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**Initialization, distances and local minima in audio applications of
the non-negative matrix factorization**

Nancy Bertin and Roland Badeau
Télécom Paristech (ENST) / TSI - CNRS LTCI, 46, rue Barrault, 75634 Paris Cedex 13, France

The use of the Non-Negative Matrix Factorization (NMF) as a decomposition technique has dramatically grown in various signal processing applications over the last years. Its computation, based on the iterative minimization of a cost function, relies on several choices, among which the distance involved in the cost function itself but also the initialization of the algorithm. These choices are all the more crucial as the usual algorithms, iterative, only ensure convergence to a local minimum. In this work, we compare three typical distances in the NMF problem (namely Euclidian, Kullback-Leibler divergence and Itakura-Saito distance) and their combination with different initializations, in an audio context: decomposition of the time-frequency representation for the transcription of polyphonic music. Both the existence of global and local minima, and the efficiency of transcription are examined. Moreover, NMF update rules can be formulated in a unified framework for the three aforementioned cost functions. This formulation allows figuring out new NMF algorithms which could address the local minima question.