מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Machine Learning and Statistics Seminar

Room 1 ,Ziskind Building
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at 11:15

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The Gaussian Maximum Likelihood Approach for Independent Component and Vector Analysis

Abstract:

The Blind Source Separation (BSS) problem consists of retrieving signals of interest, termed the sources, from a dataset consisting of their mixtures. One of the most popular and common paradigms for solving the BSS problem is Independent Component Analysis (ICA), where the sources are assumed to be (only) mutually statistically independent random processes, and the mixtures are assumed to be linear combinations thereof, where the linear mixing operator is unknown. In this talk, we shall start with the Gaussian Maximum Likelihood (GML) approach for the semi-blind problem, in which the sources are assumed to be temporally-diverse Gaussian processes. Based on the principles of this approach, we shall then discuss two extensions. First, the noisy Gaussian ICA problem, for which two asymptotically optimal solutions, w.r.t. two different optimality criteria, will be presented. We shall see (both analytically and empirically) that these solutions possess attractive properties even for non-Gaussian mixtures. Then, we shall consider the Independent Vector Analysis (IVA) framework, which has emerged in recent years as an extension of ICA into multiple datasets of mixtures. In IVA, the sources in each set are independent, but may depend on sources in the other sets. We will show that in IVA, the GML approach leads to consistent separation regardless of the sources' distributions.