Student Research Talks (StReeTs)

Department of Mathematics, George Mason University

A Construction related to the Helly Number for line transversals to unit balls in the plane
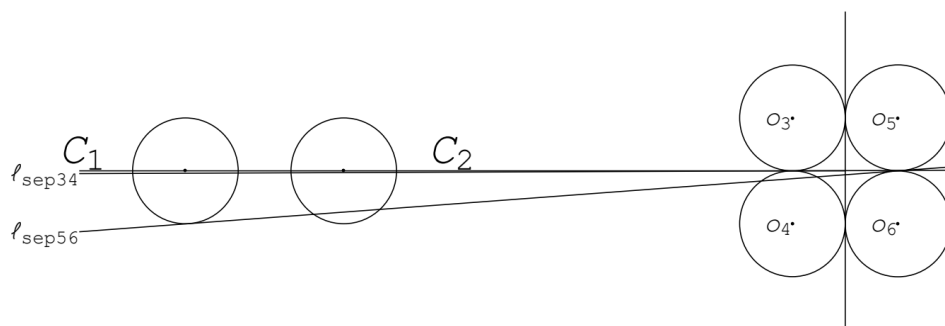
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Figure 1: Six disks with transversal property $T(5)$ but not T; disks $3 - 6$ are disjoint from the x-axis.

Abstract

Given a family of n translates of a convex body in the plane, the family is said to have the transversal property T if there is a (single) line that intersects each body. For large families, checking for this property globally may be infeasible. Checking locally, we can determine whether subfamilies of size k have the transversal property. If every subfamily of size k has the transversal property, we say the family has property $T(k)$. When we find that for some k the property $T(k)$ implies the property T, we say the Helly number for this set of bodies is k. This is potentially more case-intensive with $\binom{n}{k}$ subfamilies, but the difficulty is distributed over the subfamilies. It appears that an error persisted in the literature for a period of about 40 years, from 1958 to 2000. In 1958 it was claimed that $T(4)$ implies the property T for (unit) disks in the plane. It was also conjectured that $T(5)$ implies T for translates of a compact convex set in the plane. In 1989 Tverberg proved the conjecture. The correction to the case for unit disks did not arrive until the year 2000 (B. Aranov, et al.). In this talk, we will examine the construction by Aranov et al. This is a self-contained talk. The needed definitions and background will be provided, and any audience questions about notation or definitions will be answered.

Date: Friday, October 2, 2020
Time: 2:30pm–3:20pm
Place: See https://streets-gmu.wikidot.com/ for zoom link