



# Dottorato di Ricerca in Ingegneria dell'Informazione

## PhD Program in Information Engineering

### An Introduction to Reinforcement Learning

Professor Luca Iocchi and Dr. Roberto Capobianco

Sapienza Università di Roma

3 Dicembre 14:30-18:30, aula B1.5

4 Dicembre 10:00-13:30, aula B2.4

11 Dicembre 14:30-18:00, aula B1.4

12 Dicembre 9:30-13:30, aula B1.4

*L'orario delle lezioni 11-12 dicembre sarà confermato nella lezione del 3 dicembre*

**Abstract:** Nowadays, research on reinforcement learning (RL) has demonstrated promising results in manifold domains, while major breakthroughs have been obtained in gaming applications (e.g., atari, GO, poker). In this short course, we will introduce the basic principles and algorithms for solving Markov Decision Processes and simple RL problems. We will further investigate how these algorithms have been extended, modified and applied at the state-of-the-art to solve challenging problems in the gaming/simulation domains, pointing at the open challenges in the research field. Finally, we will analyze the applicability of these algorithms with or without modifications in robotics.

**Prof. Luca Iocchi** is Full Professor at Sapienza University of Rome, Italy. His main research interests lie at the intersection of artificial intelligence and robotics and aim at a principled integration of AI techniques in real robotic scenarios. Research fields include cognitive robotics, action planning, multi-robot coordination, robot perception, robot learning, human-robot interaction and social robotics. He is author of over 160 referred papers (h-index 39 for Google scholar), in journals and conferences in artificial intelligence and robotics, member of the program committee of several conferences (IJCAI, AAI, ICAPS, AAMAS, ICRA, IROS), guest editor for journal special issues and reviewer for many journals in the field. He has coordinated national projects and he has been principal investigator of international projects (including COACHES). Currently, he is co-PI of SciRoc and AI4EU H2020 projects. He is currently Vice-President of the RoboCup Federation and contributed to benchmarking domestic service robots through scientific competitions within RoboCup@Home and the European Robotics League Service Robots (ERL-SR), of which he has been member of the Organizing Committees since their origin. He organized several international scientific competitions, as well as student competitions focusing on service robots and human-robot interaction (including ERL-SR, European RoboCupJunior Championship and RoboCup@Home Education Challenges). He has supervised the development of teams participating to robot competitions, such as RoboCup soccer, RoboCup rescue, and RoboCup@Home.

**Roberto Capobianco** is an Assistant Professor at Sapienza University of Rome and Research Scientist at Cogitai, Inc., with both academic and industrial experience in RL. His main research interests lie at the edge between RL, robotics and explainability in AI. He obtained his PhD from Sapienza University of Rome working on the generation and learning of semantic driven robot behaviors, and he has been a Research Scholar at the Robotics Institute of the Carnegie Mellon University (Pittsburgh, USA) working with Prof. Drew Bagnell.



