

An approach to hierarchical algebraic decomposition of Boolean tensors
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Decomposition of tensor representations of Boolean functions can be of canonical polyadic (CP) form which leads to formats known as ternary vector lists. If the condition that all elements of the factor matrices and weighting vectors are Boolean is relaxed and real values are allowed, it is possible to reconstruct the Boolean values of the original tensor by quantization. A new approach to hierarchical algebraic decomposition of Boolean tensors will be presented. It uses hierarchical Tucker decomposition techniques based on low-rank approximated SVD on real numbers. The main design parameters of the algorithm are the quantization thresholds and the desired rank of the decomposition. Results of this new decomposition method are discussed together with some examples. Additionally a comparison to a pure binary method that uses Boolean matrix decomposition (BMD) instead of SVD is given.