A Tensor Framework for Seismic Imaging Applications

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Tensors (aka multiway arrays) can be instrumental in revealing latent correlations residing in high dimensional spaces. In this talk, we first review some of the common tensor definitions, discuss their limitations, and introduce a tensor-tensor product framework which permits the elegant extension of linear algebraic concepts and algorithms to tensors. In particular, we describe the tensor SVD (t-SVD) and optimality properties of its compressed representation which we then employ on the application of seismic data compression when the data is stored as a 5th order tensor.   Piggybacking on the tensor SVD, we define a tensor nuclear norm that we then utilize in our approach to the seismic data completion problem.   Numerical results illustrate the promise of these approaches for these seismic data applications. If time permits, we will discuss how tensor models can also be used in the problem of inversion for seismic images.