INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The thesis explores some new strategies for cooperative and multi-band spectrum sensing. The primary focus in this research work is on improving the performance of cooperative spectrum sensing (CSS) in the absence of dedicated reporting channels. Firstly, a conventional hard decision based CSS network, operating without dedicated reporting channels is assumed. In this case, the reported decisions suffer different rates of outage depending on the presence or absence of the primary user (PU) signal. This differential outage information is used in further optimizing the well-known n-out-of-K voting rule. Improvement in the detection performance is reported due to the use of this information. Secondly, a decentralized CSS network architecture that operates in the absence of dedicated reporting channels is proposed. The proposed architecture supports soft decision fusion and adopts random access protocols to avoid potential collisions among transmitting secondary users (SUs). Closed form expressions of probability of detection and probability of false alarm are derived. Finally, the thesis explores the sensing of multiple unknown numbers of frequency hopping primary users operating over a wideband of interest. Sparse coding based approach on a *learned exemplar dictionary* is proposed for such detection. Studies carried out through simulation establish the superiority of the proposed technique compared to the state-of-the-art, fast Fourier Transform averaging ratio (FAR) based algorithm in terms of sensing time and detection performance.