CS-430

Intelligent agents

Faltings Boi

Cursus	Sem.	Type
Computer and Communication Sciences		Obl.
Computer science minor	H	Opt.
Computer science	MA1, MA3	Opt.
Cybersecurity	MA1	Opt.
Data Science	MA1, MA3	Opt.
Data science minor	H	Opt.
Energy Management and Sustainability	MA1, MA3	Opt.
Financial engineering	MA1, MA3	Opt.
Robotics	MA1	Opt.
SC master EPFL	MA1, MA3	Opt.

Language of teaching	English
Credits	6
Session	Winter
Semester	Fall
Exam	During the semester
Workload	180h
Weeks	14
Hours	**6 weekly**
Lecture	3 weekly
Exercises	3 weekly
Number of positions	

Summary

Software agents are widely used to control physical, economic and financial processes. The course presents practical methods for implementing software agents and multi-agent systems, supported by programming exercises, and the theoretical underpinnings including computational game theory.

Content

The course contains 4 main subject areas:

1) Basic models and algorithms for individual agents:
game-playing algorithms, reactive agents and reinforcement learning. Models and algorithms for rational, goal-oriented behavior in agents.
2) Multi-agent systems:
multi-agent planning, distributed algorithms for constraint satisfaction, coordination techniques for multi-agent systems.
3) Self-interested agents:
Models and algorithms for implementing self-interested agents motivated by economic principles: elements of computational game theory, models and algorithms for automated negotiation, social choice, mechanism design, electronic auctions and marketplaces.
4) Implementing multi-agent systems:
Agent platforms, ontologies and markup languages, web services and standards for their definition and indexing.

Learning Prerequisites

Recommended courses

Intelligence Artificielle or another introductory course to AI

Learning Outcomes

By the end of the course, the student must be able to:

- Choose and implement methods for rational decision making in software agents, based on decision processes and AI planning techniques
- Choose and implement methods for efficient rational decision making in teams of multiple software agents
- Model scenarios with multiple self-interested agents in the language of game theory
- Evaluate the feasibility of achieving goals with self-interested agents using game theory
- Design, choose and implement mechanisms for self-interested agents using game theory
- Implement systems of software agents using agent platforms

Teaching methods

Ex cathedra, practical programming exercises

Expected student activities

Lectures: 3 hours
Reading: 3 hours
Assignments/programming: 4 hours

Assessment methods

Mini-projects and exercises 40%, final exam 60%

Resources

Bibliography

Michael Wooldridge : An Introduction to MultiAgent Systems - Second Edition, John Wiley & Sons, 2009Stuart Russell and Peter Norvig: Artificial Intelligence: A Modern Approach (2nd/3rd Edition), Prentice Hall Series in Artificial Intelligence, 2003/2009.

Ressources en bibliothèque

- An Introduction to MultiAgent Systems / Wooldridge
- Artificial Intelligence: A Modern Approach / Russell

Websites

- http://liawww.epfl.ch/
- http://moodle.epfl.ch/