



Technion-Israel Institute of Technology

Computer Science Department

Center for Graphics and Geometric Computing

CGGC Seminar

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Depth with respect to a family of convex sets

We introduce the notion of depth with respect to a finite family F of convex sets in \mathbb{R}^d that generalizes the well-studied Tukey depth. Specifically, we say that a point p has depth m with respect to F if every hyperplane that contains p intersects at least m sets of F . We study some nice properties of Tukey depth that extend to this definition and point out some key differences.

By imposing additional intersection hypothesis to the family F , we prove a centerpoint theorem for family depth. This result can be thought of as a refinement that interpolates between the classical Rado's centerpoint theorem and Helly's theorem. The main theorem ties centerpoints with a purely combinatorial problem on hitting sets.

Finally, we apply the results and techniques above to geometric transversals theory. We get a new Helly-type theorem for fractional transversal hyperplanes and a new proof for a line transversal theorem of A. Holmsen.

The lecture will be held on Sunday, 14.5.2017, at 13:30, Taub 337

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