Null Space Pursuit: An Operator-based Approach to Adaptive Signal Separation

Silong Peng and Wen-Liang Hwang†

Institute of Automation, The Chinese Academy of Sciences, Beijing, China

Institute of Information Science, Academia Sinica, Taiwan†

Abstract

The operator-based signal separation approach uses an adaptive operator to separate a signal into additive subcomponents. The approach can be formulated as an optimization problem whose optimal solution can be derived analytically. However, the following issues must still be resolved: estimating the robustness of the operator's parameters and the Lagrangian multipliers, and determining how much of the information in the null space of the operator should be retained in the residual signal. To address these problems, we propose a novel optimization formula for operator-based signal separation and show that the parameters of the problem can be estimated adaptively. We demonstrate the efficacy of the proposed method by processing several signals, including real-life signals.