

理论研究

## 多智能体的增强学习及其在RoboCup中的应用

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收稿日期 2007-10-18 修回日期 2008-1-21 网络版发布日期 2008-8-5 接受日期

**摘要** 针对非确定马尔可夫环境下的多智能体系统, 提出了多智能体Q学习模型和算法。算法中通过对联合动作的统计来学习其它智能体的行为策略, 并利用智能体策略向量的全概率分布保证了对联合最优动作的选择。在实验中, 成功实现了智能体的决策, 提高了AFU队的整体的对抗能力, 证明了算法的有效性和可行性。

**关键词** [多智能体](#) [增强学习](#) [机器人世界杯足球锦标赛](#)

分类号

## Reinforcement learning for Multi-Agents Systems and its application in RoboCup

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### Abstract

Due to the presence of other agents, the environment of Multi-Agent Systems (MAS) cannot be simply treated as Markov Decision Processes (MDPs). The current reinforcement learning which are based on MDPs must be reformed before it can be applicable to MAS. Based on an agent's independent learning ability, this paper proposes a novel Q-learning algorithm for MAS—an agent learning other agents action policies through observing the joint action. The policies of other agents are expressed as action probability distribution matrixes. A concise and yet useful updating method for the matrixes is proposed. The full joint probability of distribution matrixes guarantees the learning agent to choose its optimal action. In experiment, the implementation of the agent and the enhancement of AFU shows that the approach is valid and efficient.

**Key words** [Multi-Agents Systems \(MAS\)](#) [reinforcement learning](#) [Robot World Cup \(RoboCup\)](#)

DOI: 10.3778/j.issn.1002-8331.2008.23.014

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