Block Component Analysis, a New Concept for Signal Separation

Signal separation is a key problem in signal processing and data mining. A fundamental technique is Principal Component Analysis. Principal Component Analysis works via a matrix Singular Value Decomposition and requires that the signal components are orthogonal in column and row space. An alternative is Independent Component Analysis, in which a condition of statistical independence is imposed. The application determines whether these conditions are meaningful or not.

In this thesis we study a new fundamental technique for signal separation, which we call Block Component Analysis. This technique exploits the fact that matrix representations of meaningful signals can often be very well approximated by a matrix of low rank. Applications can be found in the most diverse fields, e.g. biomedical signal processing, vibro-acoustics, image processing, chemometrics, econometrics, bio-informatics, mining of network and hyperlink data, telecommunication.

The thesis is part of a collaboration with K.U.Leuven - Campus Kortrijk.

Work: Depending on the students' interests, more or less emphasis can be put on the investigation of algebraic aspects, on the development and implementation of algorithms or on the study of applications.

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Number of students: 1 or 2

