An Interdisciplinary Approach for Teaching Artificial Intelligence to Computer Science Students

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ABSTRACT

Artificial intelligence (AI) is a demanding and important course for computer science education in the universities and open online courses (MOOCs). It includes various introductory and specialized courses for artificial intelligence like knowledge representation, machine learning, reasoning under uncertainty, natural language processing, robotics, and perception of computer vision, etc. We observed that mostly AI courses focus on the Computer Science (CS)-centric approach and lacks core explanation from their roots including philosophy, neuroscience, psychology, cognitive science, linguistics, economics, social science, etc. In this paper, we propose to engage the interdisciplinary approach along with CS-centric approach for teaching AI that includes the disciplines that have been established to tackle the age-old problem of understanding the science of thinking.

CCS CONCEPTS

• **Computing methodologies** → **Artificial intelligence**; • **Applied computing** → **Education**.

KEYWORDS

Artificial intelligence, Interdisciplinary teaching, Education

ACM Reference Format:
Anoop Mishra and Harvey Siy. 2020. An Interdisciplinary Approach for Teaching Artificial Intelligence to Computer Science Students. In *The 21st Annual Conference on Information Technology Education (SIGITE '20), October 7–9, 2020, Virtual Event, USA.* ACM, New York, NY, USA, 1 page. https://doi.org/10.1145/3368308.3415440

1 INTRODUCTION

Artificial intelligence (AI) is a demanding and important course for computer science education. This work examines the current teaching design, research practice, and characteristics of artificial intelligence courses, particularly focusing on artificial intelligence course content. We observed that mostly AI courses focus on the CS-centric approach mathematical and logical backgrounds, algorithms, and implementation techniques. While this is essential within a computer science framework, we believe important pedagogical opportunity is lost. The pioneers of artificial intelligence saw it as a means to understand how people think [3] and to develop a way of teaching thinking across the K-12 curriculum and beyond [4]. A CS-centric approach to AI courses does not adequately connect AI to its roots in philosophy, neuroscience, psychology, cognitive science, linguistics, economics, social science, etc. Classic AI books and papers talk about the correlation, roots, and motivation for AI from interdisciplinary perspectives. For example, Russell and Norvig [5] describe the foundation of artificial intelligence by answering a set of questions from the afore-mentioned fields. In our research, we propose to develop an interdisciplinary approach for teaching AI. To illustrate the difference, a CS-centric approach teaches neural network memory models without explaining how human memory works. By contrast, we focus on making strong connections between AI and human cognitive processes (attention, memory, learning), inspired by the works of Hassabis et al. [2], Gershman and Daw [1], and others. We expect that misconceptions of memory models can be avoided if students have a proper understanding of human memory and how people use episodic memory, semantic memory, long-short term memory, etc. We plan to illustrate with similar examples in linguistics, economics, social science, etc. and develop a suitable pedagogy and teaching methodology.

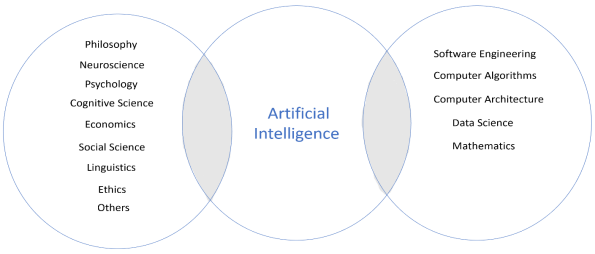

Figure 1: Disciplines that influence and are influenced by Artificial Intelligence.

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SIGITE '20, October 7–9, 2020, Virtual Event, USA

ACM ISBN 978-1-4503-7045-5/20/10.
https://doi.org/10.1145/3368308.3415440