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# Evolutionary Nonnegative Matrix Factorization with Adaptive Control of Cluster Quality

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## Abstract

Nonnegative matrix factorization (NMF) approximates a given data matrix using linear combinations of a small number of nonnegative basis vectors, weighted by nonnegative encoding coefficients. This enables the exploration of the cluster structure of the data through the examination of the values of the encoding coefficients and therefore, NMF is often used as a popular tool for clustering analysis. However, its encoding coefficients do not always reveal a satisfactory cluster structure. To improve its effectiveness, a novel evolutionary strategy is proposed here to drive the iterative updating scheme of NMF and generate encoding coefficients of higher quality that are capa-

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