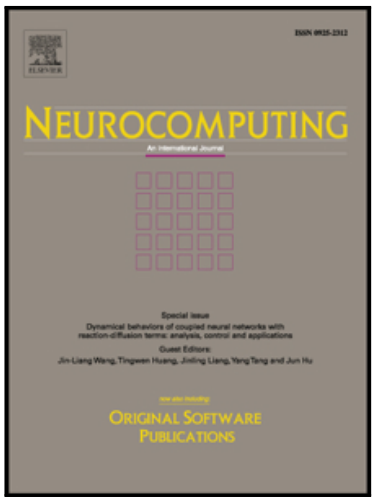

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Passive Source Localization from Array Covariance Matrices via Joint Sparse Representations

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Abstract

A novel joint sparse representation based multi-source localization method is presented in this work. With the proposed approach, the directions of arrival (DOA) of each source may be formulated as a sparse reconstruction problem using spatial array covariance matrix, and the corresponding source locations can be formulated as a joint sparse representation of array covariance matrices (JSRACM) for multiple phase arrays. The proposed approach transforms the source location estimation problem into a spatial sparse signal representation (SSSR) optimization problem, which avoids the conventional DOA association in the case of multiple sources. To mitigate the high computation complexity of the JSRACM approach, a novel binary sparse indicative vector (SIV) is introduced to represent the support of joint SSSR of array covariance matrices. As such, the multiple source locations may be estimated by solving an unconstrained optimization problem of the SIV vector using existing FOCUSS-like algorithms. The resulting SIV-JSRACM algorithm does not require prior information of the number of sources nor initial source location estimates. Simulation results demonstrate the advantages of the proposed approach.

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