

On a Carathéodory theorem for Minkowski sum of polytopes

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Abstract

A well-known theorem by Carathéodory states that for a compact convex set $K \subseteq \mathbb{R}^n$ and any $\tilde{x} \in K$, there is a subset Y of the extreme points of K with $|Y| \leq n + 1$ such that $\tilde{x} \in \text{conv}(Y)$. A recent nice result by Lawrence and Soltan gives a similar bound for the number of points needed for a Minkowski sum of k compact convex sets in \mathbb{R}^n . – We will discuss a key ingredient for this result and focus on polytopes; convex combinations of finitely many points in \mathbb{R}^n . In addition, we will present some comments, examples and observations relating to this result.

Keywords: convex set, polytope, Carathéodory's theorem, Minkowski sum.