

COURSE DESCRIPTION: ELEMENTS OF AI

SYLLABUS AND LEARNING OBJECTIVES

The material of the massive open online course *Elements of AI* (<https://course.elementsofai.com>), offered by the University of Helsinki in collaboration with Reaktor, consists of text and interactive elements. The material is divided in six chapters which are:

1. What is AI?
2. AI problem solving
3. Real world AI
4. Machine learning
5. Neural networks
6. Implications

After successfully completing the course the student will be able to:

- Identify autonomy and adaptivity as key concepts of AI
- Distinguish between realistic and unrealistic AI (science fiction vs. real life)
- Express the basic philosophical problems related to AI including the implications of the Turing test and Chinese room thought experiment
- Formulate a real-world problem as a search problem
- Formulate a simple game (such as tic-tac-toe) as a game tree
- Use the minimax principle to find optimal moves in a limited-size game tree
- Express probabilities in terms of natural frequencies
- Apply the Bayes rule to infer risks in simple scenarios
- Explain the base-rate fallacy and avoid it by applying Bayesian reasoning
- Explain why machine learning techniques are used
- Distinguish between unsupervised and supervised machine learning scenarios

Tietojenkäsittelytieteen laitos
Matemaattis-luonnontieteellinen tiedekunta

PL 68 (Gustaf Hällströminkatu 2b), 00014 Helsingin yliopisto
Puhelin (09) 1911, faksi (09) 1915 1120, www.cs.helsinki.fi

Institutionen för datavetenskap
Matematisk-naturvetenskapliga fakulteten

PB 68 (Gustaf Hällströms gata 2b), FIN-00014 Helsingfors universitet
Telefon +358 9 1911, fax +358 9 1915 1120, www.cs.helsinki.fi/sv

Department of Computer Science
Faculty of Science

P.O. Box 68 (Gustaf Hällströmin katu 2b), FIN-00014 University of Helsinki
Telephone +358 9 1911, fax +358 9 1915 1120, www.cs.helsinki.fi/en

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- Explain the principles of three supervised classification methods: the nearest neighbor method, linear regression, and logistic regression
- Explain what a neural network is and where they are being successfully used
- Understand the technical methods that underpin neural networks
- Understand the difficulty in predicting the future and be able to better evaluate the claims made about AI
- Identify some of the major societal implications of AI including algorithmic bias, AI-generated content, privacy, and work

ASSESSMENT

Assessment is based on exercises, including multiple choice quizzes, numerical exercises, and questions that require a written answer. The multiple choice and numerical exercises are automatically checked, and the exercises with written answers are reviewed by other students (peer grading) and in some cases by the instructors.

Successful completion of the course requires at least 90% completed exercises and minimum 50% correctness. The course is graded as pass/fail (no numerical grades).

TIME REQUIREMENT AND STUDY CREDITS

The estimated time requirement is about 30–60 hours depending on the background of the student. Two (2) ECTS credit units are awarded to students who have a student id at the University of Helsinki. Persons with a Finnish personal identification number can obtain a student id for this purpose through the Open University.

As a proof of completion, each student is given an electronic certificate that includes a verification link to <https://certificates.mooc.fi>.



Signed by: Lead Instructor of the *Elements of AI*
Associate Professor Teemu Roos, PhD
Department of Computer Science, University of Helsinki
e-mail: teemu.roos@cs.helsinki.fi

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