Insper

Reinforcement Learning

How this subject will work

Reinforcement Learning
Fabricio Barth

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!

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 Q-Learning, Double Deep Q-Learning and Policy Optimization Algorithms

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 **two major projects**. The average grade of these projects will make up the other 50% of the final grade.
- The remaining 20% will be calculated from **the final exam**.