

Optimization in hierarchical and TT tensor formats
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Novel hierarchical tensor formats offer stable approximation by a low order cost. We consider the solution of quadratic optimization problems constraint by the restriction to tensors of prescribed ranks \mathbf{r} .

We analyse the open manifold of such tensors and its projection onto the tangent space. We further derive differential equations for the gradient flow and stationary equations based on Dirac-Frenkel variational principle. We derive projected gradient methods, and a preconditioned version which generalize the selfconsistent iteration scheme. And focus on the ALS, the alternating least square or alternating linear scheme. We examine the convergence of these algorithms and stability properties. For sake of simplicity, we often confine ourselves to TT format and its matrix product representation. Nevertheless most material generalizes to hierarchical tensor formats resp. tree tensor networks.

The talk contains material from ongoing collaborative research with the group at MPI Leipzig.