Artificial Intelligence and logical reasoning

INT314- 3 Credit

Course Objectives:

1. This course will help to understand the basic knowledge representation, problem solving and logical reasoning.
2. The students will learn various methods of solving problems using artificial intelligence.

Sessions and Credits

Theory Credit -3
Hours – 3/week
Lab credit-1
Hours – 2/week

Discussions

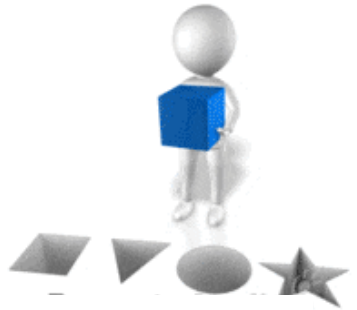
Assessment

Games

Problems

Observation

CIA

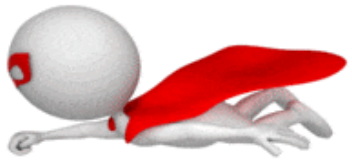


Time - Attendance










Units – Learning outcomes

Unit 1

- Classify intelligent agents based on their relationship with the environment
- 15 Sessions

Unit 2

- Choose an appropriate search strategy for problem solving
- 15 Sessions

Unit 3

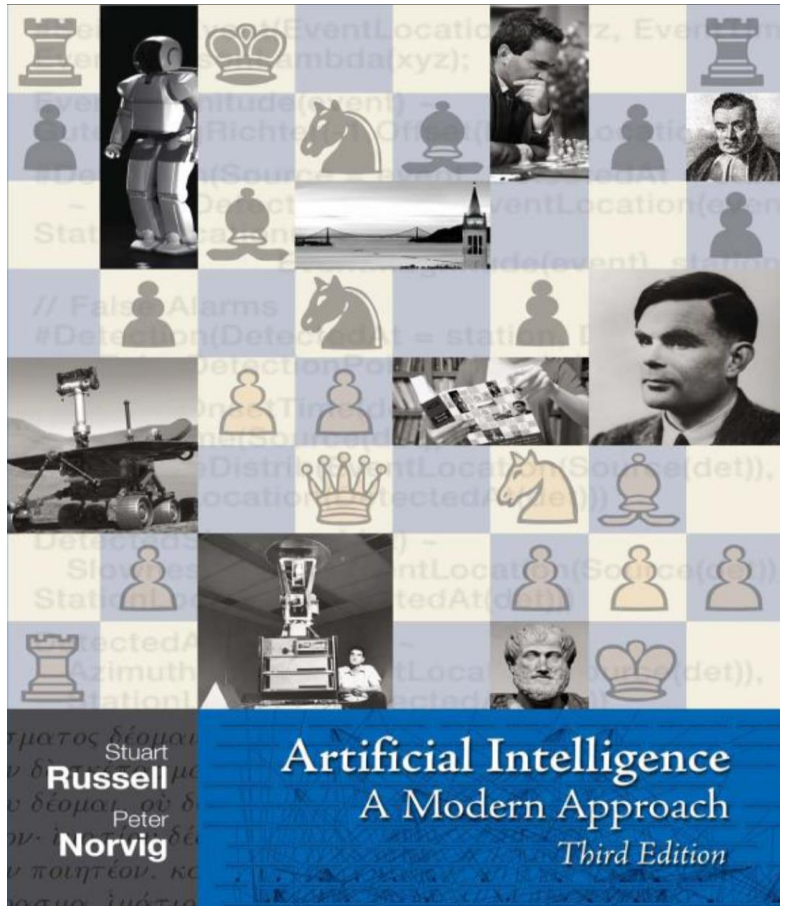
- Choose appropriate ontology and logic for knowledge representation and inference
- 15 Sessions

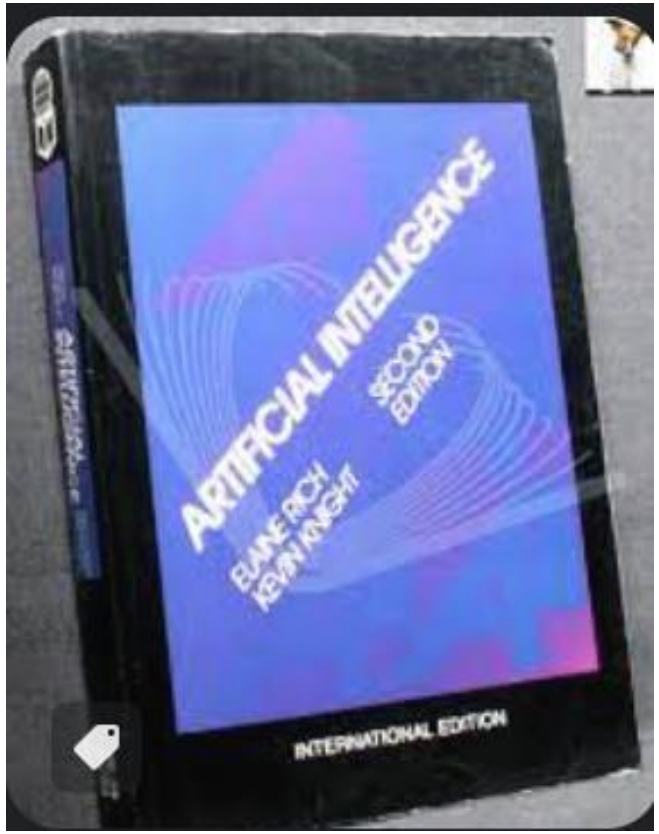
Unit 4

- Discuss the various expert systems attributes and tool of real world problems.
- 12 Sessions

Text Books

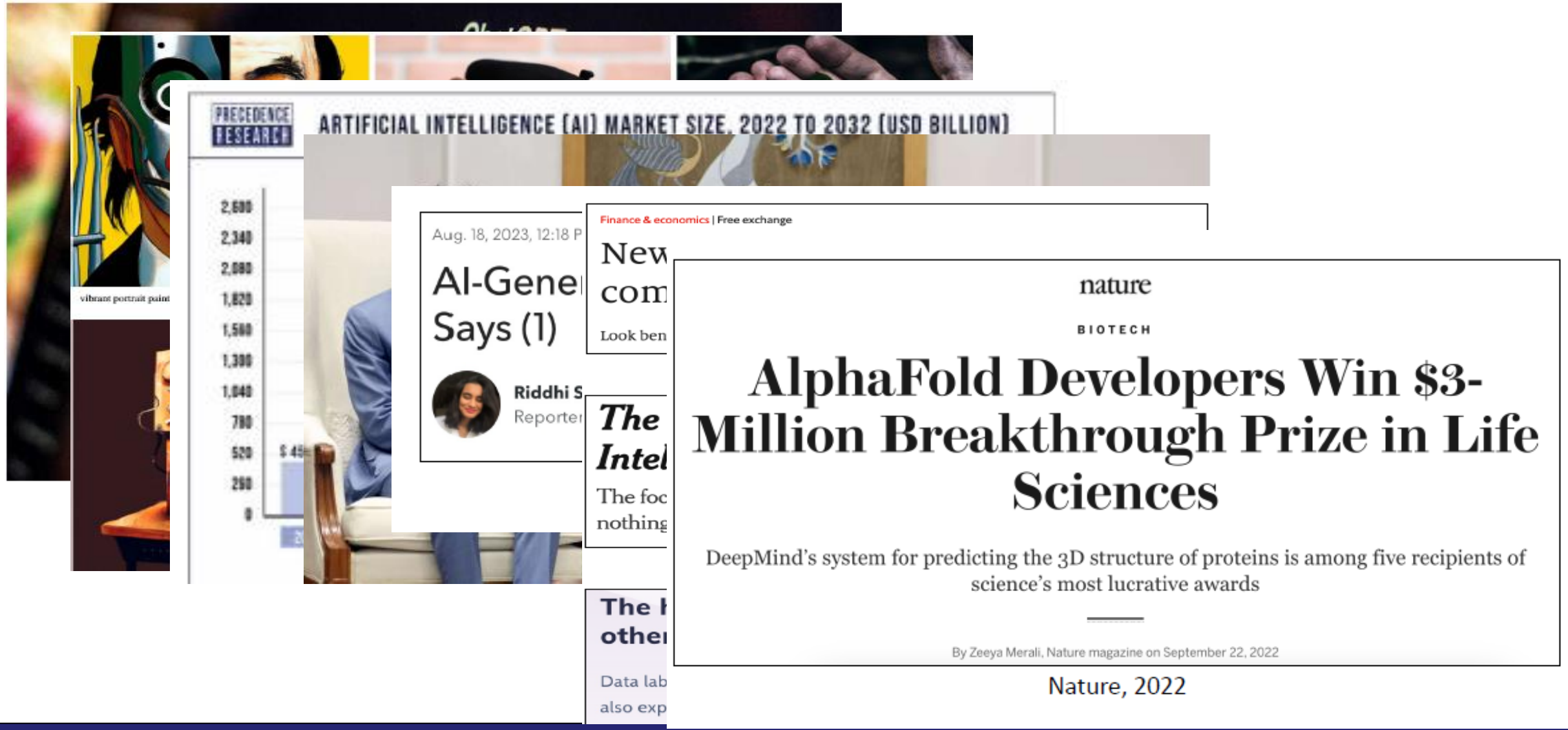
- Stuart Russell and Peter Norvig. *Artificial Intelligence - A Modern Approach*. Pearson Education / Prentice Hall of India, 3rd Edition, 2014.





Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw-Hill, New Delhi, 3rd Edition, 2008

AI in Real time



What can AI Do?

Quiz: Which of the following can be done at present?

Win against any human at chess? ✓

Play a decent game of tennis? ✓

Unload any dishwasher in any home? ✗

Drive safely along the highway? ✓

Drive safely along streets of San Francisco? ?

Buy a week's worth of groceries on the web? ✓

Buy a week's worth of groceries at Berkeley Bowl? ✗

Discover and prove a new mathematical theorem? ?

Perform a surgical operation? ✗

Translate spoken Chinese into spoken English in real time? ✓

Win an art competition? ✓

Write an intentionally funny story? ✓

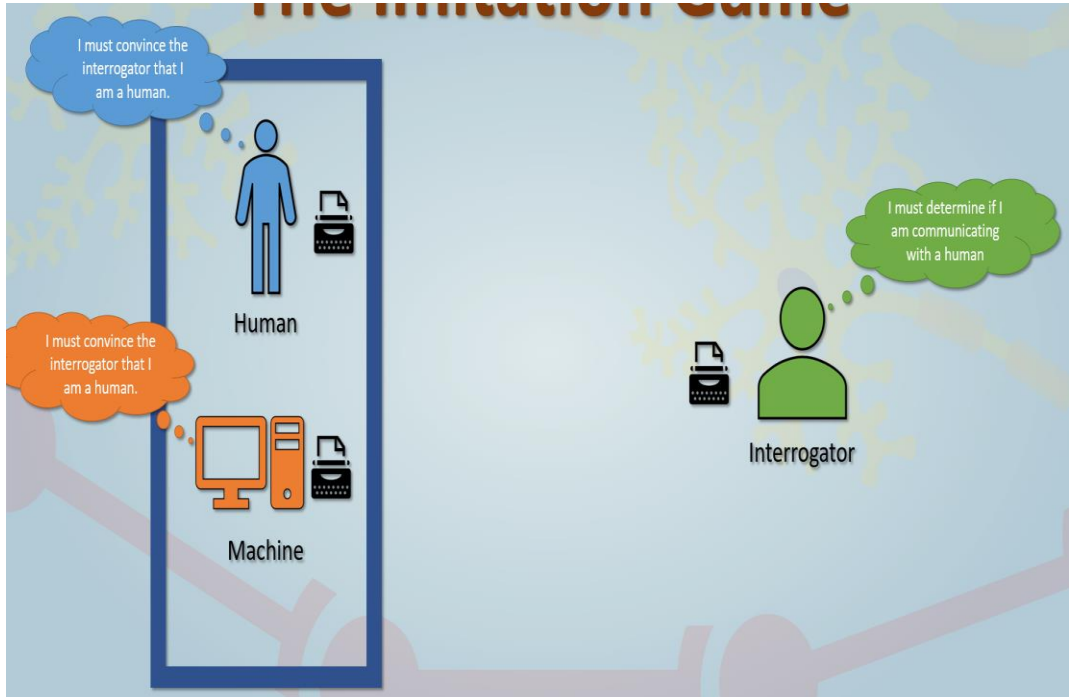
Construct a building? ✗

What is AI?

	Human-centered	Rationality-centered
Thought-centered	Systems that think like humans.	Systems that think rationally.
Behaviour-centered	Systems that act like humans.	Systems that act rationally.

Acting humanly

The Turing Test approach



The **Turing Test**, proposed by Alan Turing TURING TEST (1950)
The computer would need to possess the following capabilities:

- **natural language processing** to enable it to communicate successfully in English;
- **knowledge representation** to store what it knows or hears;
- **automated reasoning** to use the stored information to answer questions and to draw new conclusions;
- **machine learning** to adapt to new circumstances and to detect and extrapolate patterns.
- **computer vision** to perceive objects, and
- **robotics** to manipulate objects and move about.

Thinking humanly

The cognitive modeling approach

- we must have some way of determining how humans think.- get *inside* the actual workings of human minds.

1. through introspection—trying to catch our own thoughts as they go by;
2. through psychological experiments—observing a person in action; and
3. through brain imaging—observing the brain in action.

- For example, Allen Newell and Herbert Simon, who developed GPS, the “General Problem Solver- They were more concerned with comparing the trace of its reasoning steps to traces of human subjects solving the same problems.
- **cognitive science** =computer models from AI + experimental techniques from psychology -> to construct precise and testable theories of the human mind.

Thinking rationally

The "laws of thought" approach

- The Greek philosopher Aristotle was one of the first to attempt to codify "right thinking," that is, irrefutable reasoning processes.
- These laws of thought were supposed to govern the operation of the mind-- their study initiated the field called **logic.**

Acting rationally

The rational agent approach

- A **rational agent** is one that acts so as to achieve the best outcome or, when there is uncertainty, the best expected outcome.
- In the “laws of thought” - the emphasis was on correct inferences. - sometimes *part* of being a rational agent, -act rationally is to reason logically to the conclusion that a given action will achieve one’s goals and then to act on that conclusion. On the other hand, correct inference is not *all* of rationality;
- Knowledge representation + reasoning -> agents to reach good decisions.
- The rational-agent - advantages :
- more general than the “laws of thought” approach because correct inference is just one of several possible mechanisms for achieving rationality.
- more amenable to scientific development than are approaches based on human behavior or human thought.