COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected topics in machine learning

Course

Field of study
Control and Robotics

Year/Semester
2/3

Area of study (specialization)
Intelligent systems

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
8

Laboratory classes
18

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Poznań, Piotrowo 3A

Responsible for the course/lecturer:

Prerequisites

Knowledge: A student beginning this subject should have basic knowledge of mathematics - including, mainly, matrix calculation, knowledge of elements of mathematical logic, basics of mathematical analysis and probabilistics.

Skills: He or she should have the ability to operate a PC and implement simple algorithms and programming tasks. Additionally, the ability to obtain information from indicated sources is essential.

Course objective

The aim of this course is to learn the theoretical basis and characteristics of selected machine learning algorithms and related issues. After completing the training, the student should be able to select an algorithm or a set of algorithms that make up a complete machine learning system and implement and test such a system on their own.

Course-related learning outcomes

Knowledge

1. Has in-depth knowledge and understanding of selected sections of mathematics; has a broad and in-depth knowledge necessary to formulate and solve complex tasks in control theory, optimisation, modelling, identification and signal processing
2. Has structured and in-depth knowledge of artificial intelligence methods and their application in automation and robotics systems

Skills

1. Is able to model simple systems and processes and use them for analysis and design of automation and robotics systems
2. Is able to construct an algorithm to solve a complex and unusual measurement and computation-control task and to implement, test and run it in a selected programming environment on a microprocessor platform

Social competences

1. Is aware of the need for a professional approach to technical issues and the need for scrupulous familiarisation with the documentation and environmental conditions in which the equipment and its components may operate

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
Lecture - final credit test carried out on Moodle plaftorm.
Laboratories - design and final practical programming test.

Programme content

Lecture:
Definition of machine learning and differences between machine learning and traditional programming.
Supervised, unsupervised machine learning, reinforcement learning.
Evaluation of machine learning methods - measurements and metrics.
The role of features in machine learning.
Presentation of machine learning algorithms, their operating principles and characteristics: selected methods for classification, regression and clustering.
Combining predictors: ensembling, bagging, boosting.
Reinforncement learning- algorithms and applications.

Laboratories:
Familiarization with scikit-learn and TensorFlow libraries. Implementation of selected algorithms with the use of the library, performance evaluation and graphical presentation of the output of algorithms in practical applications.

Teaching methods

Lectures with multimedia presentations, additionally uploaded to a streaming service to be played later. Laboratory classes covering the implementation and testing of selected algorithms for image and video processing using Python language and solving selected practical problems.

Bibliography

Basic

1. Sebastian Raschka, Vahid Mirjalili, Python. Uczenie maszynowe. Helion, 2019
2. Supplementary course materials posted on Moodle

Additional

Selected scientific papers related to the course.

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,0
Classes requiring direct contact with the teacher	26	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	54	2,0

[1] delete or add other activities as appropriate