

Orthogonally decomposable tensors

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While every matrix admits a singular value decomposition, in which the terms are pairwise orthogonal, higher-order tensors typically do not admit such an orthogonal decomposition. The ones which do admit such a decomposition are called orthogonally decomposable (odeco) tensors. Odeco tensors form a semi-algebraic set, a finite union of subsets described by polynomial equations and polynomial inequalities. The main result of the presentation says that, in fact, only equations of low degree are needed. More specifically, we prove that odeco tensors form a real-algebraic variety defined by polynomials of degree at most four. A key feature of our approach is a surprising connection between orthogonally decomposable tensors and semisimple algebras. The presentation is based on [1].

References

- [1] A. Boralevi, J. Draisma, E. Horobeț, E. Robeva, Orthogonal and unitary tensor decomposition from an algebraic perspective, *Israel J. Math.*, 2017, to appear.