

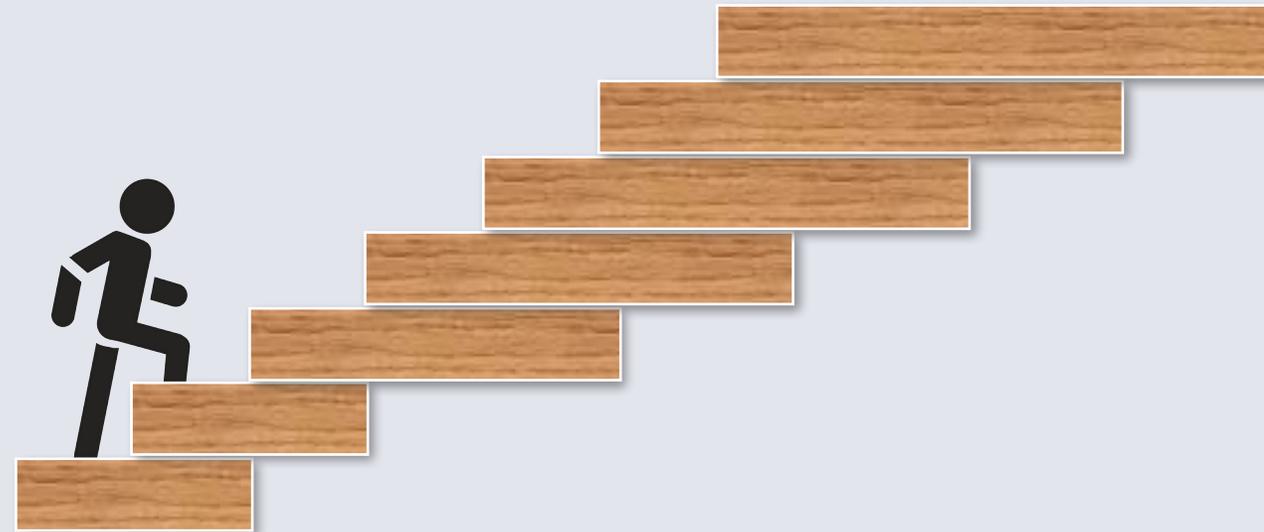
Lecture 2

Types of AI, Areas in AI

Previous Week Recap (..3 Minutes)



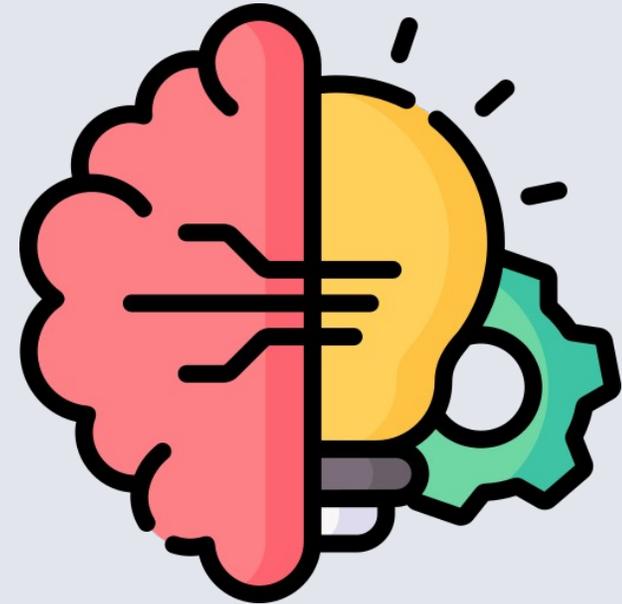
- **Course Overview**
- **What is Artificial Intelligence**
- **History of Artificial Intelligence**
- **Sub-fields in Artificial Intelligence**
- **Applications of Artificial Intelligence**



Today's Contents



- **Types of AI**
 - **Based on Capability**
 - **Based on Functionality**
 - **Based on Applications**
- **Working Areas**
 - **Facial expression recognition**
 - **Object detection**
- **Assessment 1 released (Guide)**



Today's Contents



Learning Objectives of Today's Lecture

- Familiarise you with the Capability, functionality AI, industrial impact of Artificial Intelligence
- How a real-world problem works using AI.
- Working flow of a vision-based AI application.

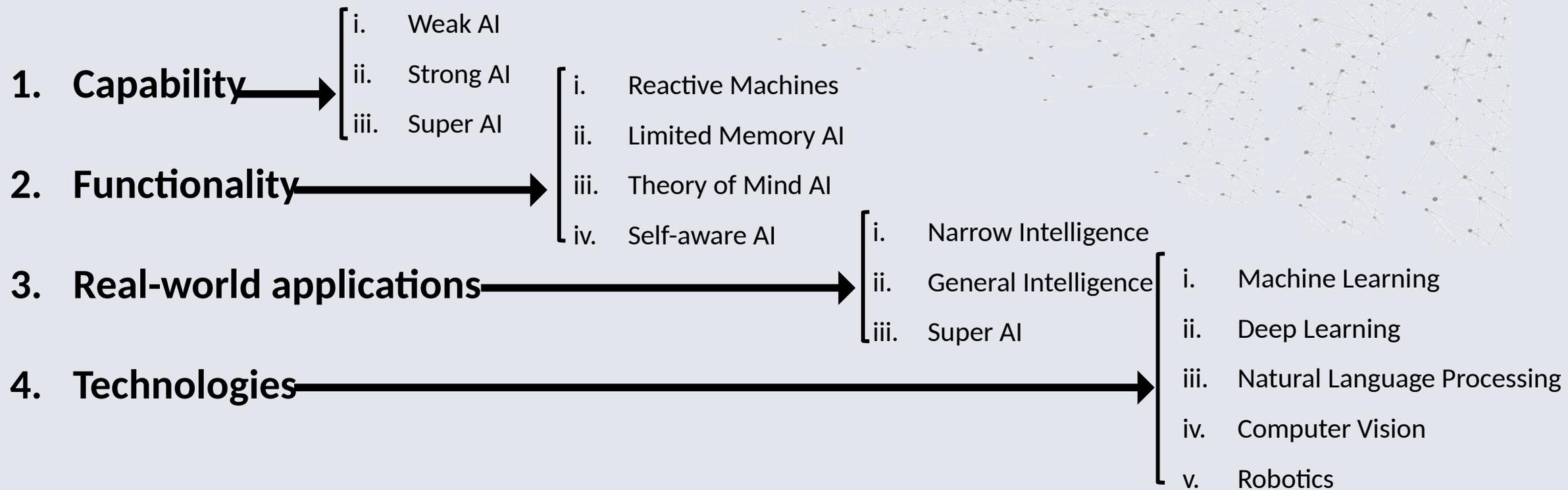
- **Important Directions**



Types of AI



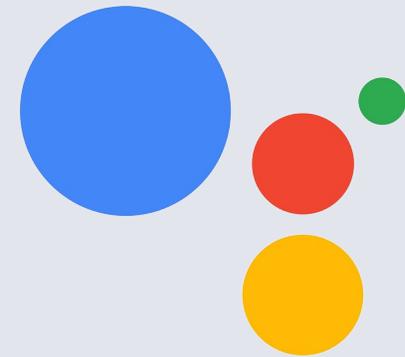
- AI can be categorized into several types based on such as functionality, capability, real-world applications, and technologies.



Types of AI (Capability)

i. Weak AI

- Trained and design for a specific task or a narrow range of tasks.
- Can't perform beyond its defined tasks.
- E.g. (voice assistants)

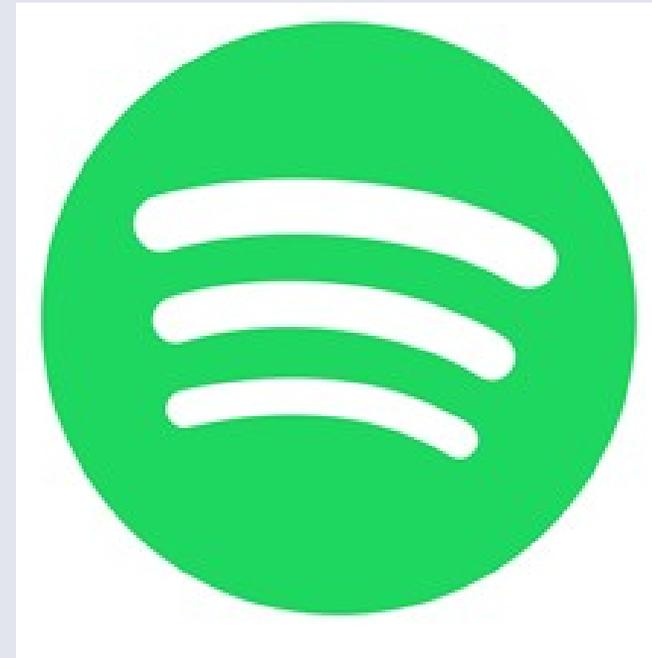


Types of AI (Capability)

i. Weak AI

- Trained and design for a specific task or a narrow range of tasks.
- Can't perform beyond its defined tasks.
- Recommendation Systems (Netflix, Spotify)

N



Types of AI (Capability)

ii. Strong AI

- Can perform any intellectual task that a human can.
- Ability to learn, reason, and understand across various domains, adapting to new situations
- Not restricted to any specific task



Types of AI (Capability)



ii. Strong AI

- Imagine an AI system that can not only assist with voice commands like Siri but:
 - write essays,
 - solve complex math equations,
 - understand human emotions,
 - drive a car, and even create art.



This would be an AI that could perform any task you ask of it, similar to a human with broad knowledge and abilities.

Types of AI (Capability)



iii. Super AI

- Far exceeds human intelligence in all respects.
- AI could learn, adapt, and evolve much faster than humans
- Solving problem in innovative ways



Types of AI (Capability)



iii. Super AI

- *The Matrix* or *Ex Machina*,

AI Depictions that not only outperform humans intellectually but also gain self-awareness and potentially control the human environment.

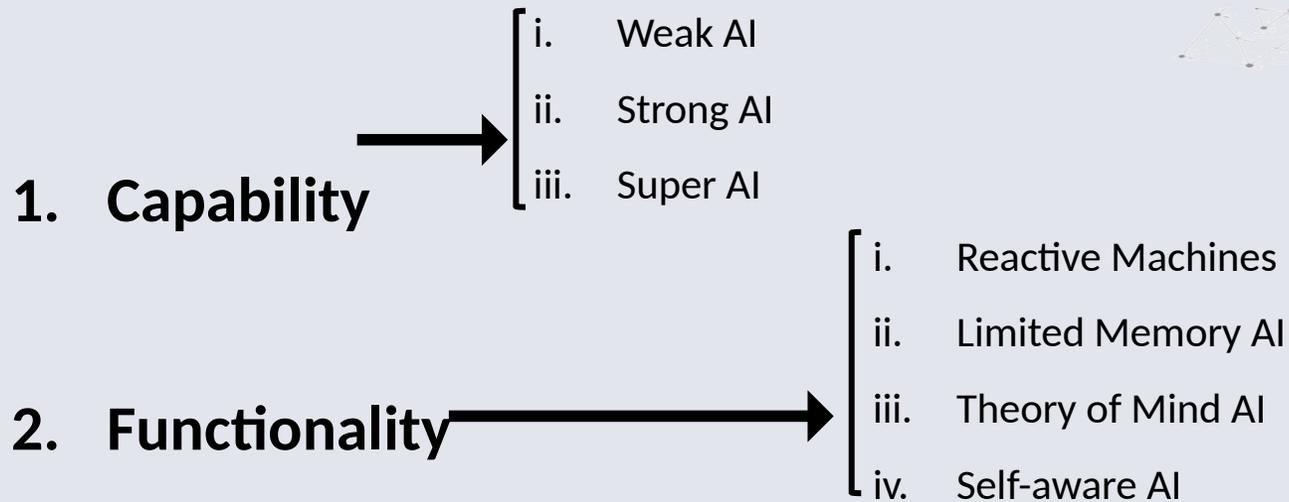


- A super AI might, for example, cure all diseases or design technologies far beyond current human capabilities, but it might also pose ethical risks if it behaves unpredictably.

Types of AI



- AI can be categorized into several types based on such as functionality, capability, real-world applications, and technologies.



Types of AI (Functionality)



i. Reactive Machines

- Simplest AI that perform specific tasks by reacting to current conditions, without storing any past experiences.
- Cannot "learn" from the previous actions or improve their performance based on experience.

Types of AI (Functionality)



i. Reactive Machines



- **IBM's Deep Blue (Chess-playing AI): 1997**
 - Famously beat chess champion Garry Kasparov, is a reactive AI.
 - It analyzed the chessboard's current state, evaluated possible moves, and chose the best one based on programmed algorithms.
 - However, it couldn't learn or adapt between games — it was purely reactive to the current game's conditions.

Types of AI (Functionality)



ii. Limited Memory AI

- Can learn from historical data to make decisions
- Can store past experiences or data for a short time and use it to improve their predictions or performance

Types of AI (Functionality)



ii. Limited Memory AI

- **Self-driving Cars:** (Developer: Tesla or Waymo)



- Use limited memory AI.
- Analyze real-time data from sensors, cameras, and radar (like road conditions, traffic, and other vehicles' behavior) to make driving decisions.
- They also use previous experiences (like patterns of traffic flow) to navigate better in the future.

Types of AI (Functionality)



iii. Theory of Mind AI

- Designed to understand emotions, intentions, and social interactions.
- To interpret human needs and respond accordingly
- To predict how humans will behave in certain situations and adjust its behavior accordingly

Types of AI (Functionality)



iii. Theory of Mind AI

State:

- In development and remains theoretical for now.
- Research into emotional AI is underway,
- No current AI system fully understands human emotions.



Types of AI (Functionality)



iii. Theory of Mind AI

If develop:

- It will be able to detect if you're feeling sad or stressed based on your facial expressions, voice tone, or physiological data.
- Will then responses accordingly by offering calming music if you're stressed or providing motivational content if you're feeling down.

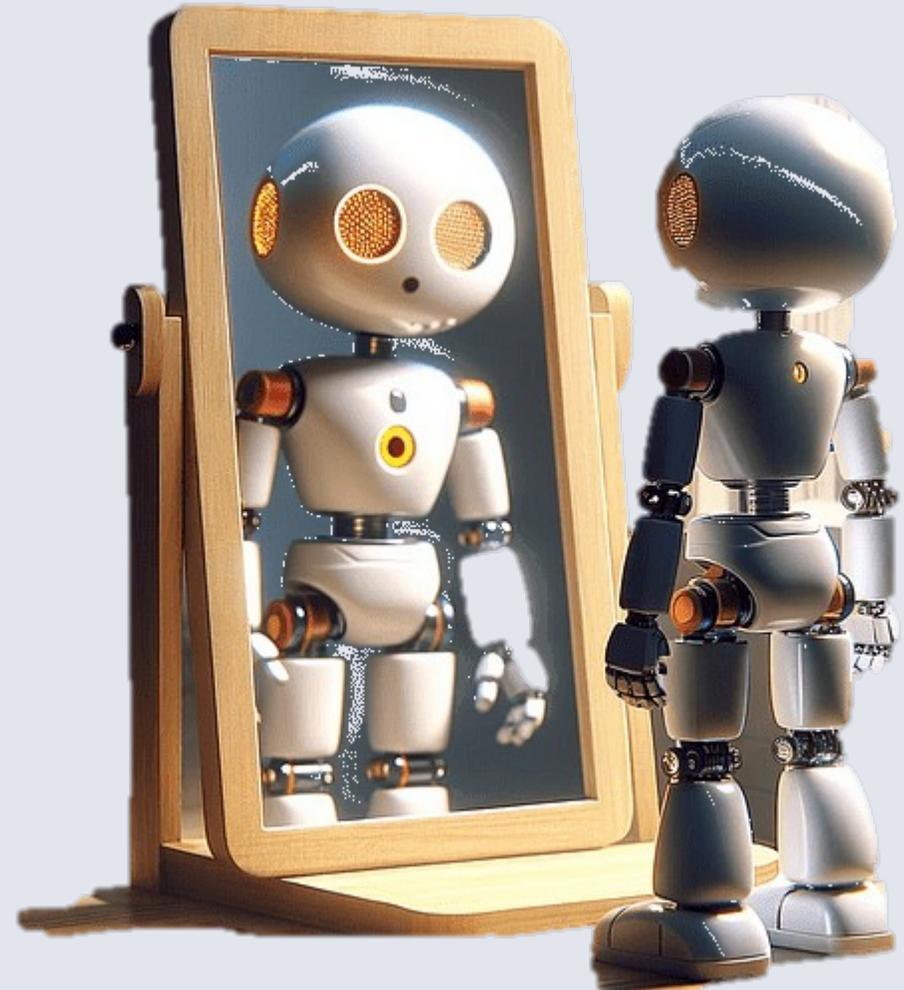


Types of AI (Functionality)



iv. Self-aware AI

- Exists only in theory.
- Own consciousness and self-awareness.
- Understand its own state of existence
- Recognize its identity
- Have independent desires or motivations.



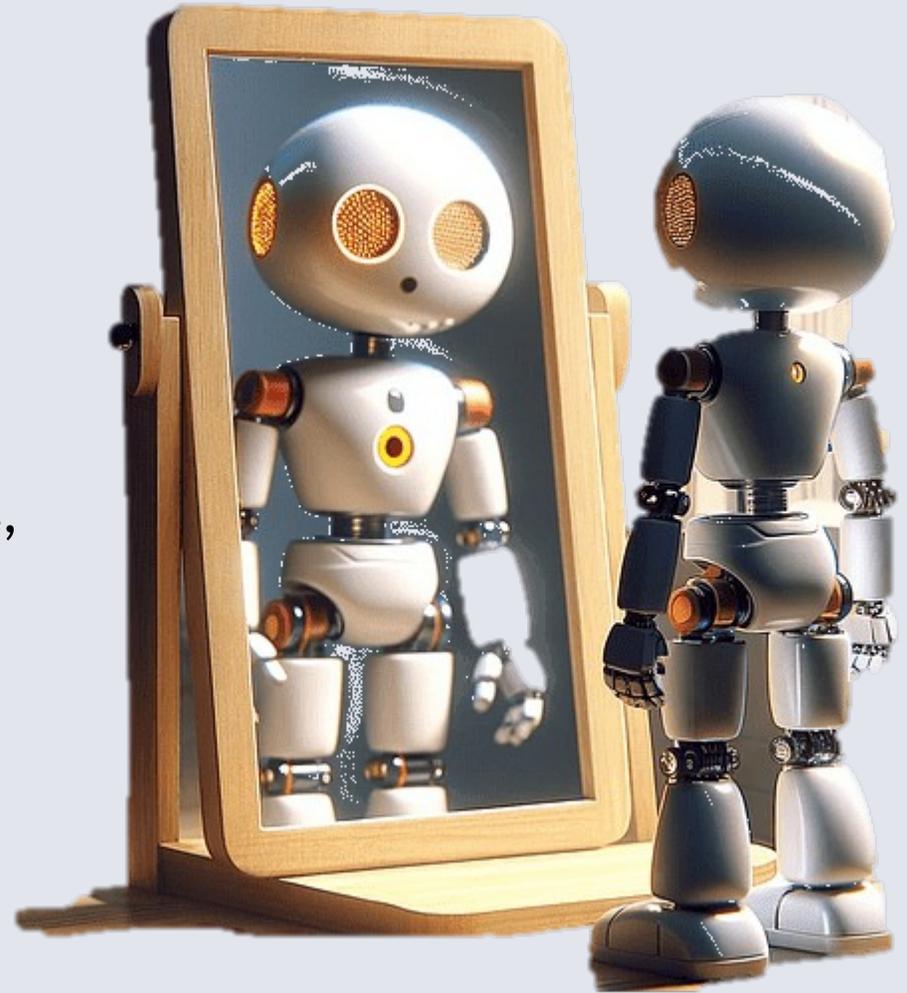
Types of AI (Functionality)



iv. Self-aware AI

Example:

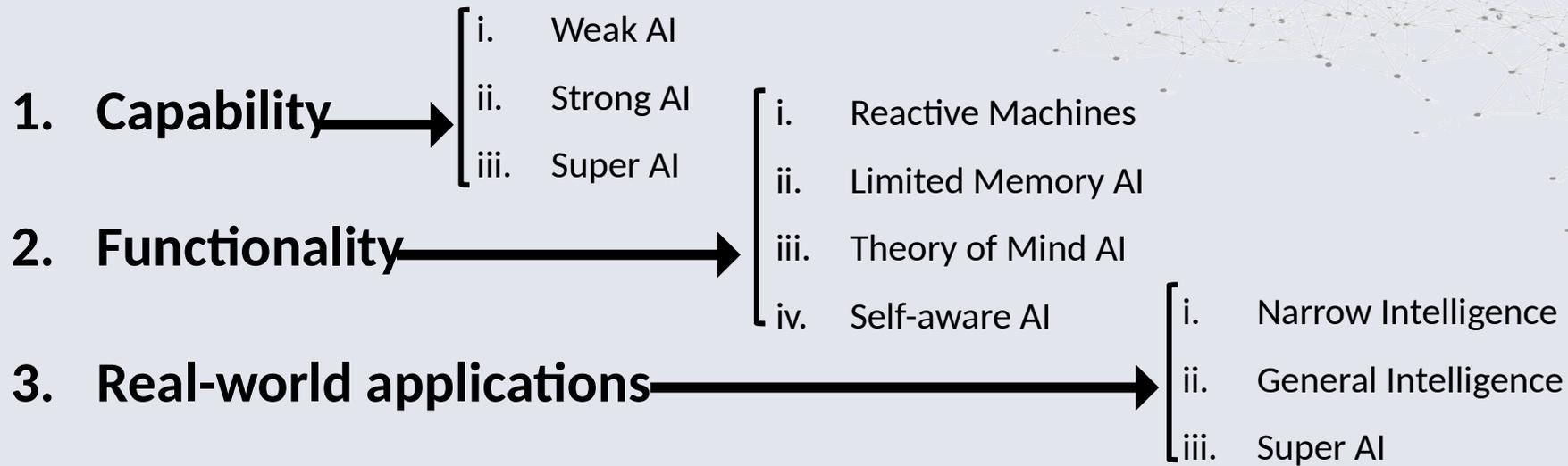
- In films like Ex Machina AI systems become self-aware, developing independent thoughts, emotions, and even desires.
- Systems start to question their purpose, existence.



Types of AI



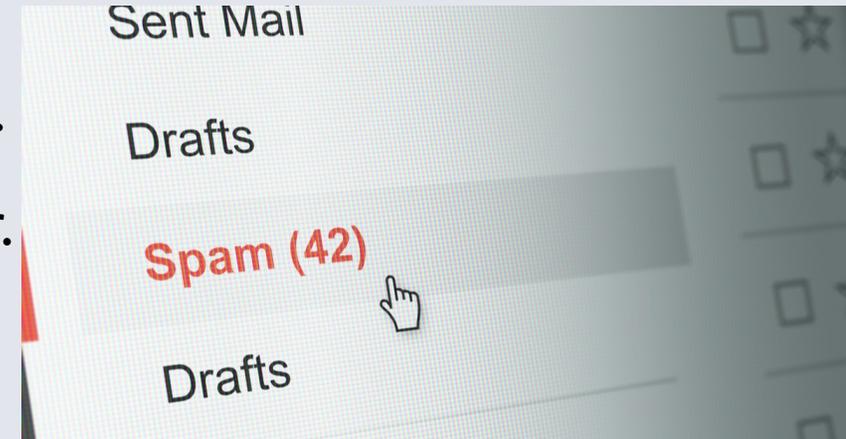
- AI can be categorized into several types based on such as functionality, capability, real-world applications, and technologies.



Types of AI (Real-world Applications)

i. Artificial Narrow Intelligence

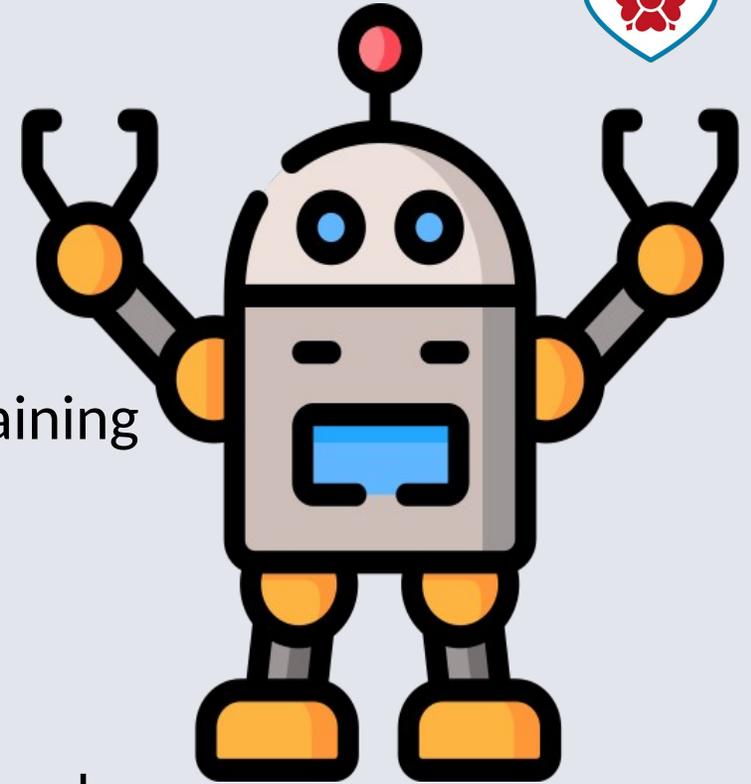
- Can't perform tasks outside of what it's designed to do.
- This is the only type of AI, successfully developed so far.



Example:

- **Spam Filters in Email:**
- Email platforms like Gmail use ANI to detect and filter out spam emails. The system is highly efficient at this task but cannot perform other tasks like writing an email, etc.

Types of AI (Real-world Applications)



ii. Artificial Narrow Intelligence

- Can perform any intellectual task that a human can do
- The system could adapt to new tasks without additional training

Example:

- has not yet been achieved.
- robot capable of learning any new task, whether it's playing chess, cooking, diagnosing diseases, or composing music.

Types of AI (Real-world Applications)



iii. Artificial Superintelligence

- Surpasses human intelligence across all fields
- Think and learn far faster and more deeply than any human

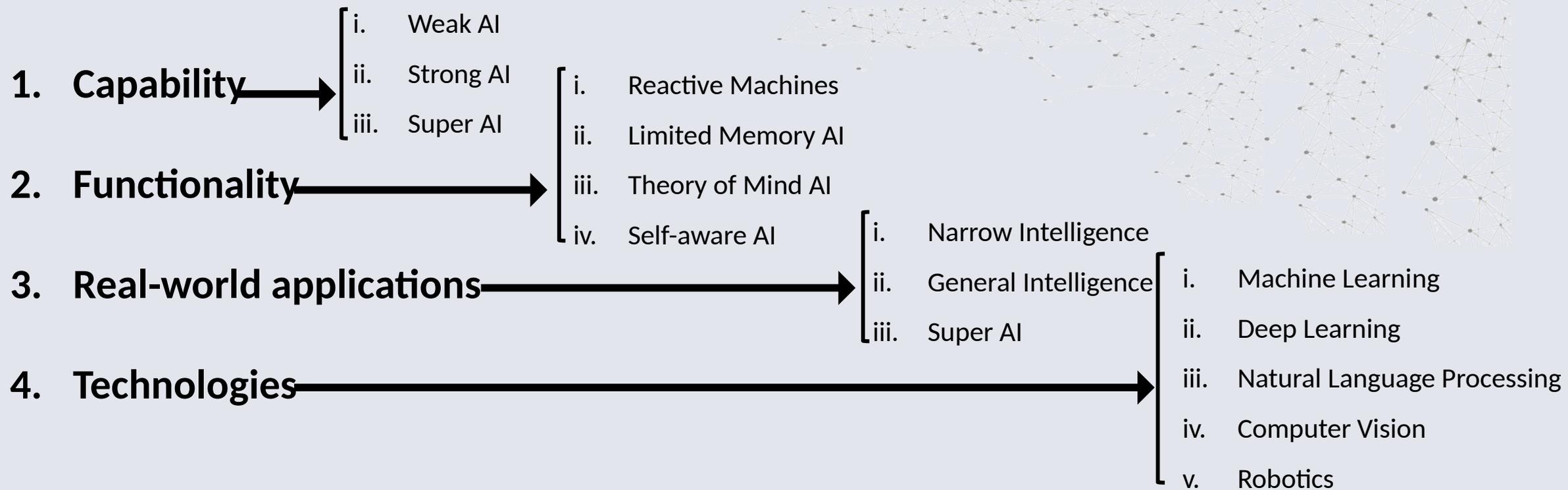
Example:

- Purely hypothetical and in the realm of science fiction.
- Potentially solve climate change, discover new forms of energy, or even develop space travel technologies far beyond what we can currently imagine.

Types of AI



- AI can be categorized into several types based on such as functionality, capability, real-world applications, and technologies.

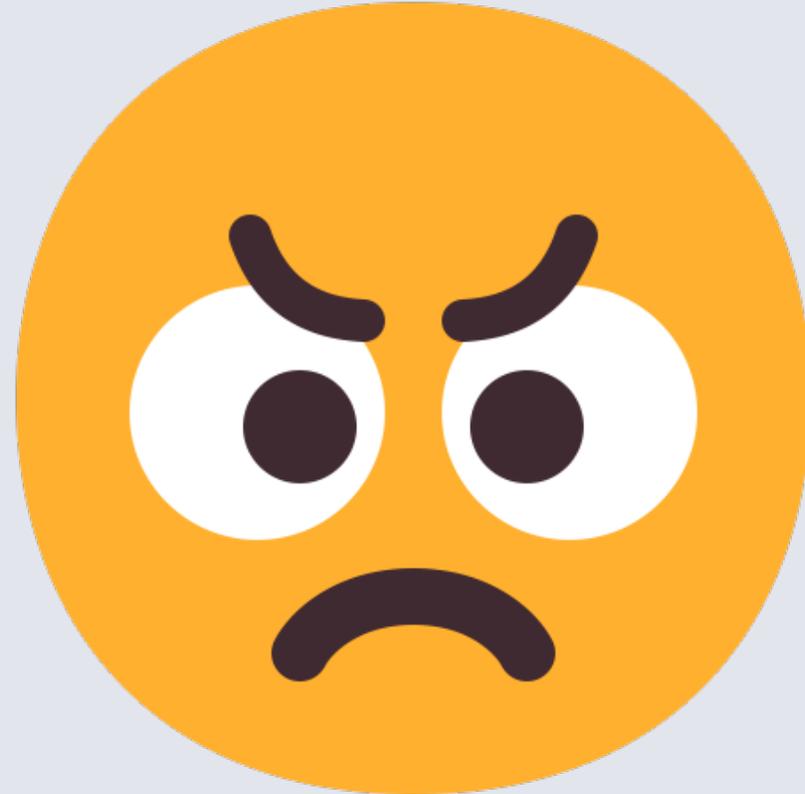




Types of AI (Technologies)

- i. Machine Learning (ML)**
- ii. Deep Learning**
- iii. Natural Language Processing (NLP)**
- iv. Computer Vision**
- v. Robotics**

Facial Expression Recognition



Facial Expression Recognition



1



2



3



4



5



6

Facial Expression Recognition



Angry



Fear



Happy



Neutral



Sad



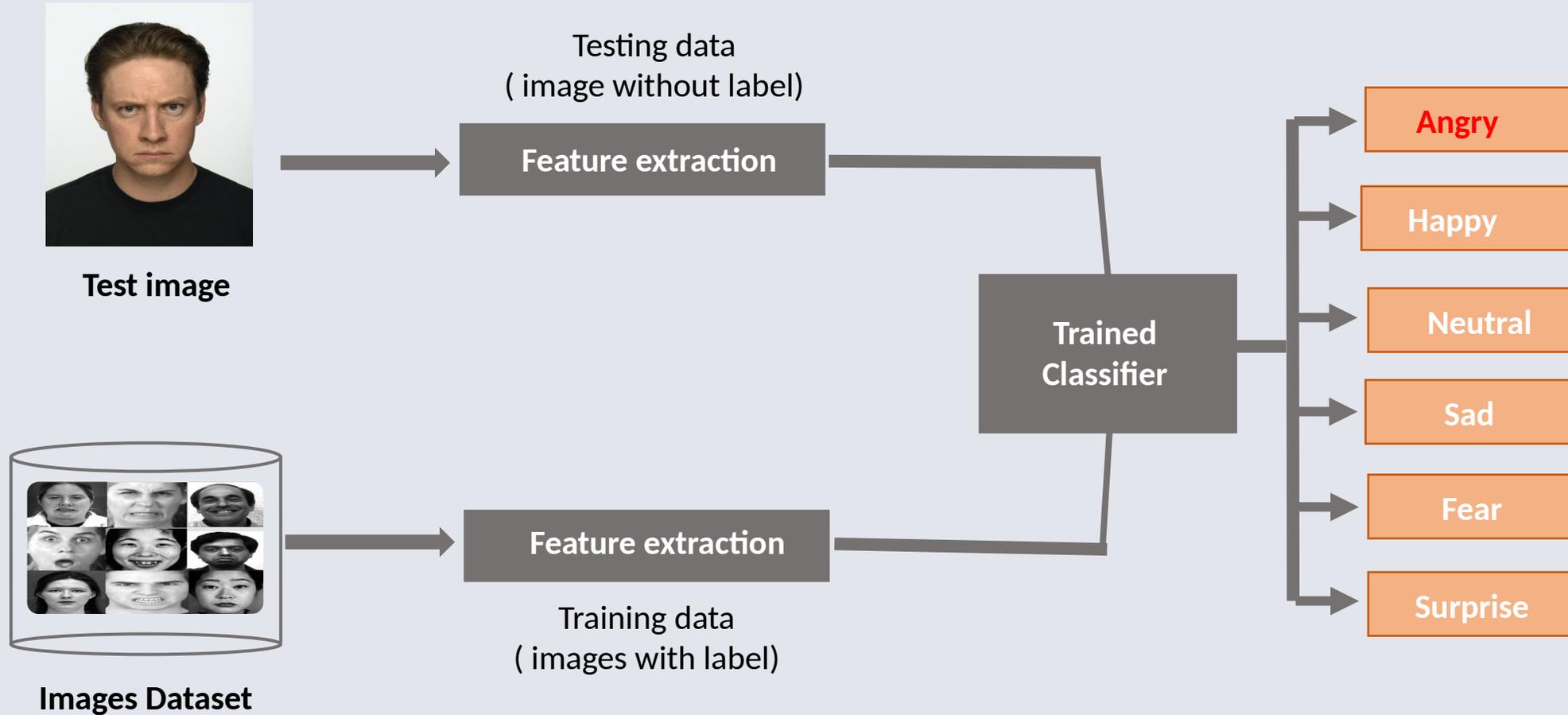
Surprise

Facial Expression Recognition

- Human Communication is the exchange of ideas, shares feelings, etc.
- Which mainly consist of two types i-e verbal com and non-verbal com.
- Non-verbal is through facial expression, eye contact and nodding with non-verbal According to M. Argyle, over 80% of communication is done through this non-verbal communication.
- As non-verbal communication is through facial expression, let understand what are these facial expressions.



Facial Expression Recognition

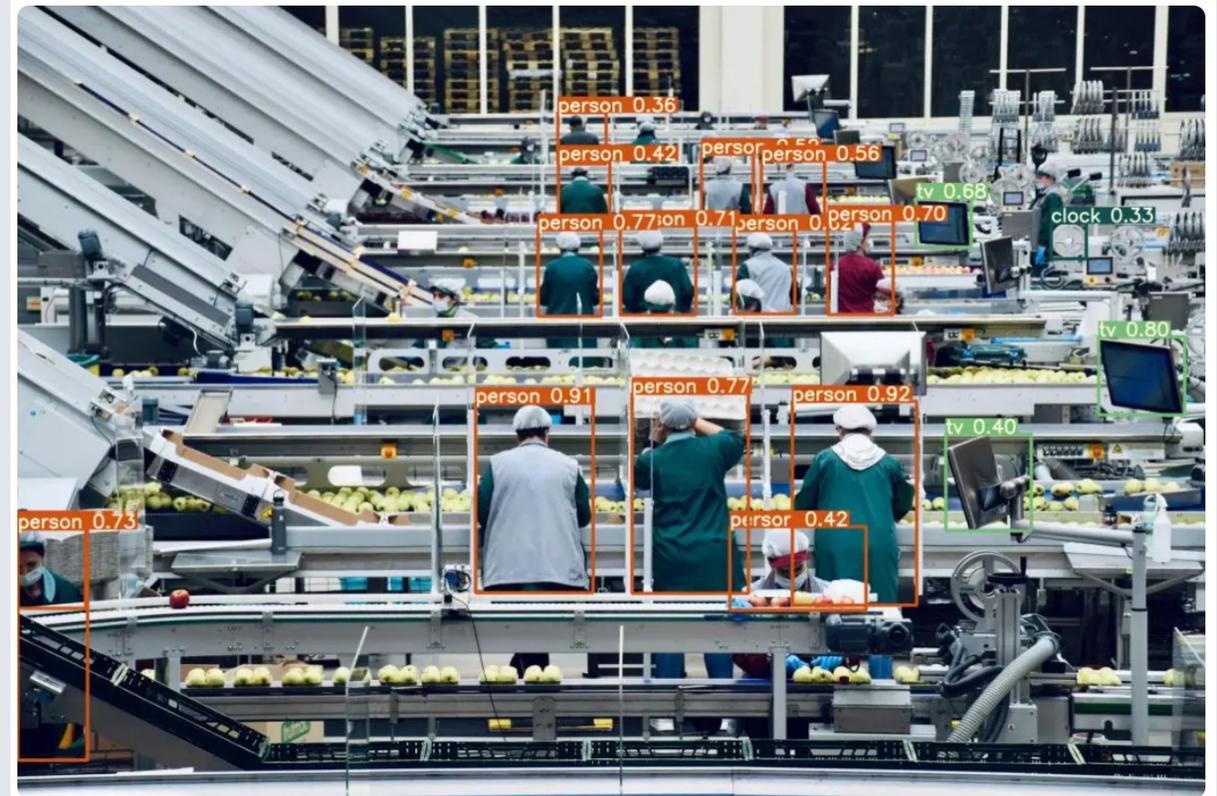


Object Detection



- Please follow the below link and read it in your free time.

[Object Detection in 2024: The Definitive Guide - viso.ai](https://www.viso.ai/object-detection-in-2024-the-definitive-guide)





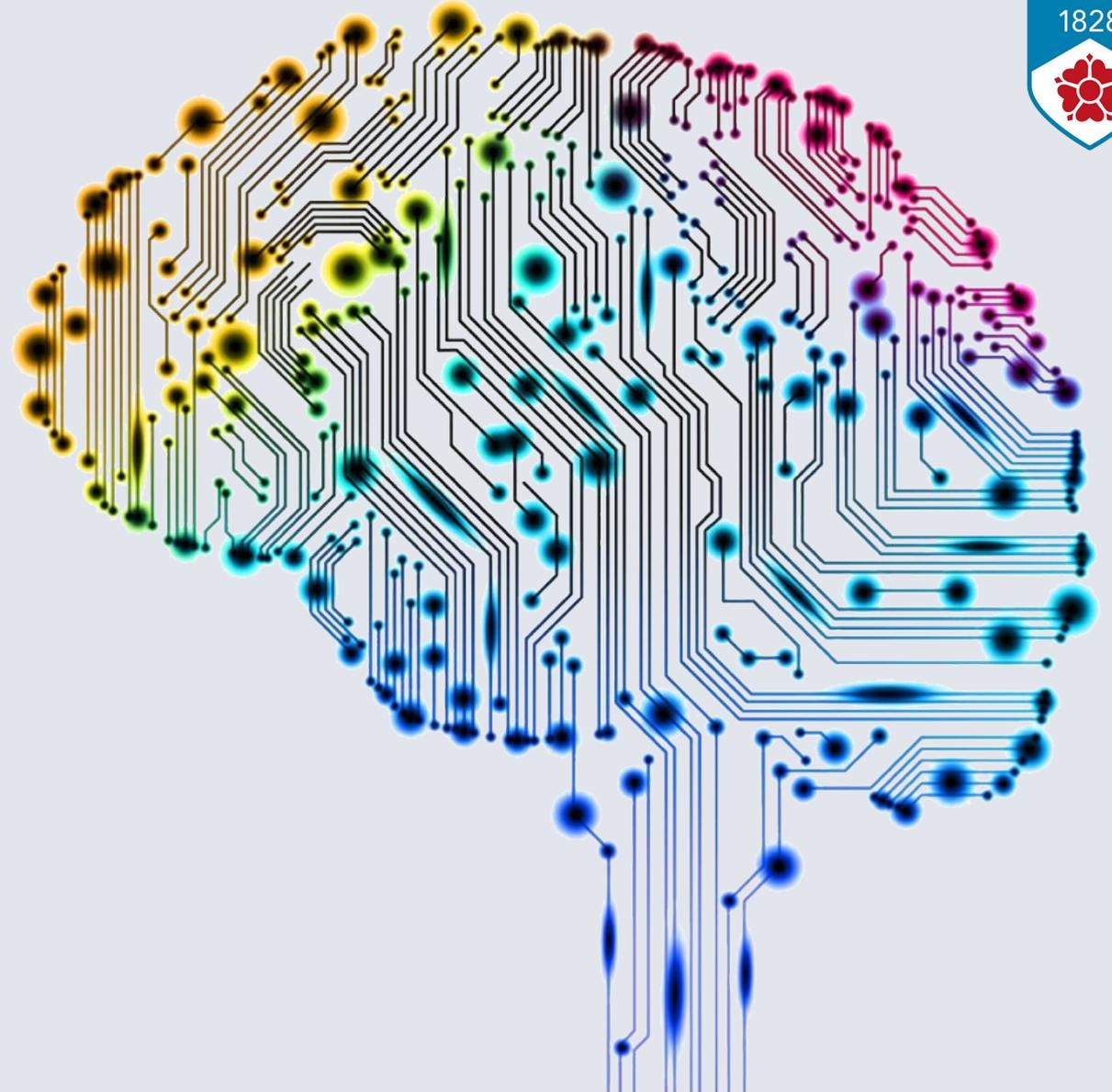
Assessment 1 Released (Guide)

- **Released:** 06 Oct 2025, 10:00 GMT
- Where can you find?
- Go to '*CO3519 : Artificial Intelligence, (2025-2026, Sem 1 and 2) (University Main Campus)*' on your blackboard.
- Look for *Assessment Folder*.
- You will find two materials
 - *CO3519 Assessment 1 Brief 2025-2026*
 - Explanation about the Assignment.
 - *Assignment 1 Submission Link - 14th Dec*
 - The Link where you will submit.

Next Week



- **Machine Learning and Key Concepts**
- **Data, Types of Data**
- **Supervised Learning**
- **Key Supervised Algorithms**





Any Question?