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A Learning Automata-Based Version of SG-1 Protocol for Super-Peer Selection in Peer-to-Peer Networks

Abstract

Super-peer topologies have been found efficient and effective in heterogeneous peer-to-peer networks. Due to dominant position of super-peers, super-peer selection requires a protocol that is aware of peer capacities. Lack of global information about other peers' capacity and dynamic nature of peer-to-peer networks are two major challenges that impose uncertainty in decision-making. SG-1, is a well-known super-peer selection protocol considering peer capacities, but lack of an appropriate decision-making mechanism makes this protocol slow at convergence and imposes overhead of client transfer between selected super-peers. In this paper, we propose an improved version of SG-1 that uses learning automata as an adaptive decision-making mechanism. For this purpose, each peer is equipped with a learning automaton which is used locally in the decisions taken by that peer. Simulations show effectiveness of proposed protocol in terms of convergence time, scalability, capacity utilization, behavior towards super-peer failure and communication cost, compared to SG-1.
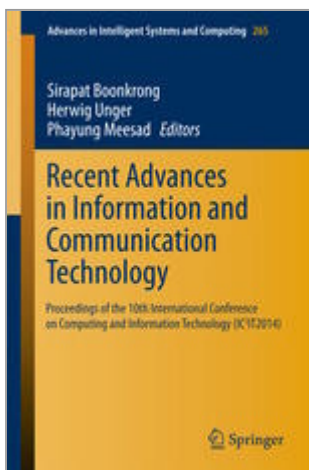
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