UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Advanced Foundations of Artificial Intelligence

2425-1-F9102Q004

Aims

The course presents the theoretical foundations, the methodologies and the technologies of artificial intelligence for information and knowledge processing.

Contents

The course consists of theoretical lectures and practical examples. The course will present the main sub-symbolic artificial intelligence approaches: neural networks, fuzzy systems, and evolutionary computing. The examples provide the skills for designing and implementing these methods.

Detailed program

? Neural networks: Definitions. Neurons: structures, perceptrons, Multi-layered feed-forward networks. Self-organizing Maps. Hopfiels' networks. Radial Basis Functions networks, Support Vector Machines. Recurrent networks. Deep Learning networks. Learning: supervised, unsupervised. Classification and clustering. Prediction. Function approximation.
? Fuzzy logic and systems: Fuzzy sets. Membership functions. Fuzzy rules. Defuzzification. Fuzzy reasoning. Fuzzy systems. Clustering. Control.
? Evolutionary computing: Genomic representation. Fitness functions. Selection. Genetic algorithms. Genetic programming. Evolutionary programming. Evolutionary strategies. Differential evolution. Swarm intelligence. Artificial immune systems.
? Basic concepts of distributed artificial intelligence.

Prerequisites

Fundamental concepts of computer science, computer programming, mathematics (discrete and continuous).

Teaching form

Lectures and practical examples. Both of them will be held in presence, unless further COVID-19 related restrictions are imposed. Attendance both at lectures and practical examples is warmly recommended.

Textbook and teaching resource

- R. Kruse, C. Borgelt, C. Braune, S. Mostaghim, M. Steinbrecher, Computational Intelligence: A Methodological Introduction, Springer, 2016
- Slides and handouts are available on the course website

Semester

First

Assessment method

Written exam aimed at verifying the student's knowledge and understanding of the subject. The written exam consists of theory questions in open-ended form. The duration of the exam is 2:00h. The mark is expressed in thirtieths and the grading will consider the correctness, completeness, and clarity of the answers to the questions. The exam is not sufficient if one or more answers are not sufficient. The exam is closed book. An additional oral discussion can be requested by the lecturer.

Office hours

By video- or audio-conference on appointments taken by email (fastest way, every day).
Office: University of Milan, Department of Computer Science, via Celoria 18, 20132 Milano - 6th floor, room 6001: Tuesday from 17:30 to 18:30 if not on mission for institutional duties.
Phone: +39-02-503-16244
Email: vincenzo.piuri@unimi.it
https://piuri.di.unimi.it/

Sustainable Development Goals

QUALITY EDUCATION