UNIVERSITY OF RHODE ISLAND

Department of Mathematics
and Applied Mathematical Sciences

Applied Mathematics and Scientific Computing Seminar

Location: Lippitt Hall 205

Time: Monday, April 22, 2024, 1:00pm

(refreshments at 12:55 p.m.)

Extending the SVD to Higher Dimensions with Tensor Decomposition

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Abstract: Tensors, as multidimensional extensions of matrices, play a pivotal role in the complex data structures encountered in data science and machine learning. This presentation targets individuals with a grounding in matrix decomposition techniques, offering a bridge to the higher-dimensional challenges tackled by tensor decomposition. It provides an accessible overview of tensors, highlights their significance in analyzing multidimensional data, and introduces two pivotal decomposition methods: **CPD** (Canonical Polyadic Decomposition) for its interpretability and **Tucker1** for its data approximation flexibility. Attendees will gain a foundational understanding of tensor decomposition, equipped to explore its applications in various data-intensive fields. This presentation is heavily based on the classical and highly cited (11K+) paper by Kolda and Bader from 2009 [1].

All are welcome, though this presentation will be enjoyed most by those with experience, either theoretical or numerical, beyond the first linear algebra course.

[1]   T.G. Kolda and B.W. Bader, "Tensor Decompositions and Applications," *SIAM Review*, 51 (3), pp.455–500, 2009.