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Agent Identification Using a Sparse Bayesian Model

Abstract

Identifying agents in a linear mixture is a fundamental problem in spectral sensing applications including chemical and biological agent identification. In general, the size of the spectral signature library is usually much larger than the number of agents really present. Based on this fact, the sparsity of the mixing coefficient vector can be utilized to help improve the identification performance. In this paper, we propose a new agent identification method by using a sparse Bayesian model. The proposed iterative algorithm takes into account the nonnegativity of the abundance fractions and is proved to be convergent. Numerical studies with a set of ultraviolet (UV) to infrared (IR) spectra are carried out for demonstration. The effect of the signature mismatch is also studied using a group of terahertz (THz) spectra.