Performance Enhancement of Adaptive Network Congestion Control Using Reinforcement Learning

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***Abstract*—As the Internet becomes an indispensable part of social infrastructure, network congestion control plays a crucial role in maintaining communication quality. Existing congestion control algorithms, such as NewReno and CUBIC, use predefined rules, making it difficult to respond optimally to changes in network conditions. To address this issue, recent studies have reported the application of dynamic algorithms utilizing reinforcement learning to congestion control. However, most previous studies have not thoroughly evaluated whether their reinforcement learning-based congestion control algorithms can adequately adapt to network fluctuations. Therefore, in this paper, we propose a novel congestion control algorithm called RL-HKD using reinforcement learning and evaluate its communication performance. The evaluation results confirmed that the proposed method improved the bandwidth utilization by up to 1.39% compared to NewReno and demonstrated that it has better throughput convergence and fair coexistence performance than CUBIC.**

***Keyword*— Network congestion control, machine learning, reinforcement learning, Deep Q-Network (DQN), RL-HKD congestion control algorithm.**

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