

A Cooperative Spectrum Sensing Algorithm Using Leading Eigenvector Matching

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Abstract—Cognitive radio emerged as a new trend to mitigate the severe spectrum scarcity problem. As an essential problem in cognitive radio, spectrum sensing has been discussed widely recently. Blind detection techniques that sense the presence of a primary user's signal without prior knowledge of the signal characteristics, channel and noise power attract more attention than non-blind detection. The sensing algorithms based on random matrix theory which are shown to outperform energy detection especially in case of noise uncertainty. In this paper, a sensing algorithm using leading eigenvector matching (LEM) is introduced into cooperative spectrum sensing process. LEM detector uses the feature blindly learned from feature learning algorithm (FLA) as prior knowledge. The LEM algorithm involves the correlation coefficient between feature learned and leading eigenvector of sample covariance matrix as the test statistic. In this paper, we also derive the closed-form expression of the threshold in order to achieve constant false alarm rate detection. Numerical simulations show that the proposed detection algorithm performs better than the MME detector and it does not suffer from a noise power uncertainty problem while also proving to be more robust against the correlation decrease between sensing nodes.

Keyword—Cognitive Radio, spectrum sensing, sample covariance matrix, leading eigenvector matching, feature learning.



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