UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Introduction To Artificial Intelligence

2425-3-E3101Q141

Aims

The aims of the course concern theoretical, methodological, and practical issues related to the area of Artificial Intelligence (AI); in particular the course:

- is aimed at supplying basic knowledge necessary to analyse and evaluate the applicability of existing AI solutions to specific problems;
- is aimed at discussing methodological issues related to the application of AI techniques to specific domains and contexts of application;
- is aimed at presenting some specific technical and technological solutions for experimentation by the students.

Contents

The course will present a historical introduction to the discipline, then it will focus on selected contribution in the area of the so-called symbolic AI, with specific reference to (i) ontologies, technologies, and inferential capabilities offered by Semantic Web technologies, (ii) planning, (ii) brief introduction to reasoning in presence of uncertainty. Finally, selected contributions of the so-called sub-symbolic AI will also be discussed, with specific reference to data analysis techniques based on machine learning approaches (supervised and unsupervised).

Detailed program

- Introduction to the discipline
- Intelligent agents and environments as a way to characterize problems
- Symbolic AI

    - Brief introduction to basic concepts
    - Introduction to Semantic Web (Knowledge Graphs, querying, and inference; enabling instruments: DBPedia, WikiData, Protegé)
    - Solving problems with search, introduction to planning
    - Brief introduction to reasoning in presence of uncertainty
- Sub-symbolic AI
    - Brief introduction to basic concepts
    - Classification (Decision trees and ensemble methods, K-NN, Neural Networks)
    - Regression
    - Clustering (K-means, DBSCAN)
    - Deep neural networks and deep learning
- Additional topics as invited seminars (on ethics, emerging topics, or particularly significant results) defined during the course

Prerequisites

Topics discussed within the classes of Fundamentals of Computer Science, Programming Languages, Probability and Statistics For Computer Science will be considered known and reasonably clear.

Teaching form

Theoretical and methodological aspects will be presented along with practical examples and case studies, employed to exemplify the introduced topics; specific tools for the realization of presented models and approaches will be presented; suitable references to the relevant and recent scientific literature will be given for supporting an in depth study of the treated topics.

The course consists of 68 hours, of which 48 hours are lectures (approximately 66% of which are expository and the rest interactive) and 20 hours are interactive exercises. The lectures and exercises are conducted in person, unless unforeseen problems or changes arise, which will be promptly announced, and will be recorded and made available.

The course is in Italian although the teaching material is mostly in English.

Textbook and teaching resource

Slides, papers and selected additional material, selected chapters from reference books, among which Artificial Intelligence: Foundations of Computational Agents, 2nd Edition, David L. Poole and Alan K. Mackworth (https://artint.info/2e/html/ArtInt2e.html). Additional resources will be indicated during the course.

Semester

First semester

Assessment method

Written and optional oral examination on topics discussed during the course; knowledge about concepts, techniques, issues discussed in the course, as well as the ability to solve exercises proposed, and the ability to choose solutions based on their appropriateness to the context of the problem will also be evaluated. The ability to convey knowledge and abilities in a compact and effective way will be appreciated. An optional group project (2-3 members) will be proposed; a single possibility to carry out the project will be defined, plausibly close to the end of the course, with assignment due in the months of January/February. It could lead to extra points for the final evaluation, provided the project is discussed.

Office hours

Giuseppe Vizzari: wednesday morning, by appointment, potentially also via teleconferencing systems.

Sustainable Development Goals

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