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分层P2P实时流媒体系统中基于演进博弈的超级组对等节点选择算法

Super group peer selection algorithm in hybrid layered P2P streaming system based on evolutionary game

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中文摘要:

针对分层混合式P2P实时流媒体系统中的超级组对等节点选择问题, 提出了一种基于演进博弈论的分布式超级组对等节点选择算法。首先使用演进博弈框架对P2P实时流媒体系统中的超级组对等节点选择问题进行了建模, 并对其演进稳定策略进行了求解分析。然后通过得到的混合策略设计了一种基于Q-Learning的分布式SGP选择算法ESS-SGP, 以达到激励对等组内的对等节点之间互相协作的目的。实验结果表明, 与传统的随机选择超级组对等节点方法相比, 使用ESS-SGP算法所选择产生的超级组对等节点能够稳定地为系统提供更高的流媒体上传速率, 使整个P2P流媒体系统的上传能力随着对等节点数目的增加而稳定增加, 并为每个对等节点带来更好的收益。

英文摘要:

Due to high efficiency and good scalability, hybrid layered P2P architecture receives more and more importance in P2P research and P2P streaming application fields recently. The problems about super peers selection are highly challenging because super peers must be selected from a huge and dynamically changing network. A distributed super group peer (SGP) selection algorithm based on evolutionary game is proposed in this paper, in which the SGP selection procedure is modeled based on evolutionary game framework firstly and its evolutionarily stable strategies are analyzed. Moreover, a distributed Q-Learning algorithm (ESS-SGP) according to the mixed strategies by analysis is proposed for the peers to converge to the ESSs based on their own payoff history. Compared to the traditional random selected SGP P2P schemes, experiments results show that the proposed ESS-SGP algorithm achieves much better performance in terms of social welfare, average upload rate of SGPs, and keeps the upload capacity of the P2P streaming system increasing steadily with the number of peers increasing.

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