Advanced decision support systems - course description

General information

Course name	Advanced decision support systems
Course ID	06.0-WE-AutD-AdvDecSuppSyst-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics / Computer Control Systems
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information

Semester	3
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. inż. Andrzej Pieczyński, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	15	1	-	-	Credit with grade

Aim of the course

- to familiarize students with advanced techniques of extracting knowledge from data
- to know methods of applying soft computing in decision making systems
- shaping the skills of building hybrid expert systems
- acquiring skills in building decision systems with uncertain and imprecise knowledge

Prerequisites

Decision support systems, Artificial intelligence methods.

Scope

Making decisions in the conditions of incomplete, uncertain and imprecise information. Parametric and nonparametric decision problems. Application of expert systems. Theory of possibilities. Application of rough and fuzzy sets in knowledge bases. Decision tree optimization. Discovering knowledge in databases, data mining. Preliminary preparation of data. The use of soft calculations in extracting knowledge from data (data mining).

Application of neural networks in decision making. Neural networks in grouping and classification. Extraction of knowledge from data using neural networks.
Fuzzy decision systems. Neurofuzzy systems in creating knowledge base. Fuzzy classifiers. Various types of neuro-fuzzy decision-making systems.
The use of rough sets in decision support. Rough sets based on dominance. Induction of classification patterns in the form of decision rules.
Designing decision support systems. Hybrid decision systems.

Teaching methods

Lecture, laboratory exercises

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Is able to develop an optimal representation of uncertain and imprecise knowledge using selected elements of artificial intelligence		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Is aware of the role of decision systems in supporting managerial activities in enterprises		• an evaluation test	• Lecture
Is able to prepare documentation of the implemented system and is attentive in obtaining its completeness		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Is able to prepare a description of knowledge combining selected elements of artificial intelligence and design the structure of a hybrid expert system		• an observation and evaluation of activities during the classes • an ongoing monitoring during classes	• Laboratory
Has knowledge of methods for describing uncertain and imprecise knowledge		• an evaluation test	• Lecture

Outcome description	Outcome symbols	Methods of verification	The class form
Is creative in choosing the environment for building a complex expert system		• an evaluation test	• Lecture
Has knowledge on the structure of approximate and complex expert systems		• an evaluation test	• Lecture
Is able to use soft computing in extracting knowledge from data (data mining)		• an observation and evaluation of the student's practical skills • an ongoing monitoring during classes	• Laboratory
Has knowledge of the functioning of a hybrid decision support system		• an evaluation test	• Lecture

Assignment conditions

Lecture – the main condition to get a pass is a sufficient mark in a written or oral exam.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Calculation of the final grade: lecture 50% + laboratory 50%

Recommended reading

J. Łęski, Systemy neuronowo-rozmyte, Wydawnictwa Naukowo-Techniczne, Warszawa, 2008.

2. R. K. Nowicki, Rozmyte systemy decyzyjne w zadaniach z ograniczoną wiedzą, Akademicka Oficyna Wydawnicza Exit, Warszawa, 2009.

3. D. Rutkowska, M. Piliński, L. Rutkowski, Sieci neuronowe, algorytmy genetyczne i zbiory rozmyte, Wydawnictwo Naukowe PWN, Warszawa, 1999.

4. J. Surma J.: Business Intelligence Systemy wspomagania decyzji biznesowych, WN PWN SA, Warszawa 2012.

5. D.T. Laros: Metody i modele eksploracji danych. WN PWN SA, Warszawa 2012.

Further reading

1. Pieczyński, Reprezentacja wiedzy w diagnostycznym systemie ekspertowym, Lubuskie Towarzystwo Naukowe w Zielonej Górze, Zielona Góra, 2003.
2. B. Nadiru, J. Y. Cheung, Fuzzy Engineering Expert Systems with Neural Network Applications, John Wiley & Sons, Inc. New York, 2002.

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 11-04-2022 09:05)

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