

High order Tensor-Train-Based Schemes for High-Dimensional Mean Field Games

Elisabetta Carlini

We propose fully discrete schemes for high-dimensional Mean Field Games that combine semi-Lagrangian time discretizations with Tensor-Train decompositions to mitigate the curse of dimensionality. We employ a smoothed policy iteration method to obtain first and second order accurate schemes. The Tensor-Train representation, coupled with suitable quadrature rules, reduces computational complexity from exponential to polynomial in the dimension. Numerical results confirm the expected convergence rates, exhibit mild scaling in memory and runtime, and demonstrate significant efficiency gains over standard grid-based approaches.