Author(s): Nascimento, JMP (Nascimento, Jose M. P.); Bioucas-Dias, JM (Bioucas-Dias, Jose M.)

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Abstract: This paper is an elaboration of the DECA algorithm [1] to blindly unmix hyperspectral data. The underlying mixing model is linear, meaning that each pixel is a linear mixture of the endmembers signatures weighted by the correspondent abundance fractions. The proposed method, as DECA, is tailored to highly mixed mixtures in which the geometric based approaches fail to identify the simplex of minimum volume enclosing the observed spectral vectors. We resort then to a statitistical framework, where the abundance fractions are modeled as mixtures of Dirichlet densities, thus enforcing the constraints on abundance fractions imposed by the acquisition process, namely non-negativity and constant sum. With respect to DECA, we introduce two improvements: 1) the number of Dirichlet modes are inferred based on the minimum description length (MDL) principle; 2) The generalized expectation maximization (GEM) algorithm we adopt to infer the model parameters is improved by using alternating minimization and augmented Lagrangian methods to compute the mixing matrix. The effectiveness of the proposed algorithm is illustrated with simulated and read data.

Addresses: [Nascimento, Jose M. P.] Inst Super Engn Lisboa, Lisbon, Portugal

Reprint Address: Nascimento, JMP, Inst Super Engn Lisboa, Lisbon, Portugal.

E-mail Address: zen@isel.pt; bioucas@lx.it.pt

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