Multi-Level Learning and Opponent Modelling in No Limit Texas Holdem Poker

Supervisor

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Abstract

In a multi-player game with imperfect knowledge, where multiple competing agents must deal with risk management, unreliable information and deception, agent modelling and online learning are essential element in successful agent play. In this kind of environment, agents act under uncertainty, and a crucial issue is to have good opponent modelling (OM), learning and problem solving skills.

This thesis will focus in developing these types of methodologies to enable an autonomous agent to play No Limit Holdem Poker, the most popular poker variant in the world. New OM, learning and problem solving methodologies are necessary to achieve success in this area. There is no computational poker player which is known to be successful at human level in this variant of poker. Enphasis will be given in exploring strategical reasoning and multi-level learning methodologies enabling high-level learning to be applied.

Objectives

The main objective of this work is to develop opponent modelling, machine learning and problem solving capabilities applicable to autonomous agents working in general multi-agent, imperfect knowledge environments. The application will be on the No Limit Holdem Poker domain and thus it will be developed a poker player agent to play No Limit Holdem Poker; with significant innovation comparing to existing artificial known players and capable of competing with human players, what may be a significant advance to the current state of the art in this domain.

Specific objectives of the project include:

- Study existing multi-player game and Poker research work;
- Adaptation of the LIACC Poker multi-agent simulation system for this project;
- Extend known methodologies in several domains of artificial intelligence (opponent modelling, machine learning and problem solving) with enphasis on multi-level learning and strategical reasoning.
- Participate in the arising international AAAI Agent competitions of No Limit Holdem Poker to validate the approach.

Additional Information

Complete Description available uppon request. More Information at: Http://www.fe.up.pt/~lpreis

Other Proposals

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

- 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.