

Fundamentals of Artificial Intelligence

Laboratory

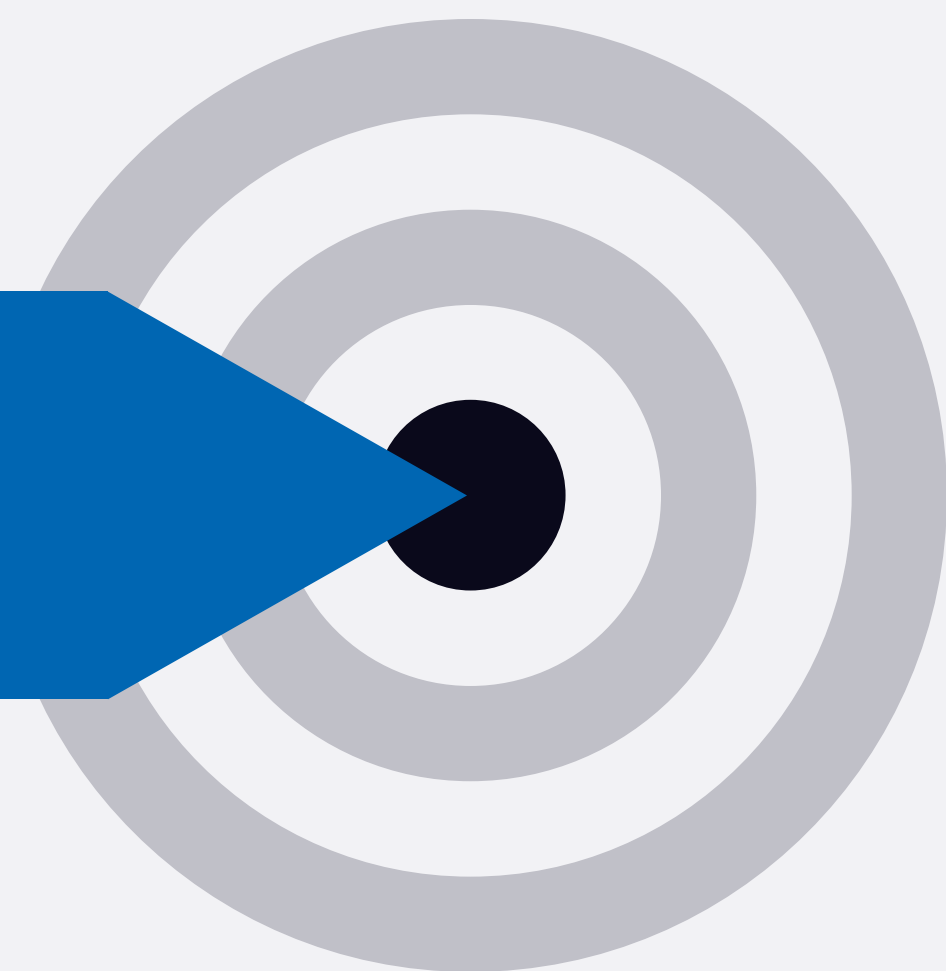
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Intro

- Schedule: **Wednesday 11:30-13:30**
- Website: <http://www.maurodragoni.com/teaching/> (under construction)
- Class exercises and homework

Being proactive is the best way to learn!!!



Exercise 2.1

- For each of the following activities, give a PEAS description of the task environment and characterize it in terms of their properties.
 - Playing soccer.
 - Exploring the subsurface oceans of Titan.
 - Shopping for used AI books on the Internet.
 - Playing a tennis match.
 - Practicing tennis against a wall.
 - Performing a high jump.
 - Knitting a sweater.
 - Bidding on an item at an auction.

Exercise 2.3

- Write pseudocode agent programs for the goal-based and utility-based agents.

Exercise 2.3

- Write pseudocode agent programs for the goal-based agents.

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function GOAL-BASED-AGENT (percept) returns an action
  persistent: state, the agent's current conception of the world state
                model, a description of how the next state depends on current state and action
                goal, a description of the desired goal state
                plan, a sequence of actions to take, initially empty
                action, the most recent action, initially none

  state ← UPDATE-STATE (state, action, percept, model)
  if GOAL-ACHIEVED (state, goal) then return a null action
  if plan is empty then
    plan ← PLAN (state, goal, model)
    action ← FIRST (plan)
    plan ← REST (plan)
  return action
```

Exercise 2.2

- For each of the following assertions, say whether it is true or false and support the answer with examples or counterexamples where appropriate.
 - An agent that senses only partial information about the state cannot be perfectly rational.
 - There exist task environments in which no pure reflex agent can behave rationally.
 - There exists a task environment in which every agent is rational.
 - The input to an agent program is the same as the input to the agent function.
 - Every agent function is implementable by some program/machine combination.
 - Suppose an agent selects its action uniformly at random from the set of possible actions.
 - There exists a deterministic task environment in which this agent is rational.
 - It is possible for a given agent to be perfectly rational in two distinct task environments.
 - Every agent is rational in an unobservable environment.
 - A perfectly rational poker-playing agent never loses.

Exercise 2.4 - Homework

- Write pseudocode agent programs for the utility-based agents.

Exercise 2.5 - Homework

- Let us examine the rationality of various vacuum-cleaner agent functions.
 - Show that the simple vacuum-cleaner agent function is rational.
 - Describe a rational agent function for the case in which each movement costs one point. Does the corresponding agent program require internal state?
 - Discuss possible agent designs for the cases in which clean squares can become dirty and the geography of the environment is unknown. Does it make sense for the agent to learn from its experience in these cases? If so, what should it learn? If not, why not?