possible scenario.

➢ **Modern AI:**

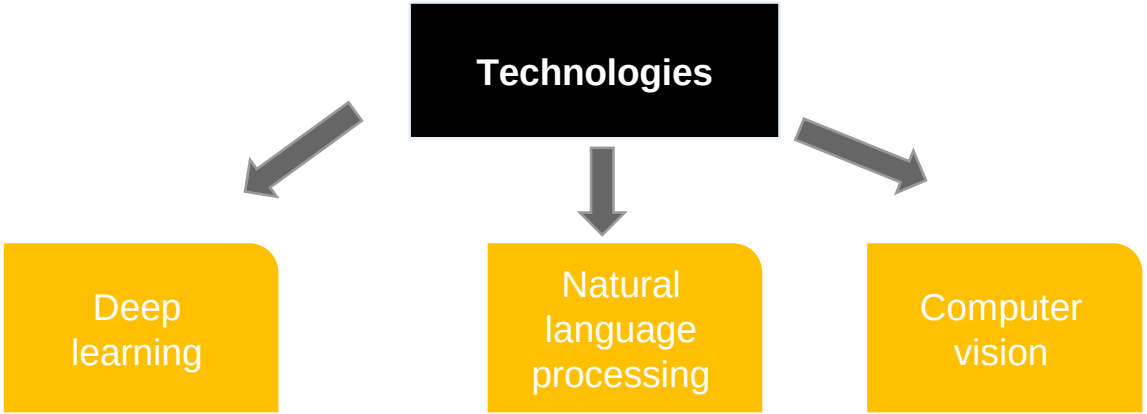
☐ Data-Driven Learning:

☐ Machines learn from large datasets and improve over time.

☐ Examples: Machine learning, deep learning, neural networks.

Traditional AI vs. modern AI

- **Advancements:**
- No need for explicit rules; AI learns patterns from data
- Highly flexible and adaptable to new tasks.



3

Main uses of artificial intelligence

Examples of AI applications

(1) Virtual personal assistants

These are the well-known chatbots that allow us to interact with them according to our search history

(2) Business and finance

In this case, AI brings the possibility of generating greater security, offering new operations and being aware of relevant market information

Examples of AI applications

(3) Education

It allows to personalize them according to the students, to control attendance and evaluations, to establish teaching-learning strategies

(4) Commercial

It allows to know and recommend what the customer needs, predicting trends and making very detailed analysis

Examples of AI applications

(5) Health

Artificial intelligence is used in healthcare, specifically in chatbots that ask us about our symptoms in order to make a diagnosis. By combining certain characteristics in common, a possible solution to the problem presented by the patient can be generated without the need of a human being

4

Advantages and disadvantages of AI

Advantages of artificial intelligence

- ✓ **Automation of repetitive tasks**

AI makes our day-to-day life much easier, as machines can perform tasks that are difficult for us automatically

- ✓ **Reduces human error**

Fewer errors, since there is little human involvement and the tasks are performed automatically, the probability of error is greatly reduced

Advantages of artificial intelligence

- ✓ **More room for creativity**

It favors the creative process of the human being, since it leaves us with more time to think freely about future tasks or work actions

- ✓ **Increased accuracy**

By reducing the likelihood of error, artificial intelligence provides high accuracy in decision making

Advantages of artificial intelligence

- ✓ **Decision making**

When making decisions, AI plays a fundamental role due to its agility in the search and connection of information and also the analysis of the data collected

Disadvantages of artificial intelligence

- **Difficulty of access to data**

For an artificial intelligence to work properly, it must have updated and reliable data. This does not always happen in this way, because being just a machine, sometimes it does not have all the necessary data to make decisions appropriate to the needs

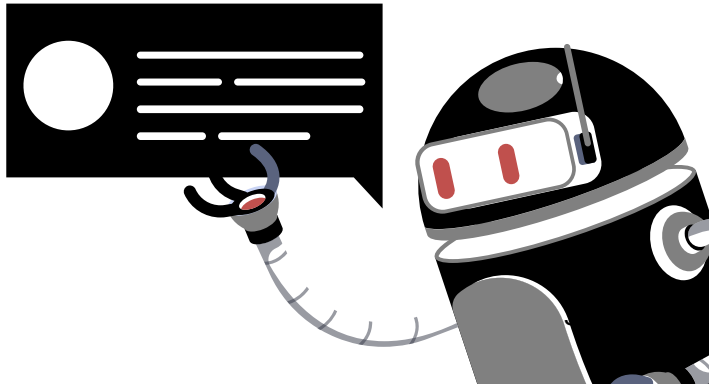
- **Lack of qualified professionals**

As this is a new technology, the number of qualified professionals who can handle these tools is very limited

Disadvantages of artificial intelligence

- **Developement is expensive**

The cost is extremely high. In order to replace or match the human figure with machines, it is essential to have a large amount of money that can cover the necessary development and maintenance costs of these tools



Conclusion

- ✓From theoretical concepts to real-world applications.
- ✓Ongoing challenges and exciting possibilities.