

Detection of Primary User in Cognitive Radio Network

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Abstract

Spectrum sensing is a key component in cognitive radio networks. Recently there has been intense research interest in eigenvalue based sensing. The results presented so far rely on the distributions of infinite dimensional covariance matrices, therefore these analyses are not accurate for a small sample size. In this paper, we propose a new spectrum sensing method based on the distribution of the largest eigenvalue of the covariance matrices. Using distribution functions for finite dimensional matrices, we conduct exact analysis on the performance of the proposed detector. Essentially, the detection problem requires characterizing the decision threshold as a function of various parameters. The threshold optimization problem is characterized by a weighted sum of false alarm and miss detection probabilities. This detector outperforms the cooperative energy detector with all sample sizes and in the whole SNR range considered. Our proposed detection scheme has direct application in OFDM systems.