Machine Learning Based Cooperative Spectrum Sensing Using Regression Methods

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New cooperative spectrum sensing (CSS), it encounters better spectrum efficiency, has come into existence as a new strategy. In this study, techniques based on machine learning (ML) work together with CSS to improve user understanding; this is only possible when ML algorithms predict channel states. Additionally, many popular regressions machine learning models such as linear regression, nonlinear regression, generalized linear model, regression tree, and support vector machine regression (SVM) ensembles are discussed along with statistical analysis. This article assumes that 20 main users have different power, controls the maximum power of 20 units, and fixes the threshold of 4 units for all four cases, and analyses the results. In this respect, we came to the conclusion that a best fit line should be used for obtaining characteristics such that linear regression could be used. To further enhance regression and achieve the best results, other changes were also employed.

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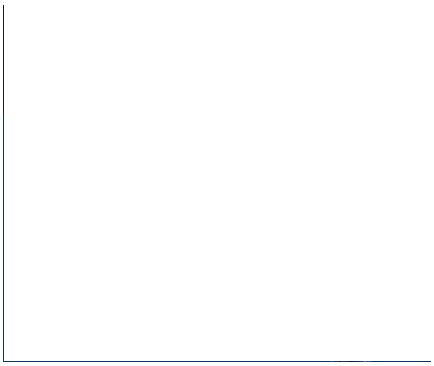
Contents

The demand for wireless communications is on the rise as the result of the popularity of new applications such autonomous driving. Networks have to deal with a rising number of smart terminals due to high bandwidth and low latency [1]–[4]. The development of wireless communications has been severely limited due to the scarcity of spectrum resources. This has led to many difficulties in wireless communication [5]. With cognitive radio (CR), full spectrum usage can be improved by means of gathering new facts from the environment surrounding us. This is done by analyzing data collected from the environment. It often happens that the licensed user or the original user of the tape does not have the tape in their possession. This makes it possible for secondary users (SUs) or unlicensed users (ULUs) to access unlicensed spectrum [6]. In this article, we examine the supply of user licenses in the spectrum. The goal is to find out methods to improve radio spectrum sensing's capacity. This problem is usually solved by estimating the channel state based on functions not available in the transmitter. The complexity of this issue has led to the use of machine learning (ML) models by numerous researchers. The effectiveness of various supervised and unsupervised coordinated spectrum sensing (CSS) techniques is discussed by the authors in [7]. These include the K-means clustering process, Gaussian mixture model (GMM), and support vector machine (SVM). The implementation of machine learning strategies for spectrum in CRNs is addressed by authors in [8]–[11]. They demonstrate that these algorithms offer accurate spectrum recognition and can quickly identify various signal kinds.



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