COLORFUL HELLY THEOREM FOR PIERCING BOXES WITH TWO POINTS

ABSTRACT. For any natural number n, a family $\mathcal{F}$ of subsets of a space $\mathbf{X}$ is said to be *n-pierceable*, if there exists $A \subseteq \mathbf{X}$ with $|A| \leq n$ such that for any $F \in \mathcal{F}$, $F \cap A \neq \emptyset$.

Helly's theorem, one of the fundamental results in discrete geometry, says that for any finite family $\mathcal{F}$ of convex sets in $\mathbb{R}^d$, if every $(d+1)$-tuple from $\mathcal{F}$ is 1-pierceable, then the whole family $\mathcal{F}$ is 1-pierceable. Unfortunately, for $n \geq 2$, a similar statement about the n-pierceable sets is not valid for general convex sets. Danzer and Grünbaum proved the first and one of the most important Helly type results on multi-pierceable families; viz. famlies of axis parallel boxes.

One important generalization of Helly's theorem is *Colorful Helly's Theorem*. In this talk, we shall prove a colorful version of Danzer and Grünbaum's 2-pierceability result for families of axis parallel boxes.

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