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Stability of extremal connected hypergraphs avoiding Berge-paths

A Berge-path of length k in a hypergraph $\mathcal{H}$ is a sequence

$$v_1, e_1, v_2, e_2, \ldots, v_k, e_k, v_{k+1}$$

of distinct vertices and hyperedges with $v_{i+1} \in e_i, e_{i+1}$ for all $i \in [k]$. Füredi, Kostochka and Luo, and independently Győri, Salia and Zamora determined the maximum number of hyperedges in an n-vertex, connected, r-uniform hypergraph that does not contain a Berge-path of length k provided k is large enough compared to r. They also determined the unique extremal hypergraph $\mathcal{H}_1$.

We prove a stability version of this result by presenting another construction $\mathcal{H}_2$ and showing that any n-vertex, connected, r-uniform hypergraph without a Berge-path of length k, that contains more than $|\mathcal{H}_2|$ hyperedges must be a subhypergraph of the extremal hypergraph $\mathcal{H}_1$, provided k is large enough compared to r.

This is joint work with Dániel Gerbner, Dániel Nagy, Nika Salia, and Máté Vizer.