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Comparison of global algorithms for Minkowski tensor estimation

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Let A be a d-dimensional set with positive reach. In analogy to the convex case, Minkowski tensors of A are introduced as integrals of elementary symmetric tensors with respect to a generalised curvature measure of A. The Minkowski tensors carry information about e.g. position, orientation, and eccentricity of the underlying set.

If only a digitisation of A is available, which is the case in many applications, two algorithms by D. Hug, M. Kiderlen and A.M. Svane [1] can be used to obtain approximations of the Minkowski tensors. These algorithms have the appealing theoretical property that they yield asymptotically the correct tensors when the resolution tends to infinity. This property, sometimes called multigrid convergence, is shown in [1].

A natural question is how well the theory carries over when the algorithms are applied in the realistic setting of finite resolution. We present an implementation of the algorithms for $d = 2$ and discuss the accuracy of the approximations of the two algorithms for different test sets.

Reference:
[1] D. Hug, M. Kiderlen, and A.M. Svane (2016), *Voronoi-based estimation of Minkowski tensors from finite point samples*, submitted