Artificial Intelligence

ECTS : 3

Volume horaire : 36

Description du contenu de l'enseignement :

This class introduces the main ideas and algorithms that let an artificial agent plan and carry out sequences of actions to reach a goal. We explore several families of techniques:

- **Search algorithms**:
  How an agent explores a state space. We look at uninformed methods like breadth-first and depth-first search, and informed methods such as greedy best-first search and A*, which use heuristics to guide the search.

- **Local search and optimization**:
  Techniques for improving a solution step by step, including hill climbing, simulated annealing, local beam search, and genetic algorithms.

- **Constraint satisfaction problems (CSPs)**:
  A framework for modelling problems using variables and constraints. We cover AC-3 for constraint propagation and backtracking search for finding consistent assignments.

- **Nondeterministic and partially observable environments**:
  How agents plan when actions have uncertain effects or when they cannot see the full state of the world. We introduce AND–OR tree search and belief states.

- **Multi-agent environments**:
  Basic ideas from game playing, including minimax and alpha–beta pruning, where agents must reason about opponents.

- **Classical planning**:
  An introduction to PDDL and planning-graph techniques for encoding and solving high-level planning tasks.

Compétence à acquérir :

By the end of this course, students will be able to:

- **Model a variety of decision and planning problems** using appropriate representations (state spaces, constraints, planning formalisms, etc.).

- **Understand and select suitable algorithmic approaches**—such as search, optimization, or constraint-based methods—to compute solutions.

- **Use existing algorithms and solvers effectively**, and assess their strengths, limitations, and suitability for a given problem.

Mode de contrôle des connaissances :

50% Project - 50% Exam

Bibliographie, lectures recommandées :

Russell, S., & Norvig, P. (2009). Artificial Intelligence: A Modern Approach (3rd ed.). Upper Saddle River, NJ: Prentice Hall.