



Introduction to Machine Learning

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Agenda

What is Artificial intelligence(AI)?

AI application and subfields of AI

Machine Learning

AI tools and how to maximize
your benefits from?

Set the environment

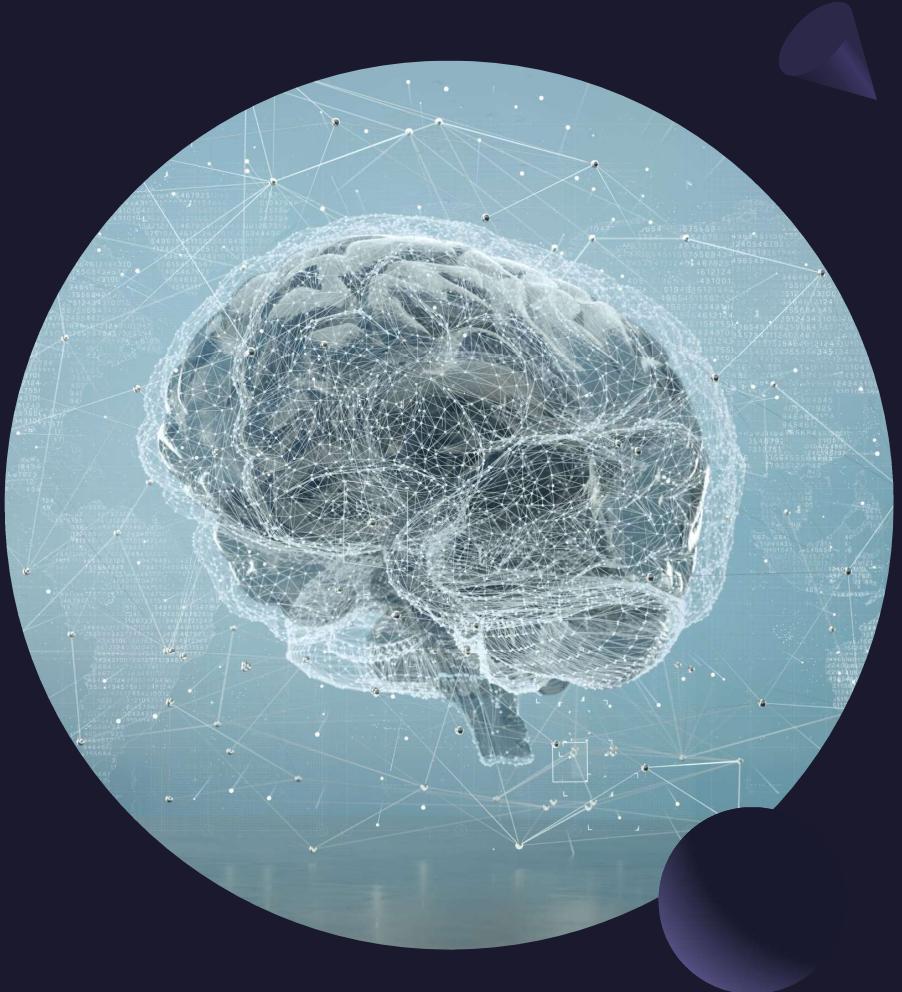


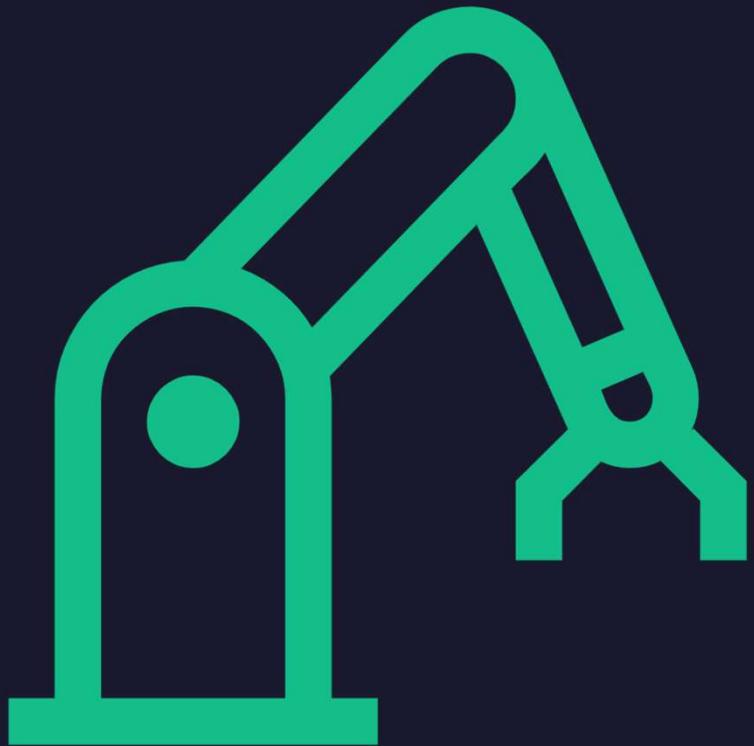
What is Artificial intelligence (AI)?

- Intelligence
- Artificial intelligence definition
- Weak AI vs Strong AI (Types based on ability)
- Types of AI (based on functionalities)
- Summary diagram

Intelligence

- might be defined as the ability to learn and perform suitable techniques to solve problems and achieve goals

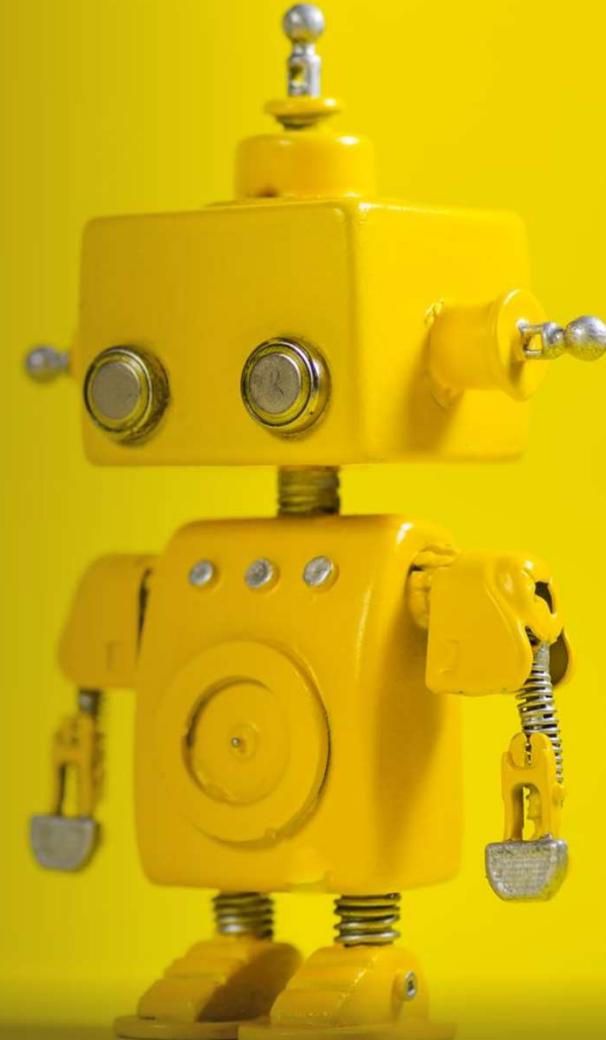




- A fully pre-programmed **factory robot** can perform its tasks effectively, being adaptable, precise, and reliable.
- However, this robot **is not considered intelligent** because it lacks the ability to learn or adapt on its own.
- Intelligence extends beyond following instructions and includes the capacity to learn, adapt, and make decisions in various situations.

Artificial intelligence(AI)

- the science and engineering of making intelligent machines “simulation of human intelligence”
- AI is when a machine can do things that human minds can do, like perceiving(understanding), reasoning, learning, interacting with the world, solving problems, and being creative.



Weak AI



Weak AI refers to AI systems **designed for specific tasks** and lacks general intelligence.



Examples of weak AI include voice assistants, recommendation algorithms, image recognition systems, Deep Blue, the chess-playing  computer, and self-driving cars that use sensors to detect obstacles.



Weak AI excels at its designated functions but operates **within predefined boundaries**.



Weak AI **cannot generalize** beyond its specialized domain and is limited to the tasks it is programmed for.

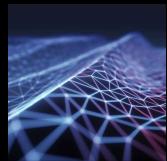
Strong AI



Strong AI, also known as **general AI**, aims to possess **human-level** or superior intelligence across various tasks.



It would be capable of understanding, reasoning, learning, and solving complex problems like humans do.



However, the development of strong AI remains largely **theoretical** and has not been realized thus far

Types of AI

Based on functionalities



PURELY REACTIVE MACHINES SPECIALIZE IN ONE FIELD AND DO NOT HAVE MEMORY. THEY MAKE DECISIONS BASED ON CURRENT OBSERVATIONS, LIKE IN A CHESS GAME.



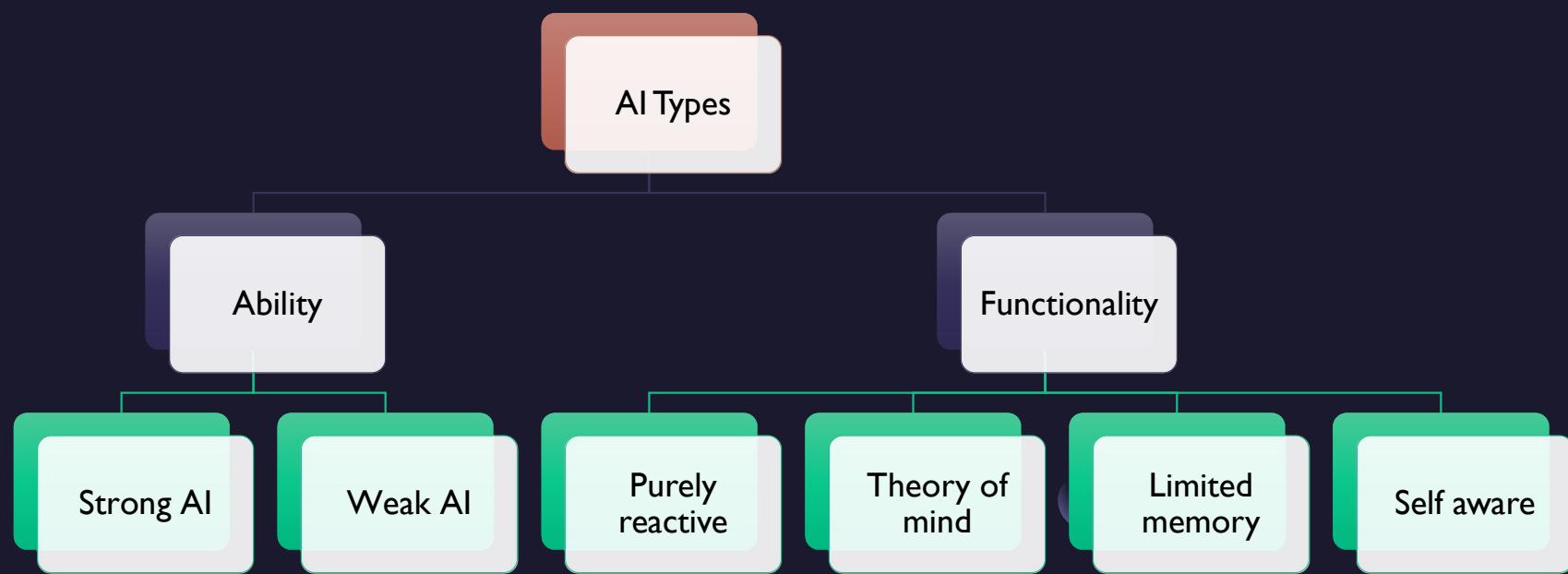
LIMITED MEMORY MACHINES COLLECT AND UTILIZE PREVIOUS DATA BUT HAVE MINIMAL MEMORY CAPACITY. THEY CAN MAKE PROPER DECISIONS, LIKE SUGGESTING A RESTAURANT BASED ON LOCATION DATA.



MACHINES WITH A **THEORY OF MIND** WOULD UNDERSTAND THOUGHTS, EMOTIONS, AND SOCIAL INTERACTIONS, BUT SUCH MACHINES HAVE NOT BEEN CREATED YET.



SELF-AWARE MACHINES, CONSIDERED THE FUTURE GENERATION, WILL BE INTELLIGENT, SENTIENT, AND CONSCIOUS.



AI applications and subfields of AI

- AI applications
- AI subfields

AI applications

Applications

Predictive maintenance

Predictive maintenance is crucial for industries relying on equipment.

It involves projecting when maintenance will be required to prevent breakdowns, minimize downtime, and reduce costs

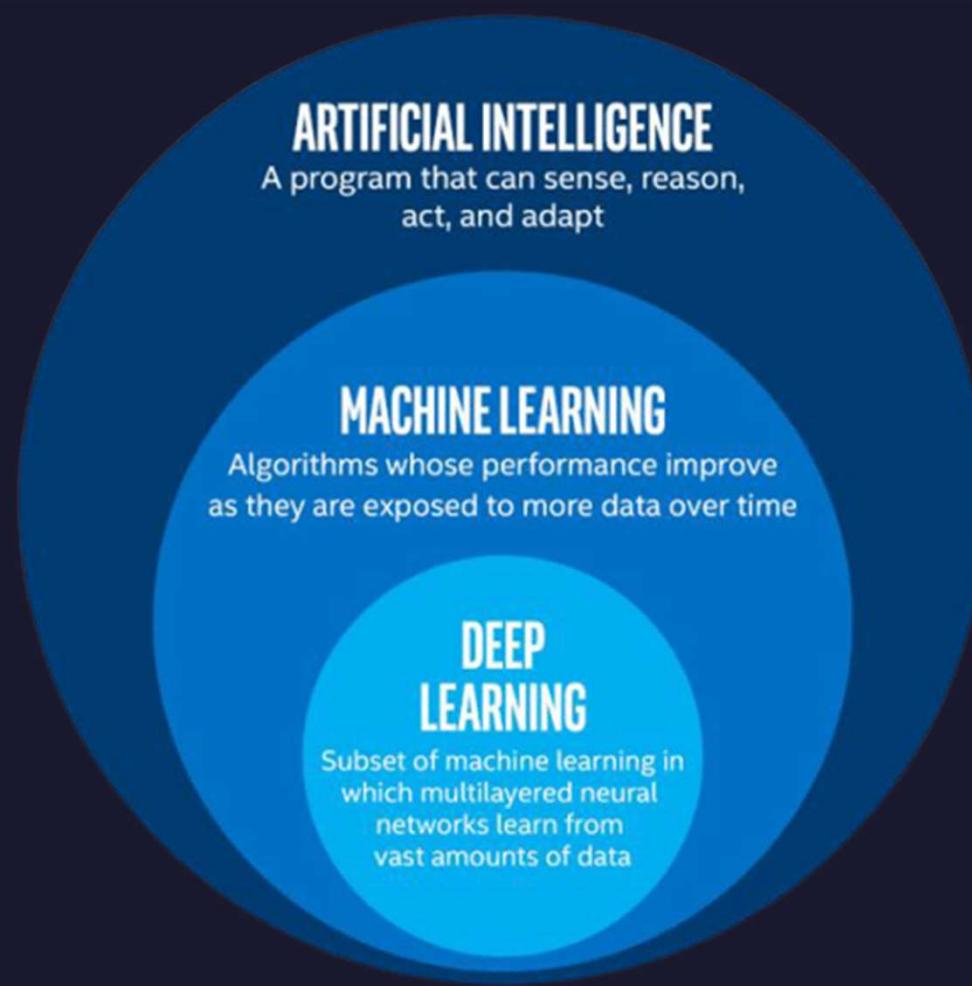
Logistics optimization

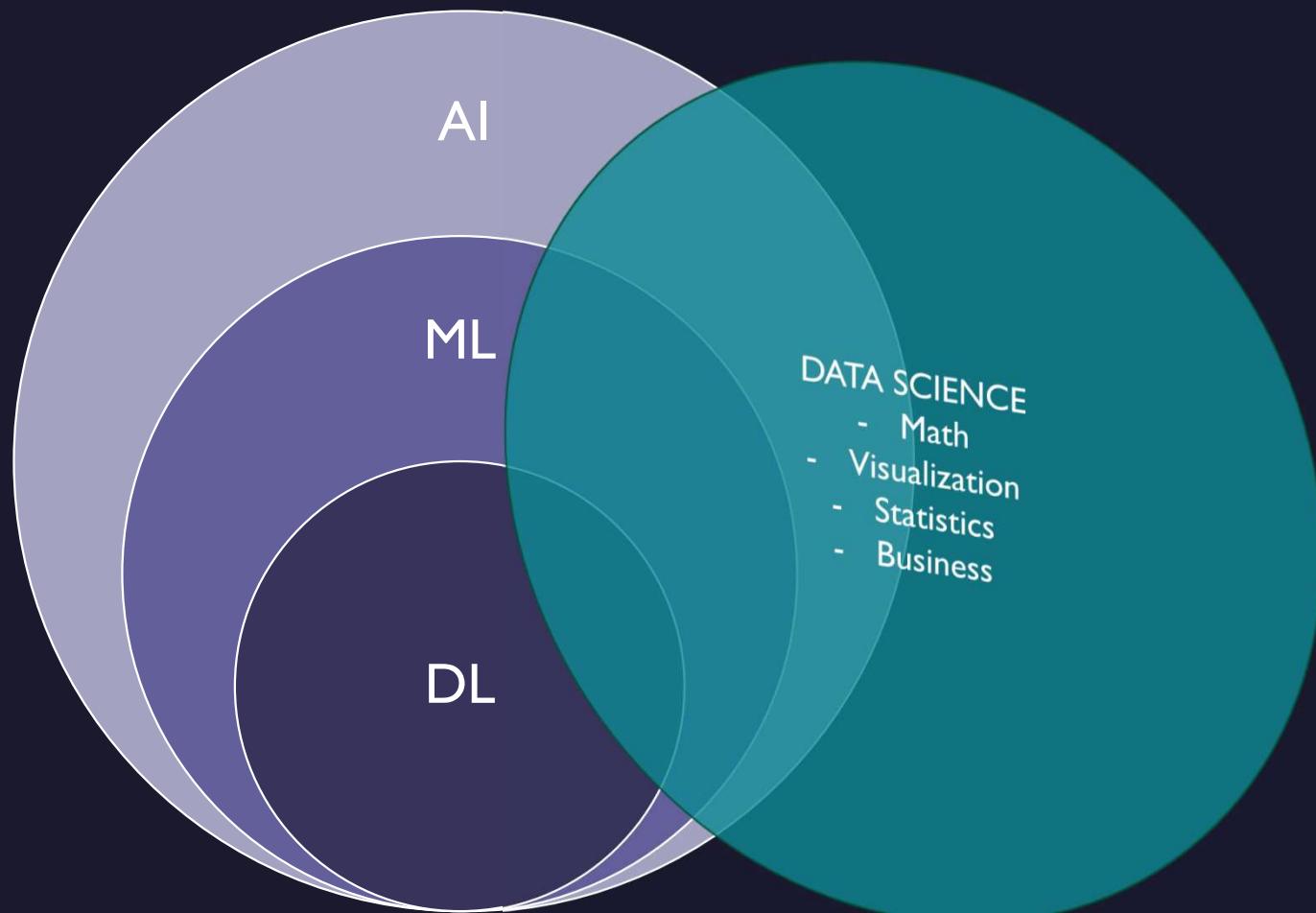
AI can be utilized to optimize logistics and achieve cost reduction.

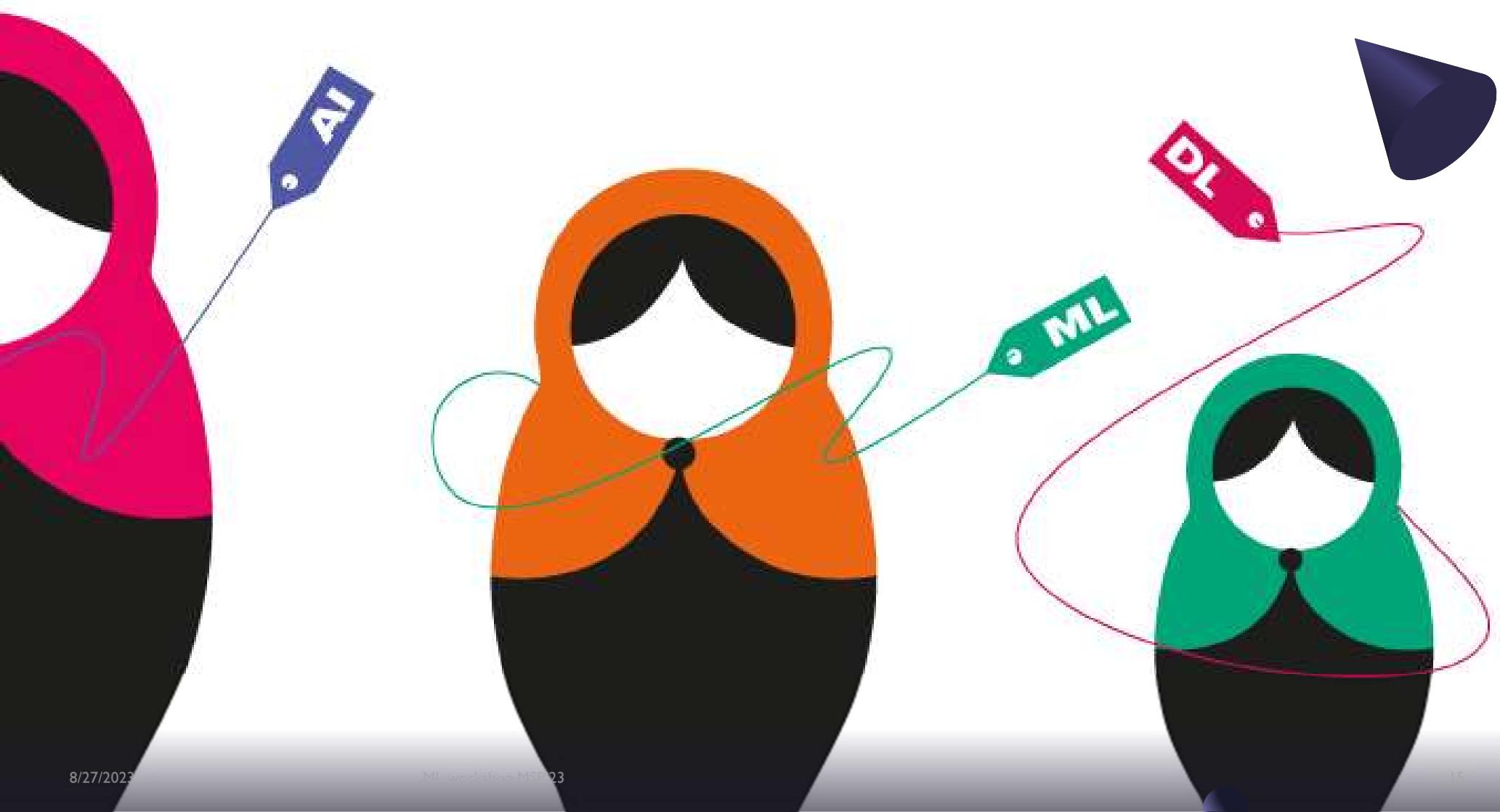
Real-time forecasts and behavioral coaching enabled by AI can contribute to cost reduction.

AI can optimize the routing of delivery traffic, leading to improved fuel efficiency and reduced delivery times.

AI Subfields







Machine Learning

*Machine learning is a method of teaching computers **to learn from data**, without being explicitly programmed. It is a subset of artificial intelligence that involves the development of algorithms that can analyze and identify patterns in data, and use that knowledge to make decisions or predictions*

Machine Learning

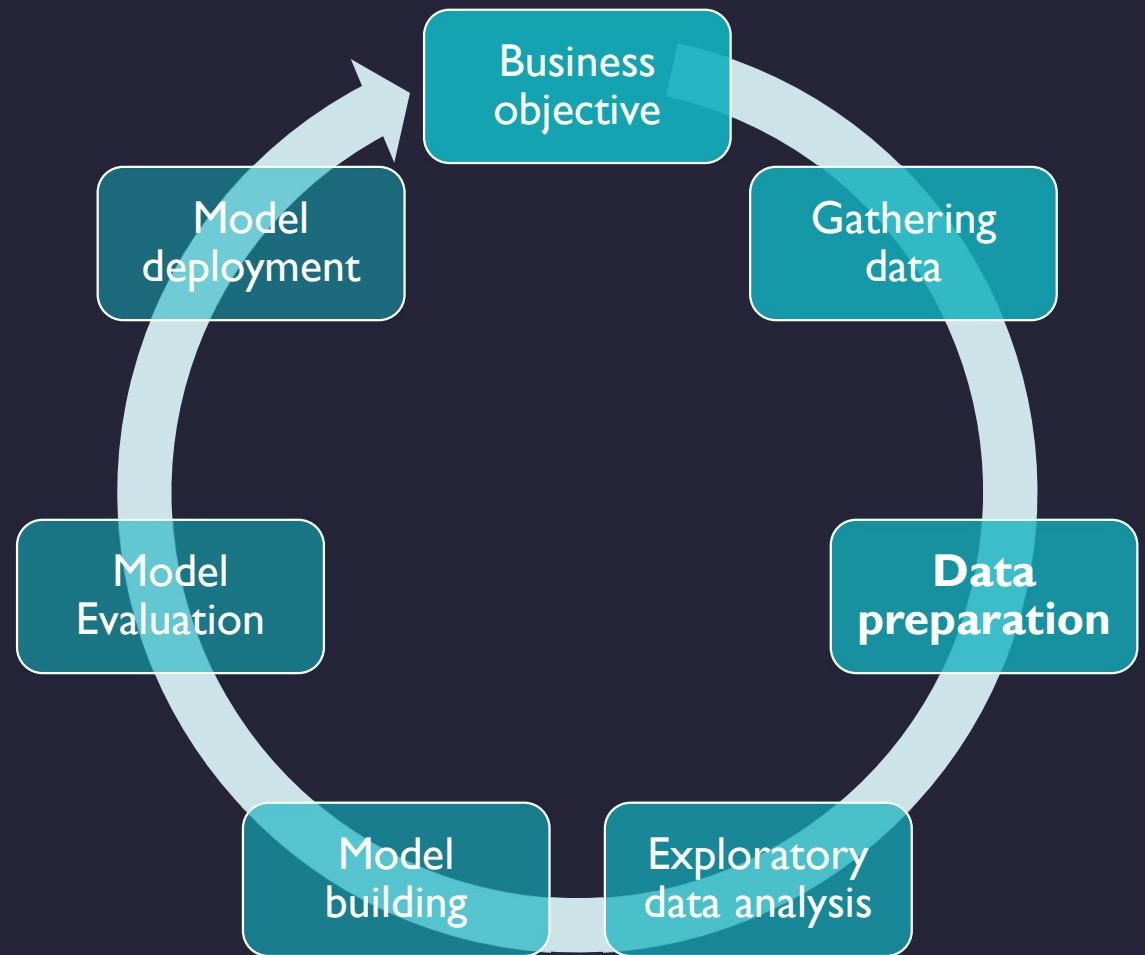
- More about ML definition
- ML lifecycle
- Types of Machine Learning tasks
- Data

More about ML definition

- Learn from data and histories
- Improve with experience
- Iteratively enhance a model that can be used to predict outcomes of questions

A computer program is said to learn from **experience E** with respect to some **task T** and some **performance measure P**, if its performance on T, as measured by P, **improves** with experience E
—Tom Mitchell, 1997 “more formal mathematical definition”

ML lifecycle



Types of ML tasks

ML task

Supervised

- Classification
- Regression

Unsupervised

- Clustering
- Segmentation
- Dimension reduction

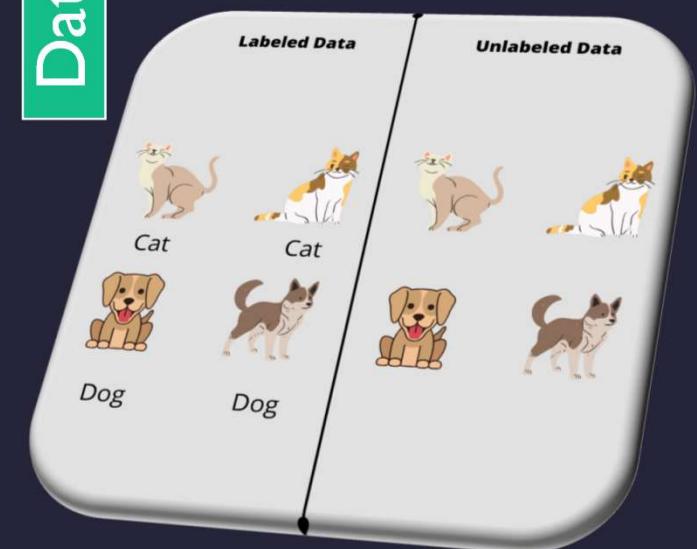
Reinforcement

- Decision process
- Reward system
- Recommendation system

Data can be !

Labeled
(Supervised)

Not labeled
(Unsupervised)



Types of ML tasks

supervised

Supervised

Classification
(sunny,
cloudy,...)

Regression
(33°)



Types of ML tasks

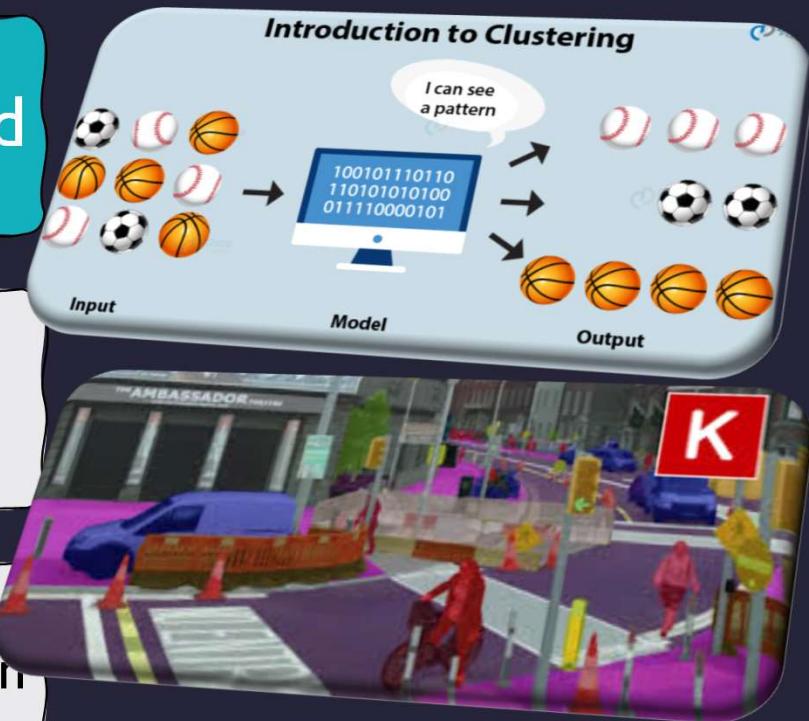
unsupervised

Unsupervised

Clustering

Segmentation

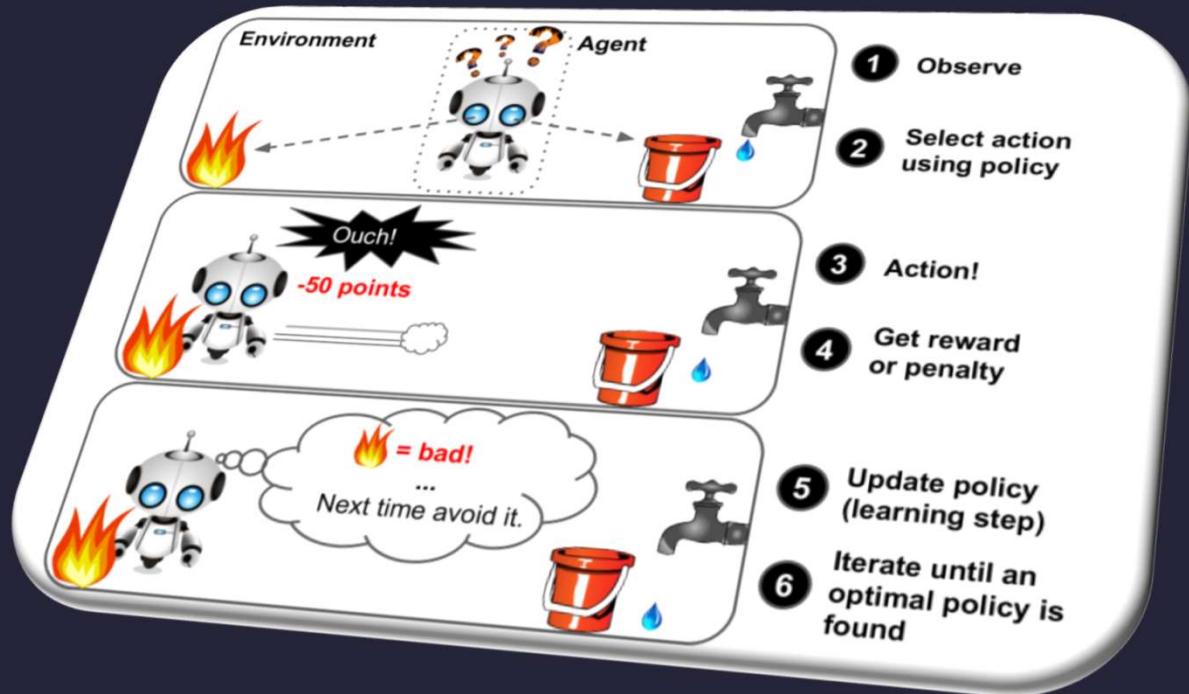
Dimension reduction



Types of ML tasks

Reinforcement

Reinforcement



Data types

Data

Tabular

images

Sound
/Speech

Text

int

Float

Object
(string)

Boolean

Data tabular

index	feature 1	feature 2	feature 3	Label
0	4.5	Practice	1.7	Yes
1	3.2	Doesn't	4.4	Yes
2	2.1	Practice	2.5	No
3	4.5	Practice	1.7	Yes

- N observation (Rows) in this case 4
- 4 columns , 3 of them features predictors to help us predict the Label (target)
- Different types of preemptive data in the table
- Real data would be larger
- X denotes the matrix of all x features just matrix without the label
- Label denoted y as a vector **True labels**
- Our prediction would be denoted as \hat{Y} (y hat) **predicted labels**

AI tools and How to maximize your benefits from?

- ChatGPT
- Some useful extensions
- OpenAI API



ChatGPT



**Another way to use
GPT if you don't have
OpenAI account**

Best practices

<https://platform.openai.com/docs/guides/gpt-best-practices/strategy-write-clear-instructions>



Useful extensions



**ChatGPT would access
internet search result**

Environment

- Python
- Anaconda



Thank You

References

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