Contents

1 Deciding and Learning How to Act

> Content from TAILOR deliverable report D9.6
>
> The content of this page is currently a re-formatted copy from the Deliverable 9.6 PhD Curriculum Report.

This topic covers ways in which AI agents can be empowered with the ability to deliberate autonomously how to act in the world.

1.1 Content/Knowledge

Students should be able to:

- Understand the different approaches in the fields of Artificial Intelligence and Formal Methods that can be applied in synergy to develop autonomous agents.
- Recognize the mathematical and algorithmic techniques as well as the key challenges to solving sequential decision-making problems.
- Integrate data-driven learning methods with model-based reasoning methods for deciding and learning how to act.
- Identify the limitations of current machine learning and reasoning methods to act in the real world.

1.2 Methodological/Skills

Students should be able to:

- Program advanced agents using learning and planning techniques for solving sequential decision-making tasks that involve other agents.
- Analyse autonomy in dynamic, partially observable settings involving a single agent or multiple agents.
- Develop methods for optimising control policies in complex sequential decision-making problems.
- Implement techniques to balance exploration and exploitation in decision-making tasks that require learning from the environment while acting on it.

- Use linear time logic as a specification language for formulating complex tasks as well as environment properties.
- Apply synthesis from formal specifications to solve planning problems in nondeterministic environments.

1.3 Transferrable/Application

Students should be able to:

- Work effectively with others in an interdisciplinary and/or international team to reach a collective objective by sharing knowledge, learning and building consensus.
- Present materials coherently and concisely in written or oral form, with clear use of language to a technical audience.