

Adaptive Large Neighborhood Search

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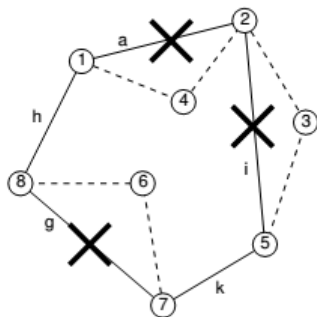
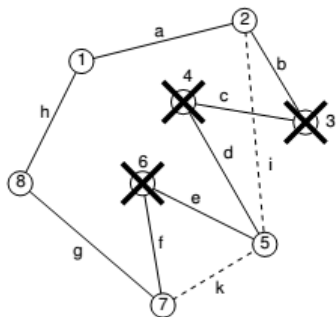


Very Large Neighborhood Search (VLNS)

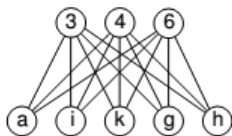
General Principle

- ▶ Define a special, (exponentially) large neighborhood $N(x)$.
- ▶ Not every solution in $N(x)$ is evaluated explicitly.
- ▶ Efficient way for searching $N(x)$ is required.

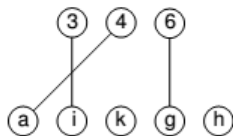
VLNS: Example for the TSP



Improvement Graph:



Minimum Cost Matching



Very Large Neighborhood Search (VLNS)

Ruin and Recreate

1. Fix certain parts of the solution.
2. Destroy the remainder of the solution.
3. Recreate the solution by ...
 - ▶ a construction heuristic
 - ▶ an exact method (DP, ILP, CP, ...)

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Extension: Adaptive Large Neighborhood Search (ALNS)

- ▶ A set of ruin and a set of recreate operators are available.
- ▶ Each operator is assigned a weight that is adapted based on its success.
- ▶ In each iteration the methods are chosen with probabilities proportional to their weights.