Learning Guide Unit 1

Site: University of the People
Course: CS 4408-01 Artificial Intelligence - AY2025-T3
Book: Learning Guide Unit 1
Printed by: Ryohei Hayashi
Date: Thursday, 30 January 2025, 3:42 PM

Description

Learning Guide Unit 1

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Overview

Unit 1: Fundamentals of AI

Topics:

- Overview of AI Problems and Successful Applications
- Intelligent Behavior
- The Turing Test
- The Chinese Room Thought Experiment
- Rational versus Non-rational Reasoning
- Philosophical and Ethical Issues

Learning Objectives:

By the end of this Unit, you should be able to:

1. Examine the fundamental concepts of Artificial Intelligence.
2. Evaluate different models of machine learning in Artificial Intelligence.
3. Reflect on the philosophical and ethical issues related to Artificial Intelligence.

Tasks:

- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete an entry in the Learning Journal
- Take the Self-Quiz

Introduction

What is Artificial Intelligence? First, we need to understand the definition of intelligence. Intelligence can be defined as the ability to learn and solve problems. To be exact, it is the capacity to solve problems, the ability to act rationally, and the ability to act like humans.

Now, Artificial Intelligence can be defined into the following four categories.

- Thinking Humanly
  According to Haugeland, "The exciting new effort to make computers think … machines with minds, in the full and literal sense" (as quoted in Nath, 21).
- Thinking Rationally
  According to Chardiak and McDermott, "The study of mental faculties through the use of computational models" (as quoted in Nath, 21).
- Acting Humanly
  According to Kurzweil, "The art of creating machines that perform functions that require intelligence when performed by people" (as quoted in Nath, 22).
- Acting Rationally
  "Computational Intelligence is the study of the design of intelligent agents." (Poole, D. L., & Mackworth, A. K., 2017).

Unit 1 introduces a broad overview of the concept of intelligence and the role of agents. Poole, D. L., & Mackworth, A. K. (2017). *Artificial Intelligence: Foundations of computational agents* describe artificial intelligence in terms of computational agents that act intelligently. Of course this then begs us to consider what is the nature of intelligence. Although there are many answers to this question it has been held by many that the test devised by Alan Turing is one of the best 'tests' for the presence of intelligence that is artificially created. Turing's test suggests that if an intelligence is created that sufficiently mimics human intelligence (such that it can fool humans) then it is evidence for intelligence.

Turing Test

Alan Turing is one of the celebrities in computer science. The highest award given by the Association of Computing Machinery, the world's largest and most influential professional association dedicated to computer science and information technology bears Turing's name.

Turing's most famous contribution to artificial intelligence was a "thought experiment" that now also bears his name, the Turing Test.

While working at the University of Manchester as director of programming for its computer project, Turing devised a concept that became known as the Turing test. In its best-known variation, the test involves a human being communicating via a teletype with an unknown party that might be either another person or a computer. If a computer at the other end is sufficiently able to respond in a humanlike way, it may fool the human into thinking it is another person.

Turing argued that a computer that could consistently fool a human being into believing that it also was a human being could be considered strong evidence that the computer is truly intelligent.

The Chinese Room Argument

The Chinese room argument is a thought experiment that challenged the idea that the Turing test offered strong evidence of intelligence. The Chinese room was proposed by philosopher John Searle in a paper that was published in 1980.

Searle asks us to consider a person who does not speak Chinese who is sitting in a locked room. Inside the room are boxes filled with Chinese characters. The person cannot read Chinese and so he doesn't know what the characters mean. However the person has a book in the room and the book provides rules, that the person does understand, that will allow him to take any message written in Chinese letters and slipped under the door, identify the appropriate response, and slip it back under the door.

Searle's scenario is much like the scenario that Turing proposes in the Turing test. Outside the door is a Chinese speaker who passes a note written in Chinese into the room. The person inside the room can use the book that they have to identify the appropriate response and send those letters back out of the room. The problem in this picture is that the person in the room has no idea what those Chinese letters mean. The only thing they know is how to craft an appropriate response and they know this only by using the rules identified within the book.

Searle is making the point that Turing's test is not a true test of intelligence. It doesn't really matter whether the person inside the room is an individual without a book of rules or a computer who has the book of rules incorporated as an algorithm. In both cases, neither understands the meaning of the message. The fact that a computer can provide an appropriate response to a question posed by a human being doesn't, in John Searle's opinion, constitute intelligence.

The following video presents a humorous look at the Chinese room thought experiment.

OpenLearn from the Open University. (2011, October 3). *The Chinese Room – 60-second adventures in thought (3/6).* [Video]. Youtube.

In Chapter 16 of the text, we are challenged to think about some of the social and ethical considerations of artificial intelligence. The authors point out the somewhat well-known principles posed by the Science fiction author Isaac Asimov who, as part of his short story "Runaround", defined the 3 robot laws:

> [I.] A robot may not harm a human being, or, through inaction, allow a human being to come to harm.
>
> [II.] A robot must obey the orders given to it by human beings except where such orders would conflict with the First Law.
>
> [III.] A robot must protect its own existence, as long as such protection does not conflict with the First or Second Laws (Asimov, 1950).

What Asimov was trying to convey is the potential issues both social and ethical of creating autonomous, self-acting entities and the effect that such entities could have on human society. Our authors point out the greatest threat or issue that AI may pose is likely to be agents implemented in software who make decisions or take actions that impact people.

We all hear stories of the project that Google is developing to create an autonomous vehicle ... one that drives itself, one cannot wonder of the implications of a car that operates itself. Consider if the vehicle were to get into an accident are the passengers still responsible for the accident?

These kinds of ethical and social issues the authors are challenging us to consider as they relate to AI.

References

Asimov, Isaac (1950). Runaround. In *I, Robot (The Isaac Asimov Collection ed.)*. Doubleday.

Nath, R. (2009). *Philosophy of artificial intelligence*. Universal-Publishers

Poole, D. L., & Mackworth, A. K. (2017). *Artificial Intelligence: Foundations of computational agents*. Cambridge University Press. https://artint.info/2e/html/ArtInt2e.html

Reading Assignment

Poole, D. L., & Mackworth, A. K. (2017). *Artificial Intelligence: Foundations of computational agents.* Cambridge University Press. https://artint.info/2e/html/ArtInt2e.html

Read the following chapters:

- Chapter 1 – Artificial Intelligence and Agents
- Chapter 16 – Retrospect and Prospect

Video Resources

Taipala, D. (2014, September 2). *CS 4408 Artificial Intelligence Unit 1 Lecture 1* [Video]. YouTube.

Taipala, D. (2014, September 2). *CS 4408 Artificial Intelligence Unit 1 Lecture 2* [Video]. YouTube.

Conti, M. (2016, April). *The incredible inventions of intuitive AI* [Video]. TEDxPortland. https://www.ted.com/talks/maurice_conti_the_incredible_inventions_of_intuitive_ai

Discussion Assignment

Can computers learn and adapt?

Given a scenario where a computer is installed in a car and the goal is to become a self-driving car. You could code/write all the possible rules or you could provide basic rules and have the computer/car learn from experience. Discuss, how does machine learning allows a computer to learn and perform a task without explicit programming? Which method is more efficient and why?

Your Discussion should be at least 250 words in length, but not more than 750 words. Use APA citations and references for the textbook and any other sources used.

Learning Journal

The Learning Journal is a tool for self-reflection on the learning process. The Learning Journal will be assessed by your instructor as part of your Final Grade.

Your learning journal entry must be a reflective statement that considers the following questions:

1. Describe what you did. This does not mean that you copy and paste from what you have posted or the assignments you have prepared. You need to describe what you did and how you did it.

2. Describe your reactions to what you did.

3. Describe any feedback you received or any specific interactions you had while participating discussion forum or the assignment Discuss how they were helpful.

4. Describe what you learned. You can think of one or more topics and explain your understanding in writings. Feel free to add any diagram or coding example if that helps you explain better.

5. Did you face any challenges while doing the discussion or the development assignment? Were you able to solve it by yourself?

6. Can you consider some ethical issues related to Artificial Intelligence? Write down your thoughts.

The Learning Journal entry should be a minimum of 400 words and not more than 750 words. Use APA citations and references if you use ideas from the readings or other sources.

Self-Quiz

The Self-Quiz gives you an opportunity to self-assess your knowledge of what you have learned so far.

The results of the Self-Quiz do not count towards your final grade, but the quiz is an important part of the University's learning process and it is expected that you will take it to ensure understanding of the materials presented. Reviewing and analyzing your results will help you perform better on future Graded Quizzes and the Final Exam.

Please access the Self-Quiz on the main course homepage; it will be listed inside the Unit.

Checklist

- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
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