Spectrum Hole Prediction in Cognitive Radio Systems by LSTM Neural Networks

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Abstract

In this paper we consider the task of channel resource occupancy prediction based on radio environment maps (REM) data LTE-based cognitive communication system. REM is a spatiotemporal database of all activities in the network and allows determining the frequencies available for use at a given time. The paper gives the passing traffic of the communication network at the corresponding cell during 10 ms as a resource grid of the LTE network. The transformation of REM map data into a binary data set is proposed and described. A description of the technology of forming a dataset for training and testing neural networks based on three consecutive steps of data conversion of the formed REM is presented. The effectiveness of a long short-term memory recurrent neural network models including classical, autoencoder, sparse autoencoder, convolutional and sweep sequences is investigated. The experiment results to evaluate the prediction accuracy of channel resource occupancy by long short-term memory models are presented.

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