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无线传感器网络中基于MDP的MAS协作策略的优化及分布执行

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摘　要：

为降低马尔可夫决策模型生成MAS协作策略的复杂度，减少协作通信量，在无线传感器网络中利用agent状态之间存在的条件独立性与上下文独立性关系提出了一种新的优化方法。方法通过分解并优化SPI算法生成的策略树，使得MAS中处于独立状态的agent可以分布独立运行，只有在需要同其他agent协商时才进行通信。并在协作中采用Q分解机制实现共享资源的分配，减少资源使用冲突，获取更大奖励。使用STATLOGO软件对方法进行验证，实验结果表明该方法在MAS完成协作任务获取目标奖励的同时，具有产生通信量较小的优点。

关键词：多智能体系统；马尔可夫决策过程；无线传感器网络；上下文独立；条件独立；Q分解

Optimization and Distributed Execution of MAS Cooperative Strategy Based on MDP in Wireless Sensor Networks

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Abstract:

In order to reduce the complexity created by MDP model and the cooperation traffic, the method of creating strategy tree by the model is improved. Using the context-specific and conditional independence existing among the agent states in wireless sensor networks, the tree created by SPI algorithm is decomposed and optimized. This makes the independent agents in MAS running independently, and only communicating with each other when cooperation is needed. During operation Q-decomposition approach is proposed for resource allocating. Simulation experiment developed by STARLOGO, Simulation indicates that MAS applying the strategy not only accomplishes the task and gains the reward, but effectively reduces traffic simultaneously.

Keywords: MAS; MDP; wireless sensor network; context-specific independence; conditional independence; Q-decomposition

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