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Reinforcement Learning - How this subject will work

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Reinforcement Learning
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Learning goals

At the end of the course, the student should be able to:

1. **build a Reinforcement Learning (RL) system** for sequential decision-making;
2. understand how to **formalize their task as a Reinforcement Learning problem**, and how to implement a solution;
3. understand the space of **RL algorithms** (Sarsa, Q-learning, Policy Gradients, and more), and;
4. understand how RL fits under the broader umbrella of **machine learning**, and how it complements supervised and unsupervised learning.

This is a hands-on subject!

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1. In every class, we will implement something.
 2. We will read many papers and implement some techniques described in several of them.
 3. We will work with different tools. However, all tools will be **python** packages.

Requirements

1. You must *know* how to code in **python!**
2. You must *enjoy* coding in **python.**
3. You must know how to work with **Github.**

Content

1. Definition and key concepts of RL
2. RL Tooling and Environments
3. Q-Learning and Sarsa algorithms
4. How to use RL in different environments (non-deterministic, deterministic and competitive environments)
5. Deep Reinforcement Learning: Deep Q-Learning, Double Deep Q-Learning, Policy Optimization Algorithms, A2C, PPO, and more.

Assignments

The grade for this subject is calculated as follows:

- ▶ Several **small implementations** will be performed. This average grade will make up 30% of the final grade for the subject.
- ▶ There will be **one major projects**. The grade for this project will make up 50% of the final grade for the subject. The project will be developed in pairs, and the grade will be the same for both students in the pair. The project will be evaluated based on the quality of the implementation, the results obtained, and the quality of the report. The students must deliver different artifacts for the project along the semester.
- ▶ The remaining 20% will be calculated from **the final exam**.