

Tensor Techniques for High-Dimensional Problems in Control

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Abstract

Low-rank tensor techniques play an increasingly important role in addressing high-dimensional problems in a wide variety of application domains, including systems and control, computational physics and chemistry, computational finance, uncertainty quantification, as well as machine learning. By now, many different low-rank formats and algorithms have been developed. In this lecture, we will focus on one of the most popular formats: MPS (matrix product states), also called TT (tensor train). We will discuss all tools needed to implement simple but yet efficient algorithms working with this format. By the end of the course, the participants will have implemented an ALS method for solving extremely large-scale linear systems and eigenvalue problems.