A MEAN FIELD APPROXIMATION APPROACH TO BLIND SOURCE SEPARATION WITH LP PRIORS (TueAmOR5)

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Abstract :

In this paper we address the problem of Bayesian blind source separation with generalized p−Gaussian priors for the sources (also known as Lp priors). These kind of priors are useful when modeling sparse sources (spiky signals, wavelet coefficients ...) The corresponding posterior laws are non linear and either maximum a posteriori (MAP) or posterior mean estimates are computationally difficult to obtain especially for values of p approaching unity. In this work, we consider a mean field approximation approach to approximate the joint posterior distribution by a separable distribution on its parameters: unobservable sources, mixing matrix, noise covariance matrix and hyper−parameters (source scale parameters). This approach requires, however, marginalisation of the log−likelihood with respect to these parameters. With appropriate prior assignments, this can be done explicitly for the mixing matrix, the noise covariance matrix and the scale parameters. For the sources, we consider a Kullback distance based approximation in order to obtain estimates of the first two moments of the sources. Simulation results are presented to support the proposed approach.

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