Eggs, ellipsoids, and other convex sets

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Abstract

The task of analyzing convex bodies in n-dimensional Euclidean space is not a new endeavor. From results spanning the 19th and 20th centuries via Brunn, Blaschke, Kubota, Busemann, and Rogers, all the way into modern day research from the likes of Morales-Amaya and Soltan, there are a variety of established methods to characterize n-dimensional ellipsoids. In this talk, we aim to conjecture one more, describing a novel method of characterizing convex bodies in $\mathbb{R}^2$. We define and use the *gberg property* to determine central symmetry, or the lack thereof, in two dimensions. We then outline the current efforts to extend this result to higher dimensions and a more specific conclusion: not just central symmetric in $\mathbb{R}^3$, but our suspicion that a 3-dimensional convex body with the gberg property must be an ellipsoid.

Keywords: convex body, ellipsoid, centrally symmetry.