Peng, Zhinan; Hu, Jiangping; Luo, Rui; Ghosh, Bijoy K.
Distributed multi-agent temporal-difference learning with full neighbor information. (English) Zbl 07366028
Control Theory Technol. 18, No. 4, 379-389 (2020)

Summary: This paper presents a novel distributed multi-agent temporal-difference learning framework for value function approximation, which allows agents using all the neighbor information instead of the information from only one neighbor. With full neighbor information, the proposed framework (1) has a faster convergence rate, and (2) is more robust compared to the state-of-the-art approaches. Then we propose a distributed multi-agent discounted temporal difference algorithm and a distributed multi-agent average cost temporal difference learning algorithm based on the framework. Moreover, the two proposed algorithms' theoretical convergence proofs are provided. Numerical simulation results show that our proposed algorithms are superior to the gossip-based algorithm in convergence speed, robustness to noise and time-varying network topology.

MSC:
68Q85 Models and methods for concurrent and distributed computing (process algebras, bisimulation, transition nets, etc.)
68T05 Learning and adaptive systems in artificial intelligence
68T42 Agent technology and artificial intelligence
93A16 Multi-agent systems

Keywords:
distributed algorithm; reinforcement learning; temporal-difference learning; multi-agent systems

Full Text: DOI