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Συντονιστές: Π. Δοδός, Β. Κανελλόπουλος, Ρ. Μαλικιώσης, Κ. Τύρος

Ομιλητές

Paata Ivanisvili (University of California, Irvine)

Discrete approximation

I will discuss polynomial approximation problems on the n-dimensional hypercube, focusing on quantitative estimates of the approximation error as n grows. This topic represents a burgeoning area in the analysis of Boolean functions—one that is far less understood than its classical counterpart on the real line. I will present several recent results together with its applications, as well as highlight ongoing challenges and open problems in the field.

Άγγελος Γεωργακόπουλος (University of Warwick)

Relating better-quasi-ordering under graph minors and Borelness of graph classes

The celebrated Robertson-Seymour Graph Minor Theorem states that the finite graphs are well-quasi-ordered under the minor relation $<$, i.e. for every sequence $\{G_i\}$ of finite graphs there are $i < j$ with $G_i < G_j$. It is not known whether this is true for countably infinite graphs. It is also not known whether the finite graphs satisfy the stronger property of better-quasi-ordering, which I will explain. I will establish a connection between these two problems, and relate them to the study of classes of graphs with vertex set $\mathbb{N}$ that are Borel with respect to a natural topology on the space of such graphs. The latter relationship is established via a new notion of computability of classes of infinite structures. [`https://arxiv.org/abs/2510.19285`]

Παντελής Δοδός (Εθνικό και Καποδιστριακό Πανεπιστήμιο Αθηνών)

Metric Poincaré inequalities for graphs

We shall present the following discrete Poincaré inequality for embeddings of random regular graphs into *arbitrary* finite metric spaces.

For every integer $d \geqslant 3$ there exists a constant $C_d \geqslant 1$, that depends only on the degree d, with the following property. Let $\mathcal{M} = (M, \rho)$ be an arbitrary finite metric space with $N := |M| \geqslant 3$ points. Then, with probability $1 - o(1)$, a uniformly random d-regular graph $G = ([n], E_G)$ on n-vertices satisfies, for any $f \colon [n] \to M$,

$$\frac{1}{n^2} \sum_{v,u \in [n]} \rho\big(f(v), f(u)\big) \leqslant \big(C_d \min\big\{\log n, \log\log N\big\}\big) \cdot \frac{1}{|E_G|} \sum_{\{v,u\} \in E_G} \rho\big(f(v), f(u)\big).$$

The result is optimal (up to constants) for all values of n, N. We shall discuss related results and applications, and—time permitting—some key aspects of the proof.

This is joint work with D. J. Altschuler, K. Tikhomirov and K. Tyros.

Ρωμανός-Διογένης Μαλικιώσης (Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης)

Linearly-exponential checking is enough for the Lonely Runner Conjecture and some of its variants

The famous Lonely Runner Conjecture (Wills '67) asserts that if we have n runners running with constant distinct velocities on a circular track of length 1, at some point each runner becomes lonely, meaning that he has distance at least 1/n from every other runner. Tao ('17) has proved that it suffices to check integer velocities up to Cn^{cn^2}. We improve this bound by several orders of magnitude, down to n^{2n}, using the geometric approach by the speaker and Schymura ('17). We will discuss recent progress on the problem as well as variants of the conjecture, if time permits.

Μιχαήλ Σαράντης (Graz University of Technology)

On the number of antichains in $\{0,1,2\}^n$

In 1897 Dedekind posed the question of enumerating the number of antichains of the Boolean lattice. This was answered, almost a century later by Korshunov, and Sapozhenko simplified his proof by using what is now known as the graph container method. Sapozhenko asked whether the same approach can be applied to the product of chains of 3 elements. Counting the antichains of $\{0,1,2\}^n$ was also asked independently by Noel, Scott and Sudakov, who obtained the asymptotics on the logarithmic scale. In our work, we provide sharp asymptotics for this number. As a tool, we prove a container type lemma to bound the number of expanding sets in a class of irregular graphs and isoperimetric estimates for generalizations of the Boolean lattice that may be of independent interest.

This is joint work with Matthew Jenssen and Jinyoung Park.