Call for Master and PhD thesis on Frugal Reinforcement Learning for Stochastic Networks ANITI

Location: LAAS & IRIT, Toulouse, France.
Supervisors: U. Ayesta (IRIT) and B. Prabhu (LAAS), Members of SOLACE Team
Master student: From October 2025 onwards (flexible).
Funding: Master's Internship + PhD grant available through ANITI Chair RL4SN

Research Summary:

Markov Decision Processes (MDPs) and reinforcement learning (RL) have led to remarkable successes in sequential decision-making. However, these approaches often rely on vast amounts of data and significant computing power – resources that are not always available in practice. This research project, funded under the ANITI Chair "Reinforcement Learning for Stochastic Networks" (RL4SN), aims to tackle this limitation by developing **frugal, data-efficient learning algorithms** that perform reliably even in data-scarce environments.

The project is structured in two phases. The first focuses on the classical MDP setting, where model parameters are known, to design new, faster-converging value iteration-type algorithms with reduced computational overhead. In the second phase, these insights will be transferred to reinforcement learning, where the system model must be learned from interaction. The main application domain will be **stochastic networks** – a rich modeling framework for computing systems and communication networks – where data-efficient learning is both challenging and essential due to the high dimensionality and randomness of the environment.

This project offers an exciting opportunity to contribute to foundational research with practical impact, bridging the gap between theory and modern machine learning practice.

Keywords: Reinforcement learning, Markov Decision processes, stochastic networks, machine learning

Candidate Profile: We are looking for motivated students with a strong background in one or more of the following areas:

- Applied mathematics, operations research, computer science, or electrical engineering
- Stochastic processes, optimization, queueing theory, or sequential decision-making
- Programming experience (e.g., Python, C++, MATLAB) for implementing and testing algorithms

Prior research or internship experience in RL or stochastic modeling is a plus, but not required.

How to Apply: To apply, please send the following documents by email to both supervisors:

- A detailed CV (including contact info for two references)
- A short motivation letter outlining your interest in the topic
- Use subject line: `Application MS/PhD RL4SN`

Contact:

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If you have any other question, don't hesitate to reach out.