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# Blind Deconvolution with Relative Newton Method

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**Abstract**

Blind deconvolution is an important task for numerous applications in acoustics, signal processing, communications, control, etc. In this work, we study a relative optimization framework for quasi-maximum likelihood single-channel blind deconvolution and relative Newton method as its particular instance. A smooth approximation of the absolute value is considered for deconvolution of super-Gaussian sources. Special Hessian structure allows fast approximate Hessian construction and inversion with complexity comparable to that of gradient methods, and sequential optimization with gradual reduction of the smoothing parameter makes the proposed algorithm very accurate. We also propose the use of rational IIR restoration kernels, which constitute a richer family of filters than the traditionally used FIR kernels. Simulation results demonstrate the efficiency of the proposed methods.

## Notation

The following notation is adopted in this work: time signals are denoted by lowercase italic and indexed starting from $n = 0$ unless stated otherwise. $Z$-transform domain representations of signals are denoted by uppercase italic and are exchangeable with the corresponding time-domain representations. Vectors and matrices are denoted by lowercase and uppercase italic, respectively, and indexed starting from $n = 0$ unless stated otherwise. The following notation is used: