

Title	AI同士の比較に着目したAIリテラシー学習システムの開発
Author(s)	清水, 誠司
Citation	
Issue Date	2024-03
Type	Thesis or Dissertation
Text version	author
URL	<a href="http://hdl.handle.net/10119/18881">http://hdl.handle.net/10119/18881</a>
Rights	
Description	Supervisor: 長谷川 忍, 先端科学技術研究科, 修士(情報科学)

## Abstract

AI has a variety of applications and is playing an increasingly important role in society. In fact, the adoption rate of AI by companies is increasing, and the demand for knowledge about AI is rising in society as a whole. There is a variety of knowledge about AI, including definitions. However, memorizing definitions does not mean understanding how AI generally works. Therefore, understanding specific types and mechanisms of AI, such as neural networks and deep learning, is more useful for those using AI. In addition, the good and bad aspects of AI are part of the knowledge that must be known when using AI. The primary good aspect of AI is that it can automate tasks. For example, AI enables automated driving of cars, automated responses to customer needs, etc. On the other hand, AI has the potential to have a negative impact on people. Specifically, deep learning can distort the public's perception by using deep faking to replace a face in a video with another person's face, and generative AI can spread misinformation.

However, there are few opportunities for people other than some science students to learn about AI, meaning they use AI without fully understanding its dangers and usefulness. Without knowing more about AI, we may be more inclined to dislike it or be overconfident than we should be. In fact, data show that people in their 50s, who may not have had much exposure to AI, have a high level of distrust toward AI. If they understand how AI works, they can use it well and improve work efficiency. However, if they do not know about AI, they will not be able to find a way to use it, which may lead to lost opportunities. Therefore, it is desirable to acquire knowledge of AI as an education.

The purpose of this study is to develop a system to support the learning of AI literacy for those who have not studied AI professionally in higher education institutions, etc. Since AI literacy covers a wide range, this study defines the state of AI literacy as "the state of being able to define typical AI methods and explain their characteristics". Since this study deals with three types of AI (rule-based AI, reinforcement learning, and supervised learning), this system aims to help learners acquire the definitions and features of these three types of AI. These three types of AI were selected as the study subjects for this research because they are widely used and their mechanisms are relatively easy to understand.

One of the most important things to remember when learning AI literacy is to prevent students from losing their motivation to learn due to various factors. One of the major reasons for students' low motivation to learn is the difficulty of the material, so a system that is easy to understand visually should be developed to remove the difficulty. In addition, a system that allows students to continue learning in an active and motivated manner is desired. One approach that satisfies these requirements is a game-based system. In addition to motivating learners to learn, game-based learning is expected to promote better understanding because learners can intuitively recognize the actions of the AI.

This study is unique in that we consider AI literacy as a learning object and the advantages of game-based learning and develop a system that enables learners to learn AI literacy by creating a game AI. In particular, by using a game as an object to represent AI behavior, we aim to provide learners with a visual understanding of AI and to maintain and improve their motivation for learning. The system supports learning by developing a graphical user interface that enables even a person without knowledge of AI to create AI easily.

The system developed in this study consists of four systems: a system for learning rule-

based AI, a system for learning reinforcement learning, a system for learning supervised learning, and a system for comparing AIs. The AI comparison system allows learners to compare AIs created by each system.

In the system evaluation experiment, we evaluated the degree to which subjects' knowledge and understanding of AI improved when they used a system in which they could learn various types of AI. In addition, we evaluated the improvement of the subjects' knowledge and understanding of AI by using the AI comparison system after using the AI learning system. The results of the experiment showed that there was a significant difference between the pre-test and intermediate/post-test groups at the 5% significance level in the written test to measure the level of understanding of AI, but no significant difference between the groups in the fill-in-the-blank test to measure the level of knowledge of AI. Therefore, using this system allows users to understand how AI works but does not sufficiently allow them to learn the definition of AI.

In the evaluation experiment, a questionnaire asking subjects about their willingness to learn was created to investigate their impressions of game-based learning. According to the results of the pre-survey, 7 out of 10 participants had a positive impression of the game-based learning, while the remaining 3 participants had a negative impression. In the post-questionnaire after using the system, 9 out of 10 participants had a positive impression of game-based learning. Five participants improved their motivation to learn by using the game, and no participants decreased their motivation to learn. The results showed that the game system was generally successful in maintaining and improving the learners' motivation to learn, which was the purpose of working on the game system.

Furthermore, although there was no significant difference in the improvement of subjects' knowledge and understanding of AIs as a result of using the comparison system, 7 out of 10 participants improved their ability to explain the differences between AIs, suggesting that the use of comparison is valuable in making subjects aware of the differences between AIs.

One of the problems with the current system is that the definition of AI is not directly presented, so there are people who can read the definition of AI from the learning environment and people who cannot. This problem could be solved by incorporating some classroom elements into the game and introducing a system in which the game progresses while explaining AI.