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Title: The NoSEs of Nonnegative Matrix Factorization: myths, conjectures, and open questions

Abstract: Given a matrix X, nonnegative matrix factorization (NMF) aims to find the smallest nonnegative matrices U and V such that X=UV'. The nonnegative rank of X is the number of columns in U (and V). Surprisingly, nobody knows how to find this number! One of the main reasons is that NMF is ill-posed with infinitely many feasible solutions. In this talk I will introduce what we call nonnegative subspace edges (NoSEs), which reveal the optimal (maximal-volume) solution to NMF. This is analogous to the Moore-Penrose pseudo-inverse, which selects the optimal (minimum-norm) solution to ill-posed least-squares problems. We conjecture that NoSEs hold the key to NMF and determining the nonnegative rank. The challenge lies in finding them!