AI-Based Dynamic Resource Allocation in 5G/6G Wireless Networks Using Deep Reinforcement Learning

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Abstract:
As 5G spreads rapidly and work on 6G advances, smarter ways to assign resources must respond quickly to shifting data flows, overcrowded channels, yet still meet service quality demands. This study introduces a system driven by artificial intelligence, built around deep reinforcement learning, combined with the ns-3 simulation platform. Instead of fixed rules, it uses a Deep Q-Network approach to manage scheduling, aiming to improve speed, reduce lag, balance access equally, while ensuring more packets reach their destination under real-world conditions like movement and heavy load. Tests reveal the method adjusts more precisely over time, maintains steadier performance across different metrics, makes choices based on current state, also manages spectrum use more effectively when compared to older strategies relying on chance or rigid plans.2

Keywords:
5G Networks, 6G Wireless Communication, Deep Reinforcement Learning, Resource Allocation, QoS Optimization, Deep Q-Network (DQN), ns-3 Simulation.