

Lecture 2 (What is AI?)

1 What is Intelligence (Continuation)

1.1 Planning Tasks

1. Predicting Structures
 - i. Structure of amino acids
 - ii. How a protein folds
2. Sequential decision-making
 - i. Game playing
 - ii. Treatment recommendation

1.2 Logic and Reasoning

1. Logical Systems
 - i. Theorem provers
 - ii. Fault diagnosis
 - iii. Medical diagnosis
 - iv. Manufacturing planning
2. Methods
 - i. Deduction systems
 - ii. Constraint satisfaction
 - iii. Satisfiability solvers

1.3 Robotics/Embodied AI

1. Autonomous cars
2. Manipulation tasks
3. Unmanned exploration
4. Machine capable of walking

2 When is AI capability displayed?

1. Human centred

- i. Comparing with human performance
 - ii. Empirical observations and hypothesis about human behaviour
- 2. Engineering viewpoint
 - i. Rationality
 - ii. Performance wrt an objective
- 3. Thinking vs Acting

3 Thinking and Acting Humanly

3.1 Turing Test (Acting Humanly)

For AI to pass the **Turing Test**, the following is needed:

- 1. NLP
- 2. Knowledge representation
- 3. Automated reasoning
- 4. ML
- 5. Computer vision
- 6. Robotics

3.2 Thinking Humanly

- 1. Cognitive Science
 - i. How humans or animals perceive and act in the world
 - ii. Tested using introspection and psychological experiments
- 2. Aim of an AI system:
 - i. To match the cognitive model of a human
 - ii. Inform our understanding of human reasoning

4 Thinking and Acting Rationally

- 1. Understanding the thought process
- 2. Reflex actions exist too

5 Agent in AI

An agent is any entity which perceives the *environment* through *sensors* and acts upon it through *actuators* such that the *performance measure* is maximised (for a good agent).

6 Domain Characteristics

- 1. Fully vs Partially observed

2. Single vs Multiple agents
3. Deterministic vs Stochastic
4. Episodic vs Sequential
5. Static vs Dynamic
6. Discrete vs Continuous