PhD Proposal MAP-I

Coordination in Multi-Agent Systems: Applications in Robotic Soccer

Supervisors

Luís Paulo Reis (Email: lpreis@fe.up.pt), Nuno Lau (Email: nunolau@ua.pt)

Research Units

LIACC – Lab. Inteligência Artificial e Ciência de Computadores da Universidade do Porto IEETA – Instituto de Engenharia Electrónica e Telemática de Aveiro.

Abstract

This research project aims at developing coordination and communication methodologies to enable teams of heterogeneous and autonomous robots, with different skills, and made by different manufacturers, to accomplish complex collective tasks, with emphasis on playing robosoccer games.

The work will be based on previous research work developed by the proponents that lead to the development of several RoboCup teams: FC Portugal, CAMBADA and 5DPO. These teams achieved more than 25 international awards in Robosoccer World and European championships in distinct leagues including World champions in Simulation (2000), Coach (2002), Simulation 3D (2006) and Middle-Size (2008) Leagues and European champions in Simulation (2000, 2001), Simulation 3D (2006, 2007) and Small-Size (2001, 2006, 2007).

The methodologies developed are expected to be flexible enough to be applied across several distinct teams participating in different leagues. The student will also have the possibility of participating in RoboCup international competitions as a member of one of the proponents' teams.

Objectives

The main purpose of this work is to develop methodologies for high-level coordination and communication of heterogeneous autonomous agents that perform in rich, dynamic, both competitive and adversarial environments. More specific objectives include: developing new coordination protocols that enable teams of agents to perform complex tasks in open multi-agent environments; Organizing and making available knowledge, languages and protocols for enabling teamwork; Defining methodologies for analyzing team behavior and use them for coaching teams of autonomous agents.

Additional Information

Complete Description available upon request. More Information: <u>Http://www.fe.up.pt/~lpreis</u>

Proposal integrated in Project FCT/PTDC/EIA/70695/2006 "ACORD: Adaptative Coordination of Robotic Teams" from which the proponent is the Principal Investigator.

Other Proposals

Several other possible PhD Proposals concerning the following subjects are available upon student request (email: <u>lpreis@fe.up.pt</u>):

- Autonomous Agents, Multi-Agent Systems (MAS) and Coordination in MAS;
- Intelligent Robotics, Cooperative Robotics and Robotic Soccer (RoboCup);
- Intelligent Simulation, Agent Based Simulation;
- Soccer, Game Analysis, Strategical Reasoning and Tactical Modeling;
- (Constraint) Logic Programming, Optimization, Scheduling and Timetabling.