ThinkBS 406 Introduction to Artificial Intelligence (Intermediate)

Offered in University of Debrecen

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Course Objectives:

The principal objective of this course is to give a short introduction to different topics and technologies used in Artificial Intelligence and show how to plan intelligent agents. We start with the concept of agents, then look at the agents’ rationality. We continue with different kinds of search methods, then we work with logical and probabilistic inference, and finally we gain an insight into machine learning.

Course Contents:

1. Agent approach.
2. Intelligent search.
3. Inference.
4. Machine learning.

Learning Outcomes of the Course Unit:

1. To plan an agent (sensors and actuators) for a given task and environment.
2. To give the state-space representation of problems and select the suitable search method for them.
3. To determine entailment and to make calculations in Bayes-networks.
4. To select the suitable learning method for a given problem.

Bibliography:

1. Stuart Russel, Peter Norvig: Artificial Intelligence: A Modern Approach, 4th edition, Pearson, 2020 aima.cs.berkeley.edu (AIMA)
2.CS188, https://inst.eecs.berkeley.edu/~cs188/
3.aima-code, <https://github.com/aimacode>
4.Pedro Domingos: The Master Algorithm, Basic Books; 1st edition 2015
5.Thom Mitchell: Machine learning, Mcgraw-Hill, 1997
6.Marvin Minsky: The Emotion Machine: Commonsense Thinking, Artificial Intelligence, and the Future of the Human Mind, Simon & Schuster, 2007

WEEKLY SUBJECTS AND RELATED PREPARATION STUDIES:

Week Subjects Realted Preparation

1 History of Artificial Intelligence, scientific environment AIMA Chapter 1

2 Concept of agents, structures of agents, rational agent, type of environments AIMA Chapter 2

3 Solving problems by searching AIMA Section 3.1-3.3

4 Uninformed search strategies AIMA Section 3.4

5 Informed/heuristic search strategies, heuristic functions AIMA Section 3.5-3.6

6 Local search algorithms & optimization problems, implementation issues AIMA Section 4.1

7 Adversarial search, game tree, labelling AIMA Section 5.1-5.2

8 Minimax search, alpha-beta pruning, implementation issues AIMA Section 5.3

9 Constraint satisfaction problem AIMA Chapter 6

10 Logical agents, propositional theorem proving, resolution AIMA Chapter 7

11 Quantifying uncertainty, probability AIMA Chapter 12

12 Probabilistic reasoning, Bayesian networks AIMA Chapter 13

13 Learning from observations AIMA Chapter 19

14 Statistical learning and outlook AIMA Chapter 20