Multi-User Dynamic Spectrum Access Based on LR-Q Deep Reinforcement Learning NetWork

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Abstract—**Dynamic spectrum access (DSA) based spectrum sharing is an effective technique to alleviate the shortage of radio spectrum supply. Many DSA schemes based on deep reinforcement learning (DRL) have been proposed in the literature, but most of them merely dealt with simple heterogeneous cognitive radio networks (CRN). Combining two typical types of DRL networks, namely Long-short term memory (LSTM) and Residual network (ResNet), we proposes a distributed DSA algorithm for complex heterogeneous CRN. The algorithm aims to achieve high channel utilization and control the interference of SU to PU at a low level. The LSTM is used to extract the temporal characteristics of the historical spectrum data sequence to improve the spectrum state prediction capability. In contrast, the ResNet solves the performance degradation problem of deep neural networks caused by network depth and improves the training accuracy. Simulation results show that the algorithm can significantly improve spectrum utilization while controlling the interference of SU to PU.**

Keyword—**Dynamic spectrum access, Deep reinforcement learning, Heterogeneous, LSTM, ResNet**

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