

Given a mixed hyperspectral data set, linear unmixing aims at estimating the reference spectral signatures composing the data-referred to as endmembers-their abundance fractions and their number. In practice, the identified endmembers can vary spectrally within a given image and can thus be construed as variable instances of reference endmembers. Ignoring this variability induces estimation errors that are propagated into the unmixing procedure. To address this issue, endmember variability estimation consists of estimating the reference spectral signatures from which the estimated endmembers have been derived as well as their variability with respect to these references. This paper introduces a new linear mixing model that explicitly accounts for spatial and spectral endmember variabilities. The parameters of this model can be estimated using an optimization algorithm based on the alternating direction method of multipliers. The performance of the proposed unmixing method is evaluated on synthetic and real data. A comparison with state-of-the-art algorithms designed to model and estimate endmember variability allows the interest of the proposed unmixing solution to be appreciated.