The Application of Forbidden Structures in Solving Reconfiguration Problems

Duc A. Hoang

Graduate School of Informatics, Kyoto University
hoang.duc.8r@kyoto-u.ac.jp

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Reconfiguration Problems

... study the relationship between *solutions* of a given *source problem* (e.g., SATISFIABILITY, INDEPENDENT SET, VERTEX COVER, VERTEX-COLORING, etc.).
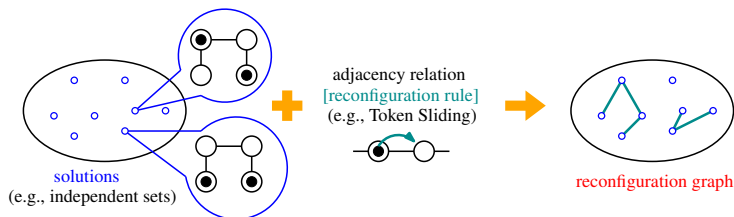

Figure: Reconfiguration.

Some typical questions:

- REACHABILITY: Is there a *path* between two given solutions?
- SHORTEST TRANSFORMATION: If REACHABILITY is yes, can we find a *shortest path*?
- CONNECTIVITY: Is there a *path* between *any* two given solutions?
- DIAMETER: Is the *maximum distance* between any two solutions bounded?
- and so on.

Forbidden Structures in Reconfiguration

- A *forbidden structure* is *part of a solution S* satisfying certain properties that *obstruct the existence of a path* in the reconfiguration graph between S and some other solution.

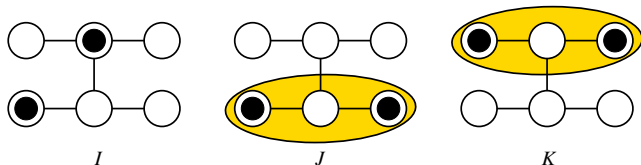- Example: *rigid tokens* (= tokens that never move) in an independent set.

Figure: Independent sets I, J, K having no path connecting any two of them under Token Sliding.

More examples in my poster

- Forbidden structures in *studying reconfiguration questions*, e.g., in solving RECHABILITY.
- Forbidden structures in *designing (reconfiguration) graphs* having certain properties.