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List homomorphisms to signed trees

The list homomorphism problem for a fixed signed graph (H, π) takes as input a signed graph (G, σ), equipped with lists $L(v) \subseteq V(H)$, $v \in V(G)$, of allowed images, and asks if there is a homomorphism $\varphi : (G, \sigma) \to (H, \pi)$. We classify the computational complexity of this problem when H is a tree (irreflexive, reflexive, and general). The polynomial targets exhibit interesting structures. The tools developed are useful for general targets, and the patterns discovered for trees suggest nice families (such as the bi-arc graphs which characterize the problem for graphs) may classify the polynomial cases in general.

This is joint work with Jan Bok, Tomás Feder, Pavol Hell, and Nikola Jedličková