

Preface

“Blind” source separation (BSS) aims to recover unknown source signals from their measurable mixtures without any information about the mixing system. It is a fundamental and challenging problem arising from a wide variety of applications such as wireless communication, medical signal analysis, passive listening, and video surveillance. In traditional BSS methods, a fundamental assumption is that the source signals are independent or at least mutually uncorrelated. This assumption is unfortunately too restrictive to be met in some emerging important applications. For example, in a densely deployed wireless sensor network for microclimatic condition monitoring, the density of sensors may be very high, e.g., more than tens of sensors per square meter. Thus, signals from adjacent sensors are unavoidably cross-correlated and their cross-correlations are unknown. Similarly, in a real-time wireless video surveillance system for anti-terrorism monitoring, images captured by cameras are often mutually correlated. The scenario of mutually correlated signals can also be found in multiple-input multiple-output wireless relay systems, where the signals received and sent by the relay nodes are spatially correlated.

In this book, we provide readers a complete and self-contained set of knowledge about dependent source separation, including the latest development in this field. In Chap. 1, we present an overview of blind source separation. Three promising blind separation techniques that can tackle mutually correlated sources are presented and discussed in Chaps. 2–4, which focus on nonnegativity-based methods, time-frequency analysis-based methods, and precoding-based methods, respectively. Finally, we outline the possible future work in Chap. 5.

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