COURSE DESCRIPTION CARD - SYLLABUS

Course name
Neuro-symbolic Integration [S2SI1E>INS]

Course

Field of study
Artificial Intelligence

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

2,00

Coordinators

dr inż. Jędrzej Potoniec
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Lecturers

Prerequisites

The student knows the issues related to machine learning and deep learning, as well as first-order logic. The student is able to implement a learning algorithm on the basis of the provided description using selected tools and conduct its experimental evaluation. They should also have the ability to obtain information from the indicated sources and have a willingness to cooperate as part of a team.

Course objective

The purpose of the course is to familiarize students with the problems of neuro-symbolic integration and the techniques used to build systems that use both paradigms together.

Course-related learning outcomes

Knowledge K2st_W3 has advanced detailed knowledge regarding selected issues in neuro-symbolic integration
K2st_W4 has knowledge about development trends and the most important cutting edge achievements in computer science, artificial intelligence in the area of neuro-symbolic-integration
K2st_W6 knows advanced methods, techniques and tools derived from neuro-symbolic integration that are used to solve complex engineering tasks and conduct research in the field of artificial intelligence and

related fields
Skills K2st_U1 is able to obtain information from literature, integrate them, interpret and critically evaluate them, draw conclusions and formulate and fully justify opinions
K2st_U13 is able to prepare and present a scientific study in English, presenting the results of a replication experiment and oral presentation on specific issues in the field of neuro-symbolic integration
K2st_U15 is able to interact in a team, taking various roles in it
Social competences K2st_K1 understands that in the field of IT with particular emphasis on the neuro-symbolic integration, the knowledge and skills quickly become obsolete

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In terms of lecture: preparation of a presentation on the topic pursued in the project. As part of the presentation, its correctness and precision are evaluated.

In terms of the project: students are assessed in teams for preparing the project (20 points), defending it in the form of a presentation (30 points) and writing a report (50 points). Receiving a passing grade requires exceeding the threshold of 50% of the maximum number of points.

Programme content

As part of the project, students in pairs reproduce experimental results presented in papers on neuro-symbolic integration published in the last two years. In addition to the experiments themselves, each pair is tasked with giving a 15-20 minute presentation summarizing the results and writing a report in English, with particular emphasis on the difficulties encountered in trying to reproduce the results. At the end of the semester, the reports are combined into a single document and published on arXiv.
The following content is presented in the lecture:
1. Introduction to the problem of neuro-symbolic integration: goals, difficulties, challenges.
2. Neuro-symbolic inference in logic.
3. Automated planning using neuro-symbolic methods.
4-7. Lectures for presentations of articles that form the basis of the project.

Teaching methods

Lecture: multimedia presentation
Project: project method, multimedia presentation.

Bibliography

Basic
n/a

Additional
Pascal Hitzler, Md. Kamruzzaman Sarker (eds): Neuro-Symbolic Artificial Intelligence: The State of the Art. Frontiers in Artificial Intelligence and Applications 342, IOS Press 2021, ISBN 978-1-64368-244-0

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	5	0,50