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Deep Reinforcement Learning-Based Computation Offloading for 5G Vehicle-Aware Multi-Access Edge Computing Network

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Abstract : Multi-Access Edge Computing (MEC) is one of the key technologies of the future 5G network. By deploying edge computing centers at the edge of wireless access network, the computation tasks can be offloaded to edge servers rather than the remote cloud server to meet the requirements of 5G low-latency and high-reliability application scenarios. Meanwhile, with the development of IOV (Internet of Vehicles) technology, various delay-sensitive and compute-intensive in-vehicle applications continue to appear. Compared with traditional internet business, these computation tasks have higher processing priority and lower delay requirements. In this paper, we design a 5G-based Vehicle-Aware Multi-Access Edge Computing Network (VAMECN) and propose a joint optimization problem of minimizing total system cost. In view of the problem, a deep reinforcement learning-based joint computation offloading and task migration optimization (JCOTM) algorithm is proposed, considering the influences of multiple factors such as concurrent multiple computation tasks, system computing resources distribution, and network communication bandwidth. And, the mixed integer nonlinear programming problem is described as a Markov Decision Process. Experiments show that our proposed algorithm can effectively reduce task processing delay and equipment energy consumption, optimize computing offloading and resource allocation schemes, and improve system resource utilization, compared with other computing offloading policies.

Keywords : multi-access edge computing, computation offloading, 5th generation, vehicle-aware, deep reinforcement learning, deep q-network
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