

Communication-avoiding orthogonalization algorithm for tensor trains

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In this work, we consider communication-avoiding algorithms for tensors represented in tensor train (TT) format. Left and right orthogonalization procedures play an important role in most computations with TT tensors, e.g., during the projection step in the Alternating Least Squares method, recompression of formal structures, etc. We analyze data distribution and communication cost of the orthogonalization procedure which appears to be in $\mathcal{O}(d \log(P))$, where d is the number of modes and P is the number of processes. By using a mixed tensor format, we present a communication-avoiding orthogonalization algorithm of cost $\mathcal{O}(\log(P))$. We present also bounds on subsequent ranks.

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