Analysis Seminar

Threshold Phenomena and the Kahn-Kalai Conjecture

By

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Abstract: In many random discrete structures, one observes a striking threshold phenomenon: as a model parameter passes a critical value, the behavior of the system changes abruptly. For example, in the Erdős–Rényi random graph G(n,p), when the edge probability p crosses an appropriate threshold, an event that was previously very unlikely suddenly becomes highly probable, such as the appearance of a triangle or of a Hamiltonian cycle.

A central question in this area is how to estimate such critical probabilities in general. The Kahn–Kalai conjecture gave a remarkably general prediction, asserting that the threshold of a family of sets can be controlled, up to a logarithmic factor, by its expectation threshold.

This conjecture was proved by Jinyoung Park and Huy Tuan Pham in 2022.

Two years later, Phuc Tran and Van Vu found a much shorter proof. In this talk, I will introduce threshold phenomena and present a proof of the Kahn–Kalai conjecture following the argument of Tran and Vu.

(This is a presentation of a senior project supervised by Gökhan Yıldırım.)

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Time: 14:00-15:00, GMT+3
Place: SA141