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Trajectory Design and Power Allocation for Energy -Efficient UAV Communication Based on Deep Reinforcement Learning

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Abstract : In recent years, unmanned aerial vehicles (UAVs) have been widely used in wireless communication, attracting more and more attention from researchers. UAVs can not only serve as a relay for auxiliary communication but also serve as an aerial base station for ground users (GUs). However, limited energy means that they cannot work all the time and cover a limited range of services. In this paper, we investigate 2D UAV trajectory design and power allocation in order to maximize the UAV's service time and downlink throughput. Based on deep reinforcement learning, we propose a depth deterministic strategy gradient algorithm for trajectory design and power distribution (TDPA-DDPG) to solve the energy-efficient and communication service quality problem. The simulation results show that TDPA-DDPG can extend the service time of UAV as much as possible, improve the communication service quality, and realize the maximization of downlink throughput, which is significantly improved compared with existing methods.

Keywords : UAV trajectory design, power allocation, energy efficient, downlink throughput, deep reinforcement learning, DDPG
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