

TCP Congestion Avoidance in Data Centres using Reinforcement Learning

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Abstract— TCP, a transport layer protocol which ensures the reliable delivery of information on the network, is the basis of Internet connectivity, with 85% of the worlds Internet traffic being TCP based. TCP however, is slow to adapt to changes in the network, drastically reducing the throughput at the first sign of possible congestion, thereby preventing rapid restoration of the throughput. Mitigating this problem has been a very active area of research, as, until recently, the idea of using Artificial Intelligence (AI) in this space was relatively limited. Recently, Reinforcement Learning (RL), a form of AI, has been explored in the networking space, and in enhancing the performance of TCP, this paper aims to expand the use of RL for TCP (TCPRL) in a software-defined data centre for the purpose of network congestion avoidance based on host-based TCP metrics. We demonstrate that our proposed approach is able to significantly reduce the impact of congestion on the end-to-end network throughput within the data centre.

Keyword— Reinforcement Learning, OpenAI Gym, Software-Defined Networking (SDN), TCP Congestion Avoidance.

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