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Research Article

## A Feature-Selective Independent Component Analysis Method for Functional MRI

Yi-Ou Li,<sup>1</sup> Tülay Adalı,<sup>1</sup> and Vince D. Calhoun<sup>2,3,4</sup>

<sup>1</sup>Department of Computer Science and Electrical Engineering, University of Maryland Baltimore County, 1000 Hilltop Circle, Baltimore 21250, MD, USA

<sup>2</sup>The MIND Institute, University of New Mexico, Albuquerque 87106, NM, USA

<sup>3</sup>Department of ECE, University of New Mexico, Albuquerque 87106, NM, USA

<sup>4</sup>Department of Psychiatry, Yale University, New Haven 06520, CT, USA

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### Abstract

In this work, we propose a simple and effective scheme to incorporate prior knowledge about the sources of interest (SOIs) in independent component analysis (ICA) and apply the method to estimate brain activations from functional magnetic resonance imaging (fMRI) data. We name the proposed method as feature-selective ICA since it incorporates the features in the sample space of the independent components during ICA estimation. The feature-selective scheme is achieved through a filtering operation in the source sample space followed by a projection onto the demixing vector space by a least squares projection in an iterative ICA process. We perform ICA estimation of artificial activations superimposed into a resting state fMRI dataset to show that the feature-selective scheme improves the detection of injected activation from the independent component estimated by ICA. We also compare the task-related sources estimated from true fMRI data by a feature-selective ICA algorithm versus an ICA algorithm and show evidence that the feature-selective scheme helps improve the estimation of the sources in both spatial activation patterns and the time courses.

Abstract

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