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On Token Sliding (Reconfiguration) Graphs of Independent Sets

Abstract: An independent set of a graph G is a vertex subset I such that there is no edge joining any two vertices in I. Imagine that a token is placed on each vertex of an independent set of G. The TS_k*-(reconfiguration) graph* of G, denoted by $\mathsf{TS}_k(G)$, takes all size-k independent sets as its nodes, where k is some given positive integer. Two nodes are adjacent if one can be obtained from the other by sliding a token on some vertex to one of its unoccupied neighbors. A graph G is called a TS_k*-graph* if there exists a graph H such that G and $\mathsf{TS}_k(H)$ are isomorphic. The study of TS_k-graphs belong to "Combinatorial Reconfiguration"—a young growing research area in computer science which has recently been emerged in different areas, including recreational mathematics (e.g., games and puzzles), computational geometry (e.g., the flip graphs of triangulations), constraint satisfaction (e.g., solution space of Boolean formulas), and so on [1, 2, 3]. In this talk, we introduce the TS_k-graphs via a geometric example and present some results and open questions involving their structure and realizability, most of which concerning trees and the acyclic property.

This is based on the recent joint works with David Avis [4, 5].

References

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