

Tensor Train Decomposition for Solving Differential Equations

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Differential equations serve as the mathematical foundation for modeling continuous changes in science and engineering. However, solving these equations numerically often demands significant computational resources and memory, especially when high-resolution approximations are required. This talk introduces an elegant numerical framework based on Tensor Train (TT) decomposition. By utilizing the TT format as a low-rank approximation tool, we can represent functions and differential operators in a highly compressed form, significantly accelerating linear algebra operations. We will cover the foundational concepts of the Tensor Train structure, demonstrate how standard differential schemes are formulated within this framework, and discuss the algorithms used to solve the resulting tensor-structured systems. Numerical experiments will be presented to illustrate how this approach maintains high accuracy while drastically reducing computational overhead.