Graz University of Technology

Institut für Diskrete Mathematik

Seminar für Kombinatorik und Optimierung

Friday 6th November 14:15

Online meeting (Webex)

Flip processes on finite graph and dynamical systems they induce on graphons

Jan Hladky

(Institute of Mathematics of the Czech Academy of Sciences)

We introduce a class of random graph processes, which we call *flip processes*. Each such process is given by a *rule* which is just a function $\mathcal{R} : \mathcal{H}_k \to \mathcal{H}_k$ from all labelled k-vertex graphs into itself (k is fixed). Now, the process starts with a given n-vertex graph G_0. In each step, the graph G_i is obtained by sampling k random vertices $v_1, \dots, v_k$ of G_{i-1} and replacing the induced graph $G_{i-1}[v_1, \dots, v_k]$ by $\mathcal{R}(G_{i-1}[v_1, \dots, v_k])$. This class contains several previously studied processes including the Erdős–Rényi random graph process and the random triangle removal.

Given a flip processes with a rule $\mathcal{R}$ we construct time-indexed trajectories $\Phi : \mathcal{W} \times [0, \infty) \to \mathcal{W}$ in the space of graphons. We prove that with high probability, starting with a large finite graph G_0 which is close to a graphon W_0, the flip process will follow the trajectory $(\Phi(W_0, t))_{t=0}^{\infty}$ (with appropriate rescaling of the time).

These graphon trajectories are then studied from the perspective of dynamical systems. We prove that two trajectories cannot form a confluence, give an example of a process with an oscilatory trajectory, and study stability and instability of fixed points.

Joint work with Frederik Garbe, Matas Sileikis and Fiona Skerman.

Meeting link:

https://tugraz.webex.com/tugraz/j.php?MTID=m1cd0904285a119237aa9a7ce985ad803

Meeting number: 137 149 1265

Password: JYc3B3dunG2

Joshua Erde, Mihyun Kang