



MAFIA - the seminar you can't refuse

Digraphons as operators

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Ústav informatiky AV ČR

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Abstract:

About 20 ago, László Lovász and collaborators introduced graphons: symmetric measurable functions on the unit square that arise as limits of large finite graphs. This viewpoint turned many questions in extremal and probabilistic graph theory into analytic problems about integral kernels, with the symmetry of the graphon corresponding to the fact that the adjacency matrix of a finite undirected graph is symmetric. In operator-theoretic terms, graphons naturally give rise to self-adjoint integral operators, and many of the key results in the area exploit this approach. In this talk I will discuss a recent project with Petr Savický in which we study the directed analogue. Digraphons are limit objects for large directed graphs, and they can also be viewed as integral kernels - but now without any symmetry assumptions. This places us in the realm of non-self-adjoint operators, where many of the convenient tools from the undirected setting no longer apply. I will explain how ideas from graph limits translate into operator language, what changes when symmetry is lost, and why directed graphs lead to genuinely new analytic phenomena. The goal is to give a functional analyst a clear sense of why these objects are interesting, what kinds of operator-theoretic questions they raise, and how techniques from analysis can help understand the asymptotic structure of large directed graphs.