Abstract

Cognitive radio (CR) has been suggested as the solution to spectrum scarcity due to the fixed allocation employed worldwide by regulatory bodies. In order to avoid interference to a primary user signal, the CR has to be aware about the spectrum usage in the geographic area in which it wants to operate. The process of spectrum sensing is a fundamental task for obtaining this awareness and the result of this process determines the successful operation of cognitive radio. Energy detection is one of the methods of spectrum sensing with the lowest computational complexity but with low performance at low signal to noise ratio. Exploring energy detection has led to the application of many techniques one of which is the use of time-frequency analysis. This method employs distribution techniques for analyzing the energy spectral density of an observed signal with a view to setting a sensing threshold. However, the distribution techniques that were used in literature suffered from the problem of cross-terms which affect the analysis of the resulting distribution thereby leading to poor sensing performance at low signal-to-noise ratio. Smoothed pseudo Wigner-Ville distribution of the time-frequency analysis has been employed in this work to reduce the effect of cross-terms for better sensing threshold.
Simulation results evaluate the performance of the employed technique compared to pseudo Wigner-Ville for AWGN, Rician and Rayleigh channel conditions.

References

Estimation of an Improved Spectrum Sensing Threshold for Cognitive Radio using Smoothed Pseudo Wigner-Ville Distribution


Index Terms

Computer Science

Signal Processing

Keywords