

A Stable Method for Determination of the Number of Independent Components

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Abstract : Independent component analysis (ICA) is one of the most commonly used blind source separation (BSS) techniques for signal pre-processing, such as noise reduction and feature extraction. The main parameter in the ICA method is the number of independent components (IC). Although there have been several methods for the determination of the number of ICs, it has not been given sufficient attention to this important parameter. In this study, we review the most used methods for determining the number of ICs and provide their advantages and disadvantages. Further, we propose an improved version of column-wise ICABlock method for the determination of the number of ICs. To assess the performance of the proposed method, we compare the column-wise ICABlock with several existing methods through different ICA methods by using simulated and real signal data. Results show that the proposed column-wise ICABlock is an effective and stable method for determining the optimal number of components in ICA. This method is simple, and results can be demonstrated intuitively with good visualizations.

Keywords : independent component analysis, optimal number, column-wise, correlation coefficient, cross-validation, ICABlock

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