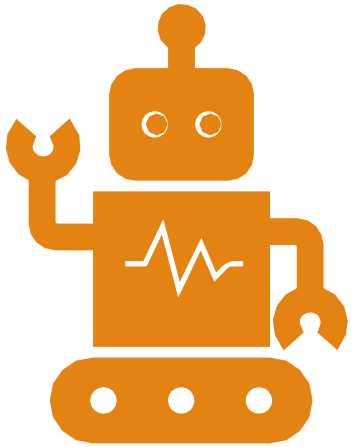
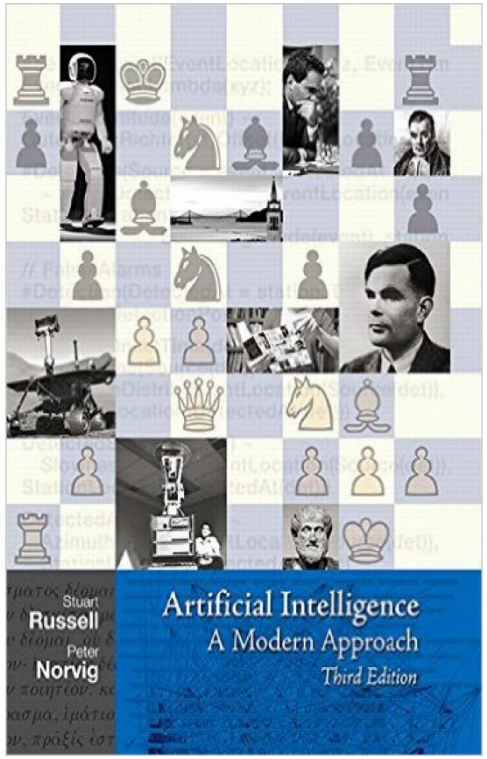


CS341
Artificial Intelligence

Lecture 1

DR. HEBA MOHSEN

Textbook



Stuart Russell

Peter Norvig

Artificial Intelligence: A modern approach

Prentice Hall

Another Textbook

George F. Luger

William A. Stubblefield

Artificial Intelligence

Structures and Strategies for Complex Problem Solving

Addison Wesley Longman, Inc.

Grading

5th-week Quiz:	10%
Midterm:	20%
Class work activities:	10%
Labs and project:	20%
Final:	40%

What is Intelligence?

For thousands of years, we have tried to understand ***how we think ?***

- How the human mind can perceive, understand, predict and manipulate ?
- Where does knowledge come from?
- How does knowledge lead to action?
- Can formal rules be used to draw valid conclusions?
- Can non-humans have minds?

What is Intelligence?

- ***Intelligence*** is the ability to understand and learn things.

- ***Intelligence*** is the ability to acquire and apply knowledge.

What is Artificial Intelligence?

- Artificial intelligence (AI) may be defined as the branch of computer science that is concerned with the automation of intelligent behavior.
- The field of AI is one of the newest fields in science and engineering which attempts not just to understand but also to build intelligent entities.
- AI involves using methods based on the intelligent behavior of humans to solve complex problems.

Computers vs. People

What computer can do better than people?

Numerical computation: Fast & accurate	**Information storage: Voluminous amounts**	**Repetitive operations : Not getting bored (??)**

However, these are mechanical *mindless* activities, and thus cannot be regarded as ***'intelligent'*** tasks

What people can do better than computers?

Activities that involve intelligence include:

- Understanding
- Common sense reasoning
- Natural language processing and generation
- Planning & Design
- Learning (e.g. from mistakes, by experience or examples)
- Emotions

Types of Artificial Intelligence

Thinking Humanly	**Thinking Rationally**
Modeling exactly how humans actually think ➢ Cognitive models of human reasoning	Modeling how ideal agents “should think” ➢ models of “rational” thought (formal logic) ➢ note: humans are often not rational!
Acting Humanly	**Acting Rationally**
Modeling exactly how humans actually act ➢ models of human behavior (what they do, not how they think)	Modeling how ideal agents “should act” ➢ rational actions but not necessarily formal rational reasoning ➢ i.e., more of a black-box/engineering approach

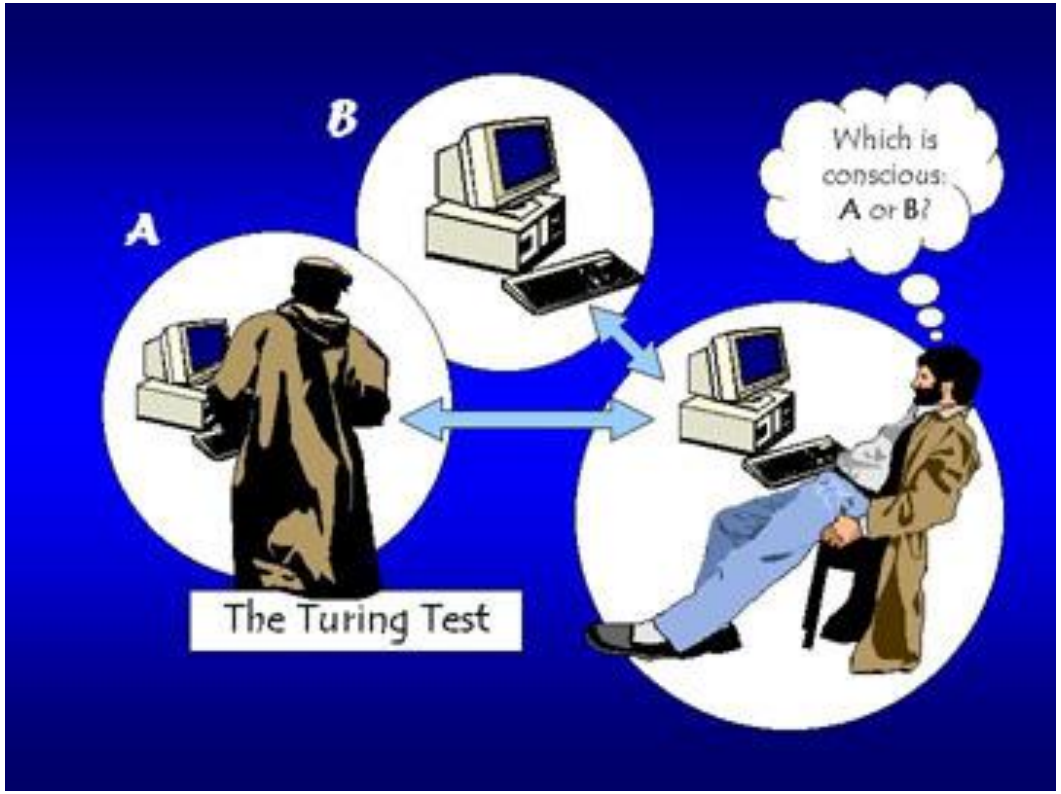
Modern AI focuses on the last definition where success is judged by how well the agent performs

Acting humanly

The Turing Test
by Alan Turing (1950)

Instead of asking, *'Can machines think?'*, Turing said we should ask, *'Can machines pass a behavior test for intelligence?'*

The computer passes the ***"test of intelligence"*** if a human, after posing some written questions, cannot tell whether the responses were from a person or not.



Acting humanly:

Suggested major AI components:

- ***Language understanding*** (Natural language processing) to enable it to communicate successfully in English
- ***Knowledge*** (Knowledge representation) to store what it knows or hears
- ***Reasoning*** (Automated reasoning) to use the stored information to answer questions and to draw new conclusions
- ***Learning*** (Machine learning) to adapt to new circumstances and to detect and extrapolate patterns

Thinking humanly: cognitive modeling

To make programs think like humans, we must have some way of determining **how humans think**!!

There are three ways to do this:

- Introspection—trying to catch our own thoughts as they go by
- Psychological experiments—observing a person in action
- Brain imaging—observing the brain in action

Cognitive science brings together computer models from AI and experimental techniques from psychology to construct precise and testable theories of the human mind.

Thinking rationally: "laws of thought"

Aristotle: what are correct arguments/thought processes?

Several Greek schools developed various forms of *logic*: *notation* and *rules of derivation* for thoughts; may or may not have proceeded to the idea of mechanization

Direct line through mathematics and philosophy to modern AI

Problems:

1. Not all intelligent behavior is mediated by logical deliberation
2. What is the purpose of thinking? What thoughts should I have?

Acting rationally: rational agent

Rational behavior: Doing the right thing

The right thing: that which is expected to maximize goal achievement, given the available information

An agent is an entity that perceives and acts.

A **rational agent** acts rationally.

- What are the skills needed for a rational agent ??