AH2179 Applied Artificial Intelligence in Transportation 7.5 credits

Tillämpad artificiell intelligens inom transportsektorn

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

The Built Environment

Specific prerequisites

Degree of Bachelor or equivalent in societal building, geography, engineering physics, computer science, statistics, finance or mathematics.

Documented knowledge in linear algebra, equivalent contents in the course SF1672 and probability theory and statistics, 3 credits equivalent to contents in the course SF1918, 3 credits or equivalent knowledge be approved by the examiner

And English B according to the Swedish upper secondary school system.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The main goal of the course is to introduce models and algorithms for artificial intelligence (AI) and provide in-depth knowledge of how one uses them to analyse, model and optimise transport systems. The course is both theoretical and applied and the aim is to educate the students in research and practical skills in applying advanced AI technician to diagnose and solve complex transport problems.

On completion of the course, the student should be able to

- Describe and explain AI concept, models, algorithms and underlying ideas.
- Identify and apply AI framework to model transport problems.
- Collect and process open source transport data.
- Implement AI algorithms by means of programming language (e.g. Python).
- Interpret the model results and reflect on the limitations of the methodology.

Course contents

The course is structured based on artificial intelligence (AI) functions in data-driven transport applications including data analysis (understanding of the system, drivers and travellers), predictions (informed proactive decision making for operation ab infrastructure and travels) and controls (optimised operation supervision of infrastructure, vehicles or demand on travels). The course content is the following

- Analysis of transport data (data collection, data process, data visualisation, data extraction, data modeling and interpretation)
- Transport prediction (problem definition, data representation, prediction modelling and model training and testing.)

o Time series models (e.g. travel times).

o Classification models (e.g. route choices).

o Duration models (e.g. duration at incidents).

- Transport control (problem definition, mathematical modelling and model training and testing)

o Operation control (e.g. control of traffic signals).

o Vehicle control (e.g. eco-driving).

o Travel management (e.g. ride sharing at travels).

- Beyond the technology

o AI ethics, the AI privacy and AI for social good.

Examination

- INL1 - Hand-in assignments, 1.5 credits, grading scale: P, F
- SEM1 - Seminars, 1.5 credits, grading scale: P, F
- PRO1 - Project work, 4.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Students must be actively participating in the seminar to pass the course.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.