Transportation Logistics

Part VI: VRP - improvement heuristics

Intra-route (single-route)

Improvement heuristics working on a single route (all TSP operators!)

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Inter-route (multiroute)

Improvement heuristics considering several routes at once.

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λ edges are removed from the tour and the λ remaining segments are reconnected in all possible ways (2-opt, 3-opt...)

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4-opt* (Renaud et al., 1996)

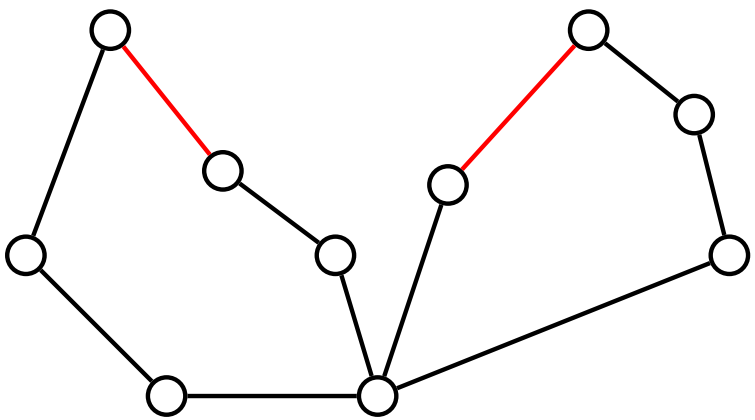
a restricted version of 4-opt: promising reconnections between a sequence of at most w edges and another sequence of 2 edges.

Inter-route operators

(Following Van Breedam's classification)

String cross

Two strings of vertices are exchanged by crossing two edges in two different routes. (2-opt*: two edges from different routes are replaced by two new edges)



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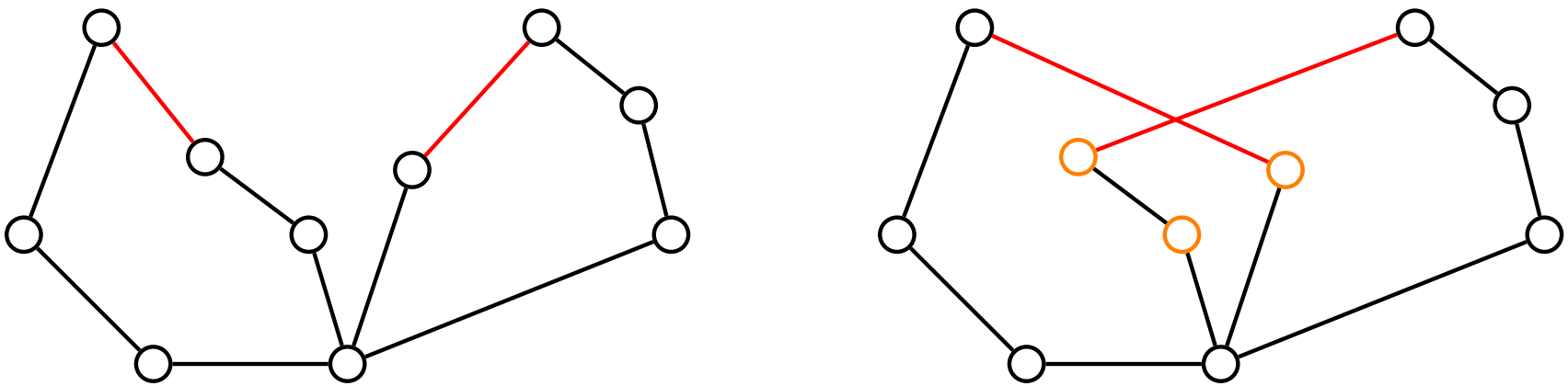

Source: Laporte and Semet (2002) Classical Heuristics for the CVRP. Chapter 5 of Paolo Toth, and Daniele Vigo (eds) The Vehicle Routing Problem, SIAM.

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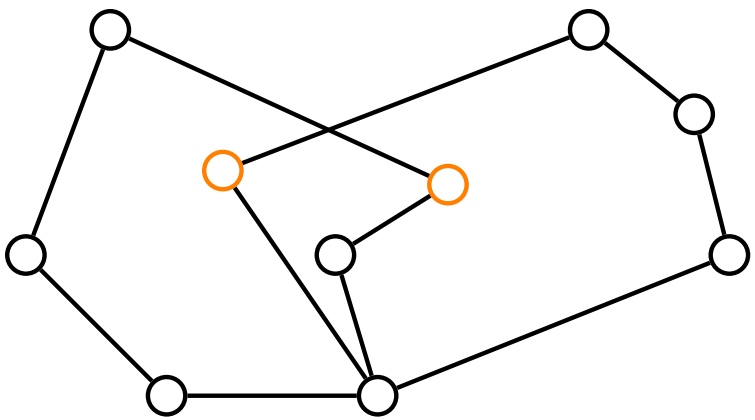

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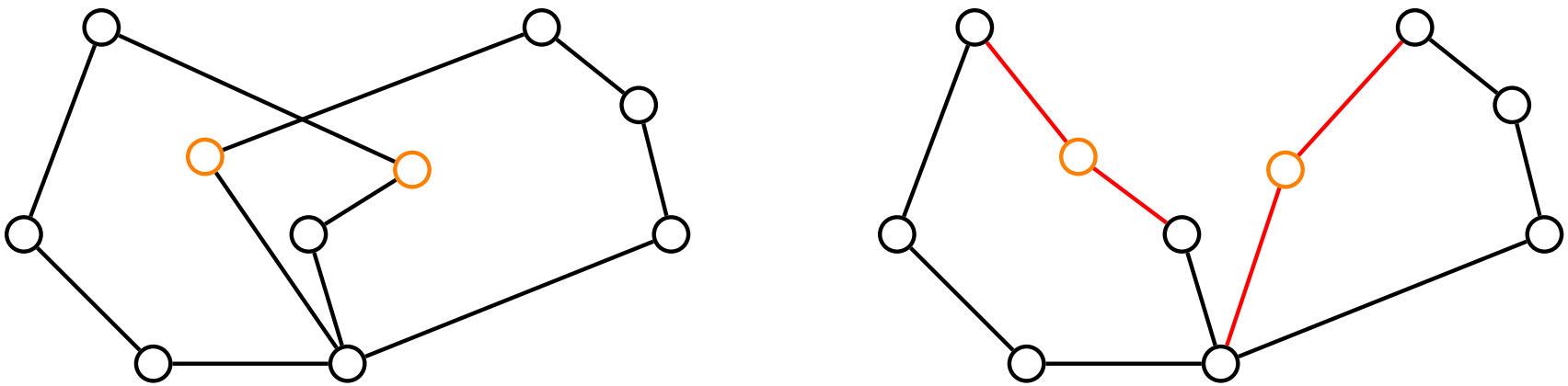

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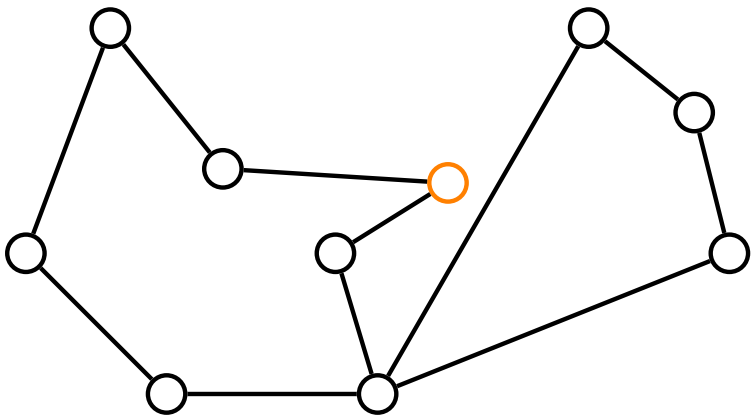

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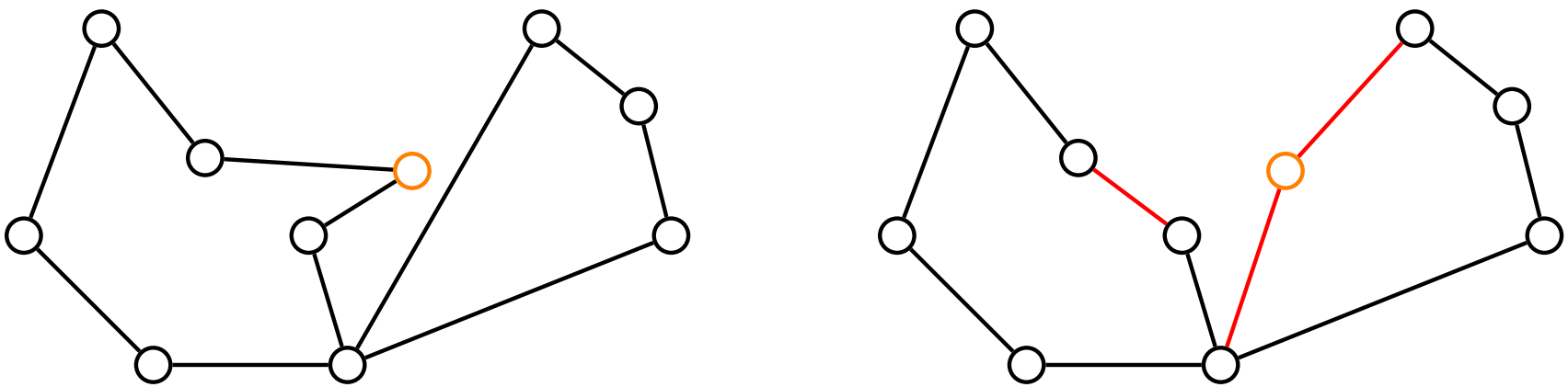

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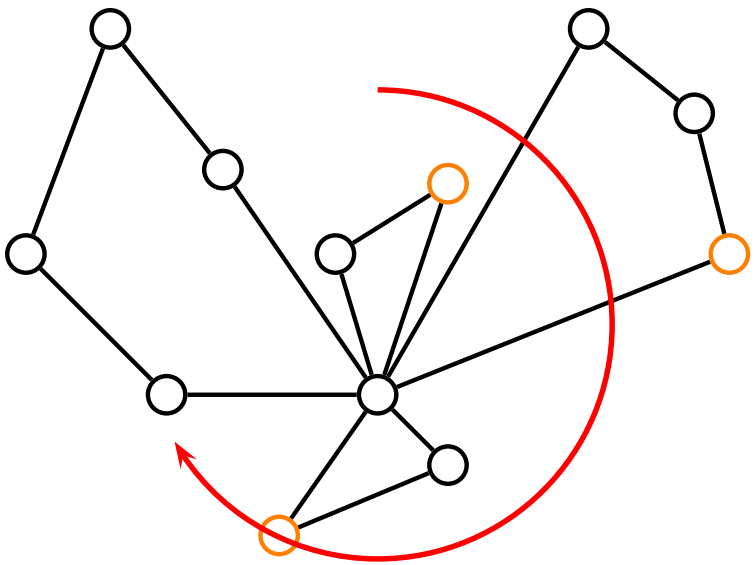
b routes are considered and k customers from each route are shifted to the next route of the cyclic permutation.



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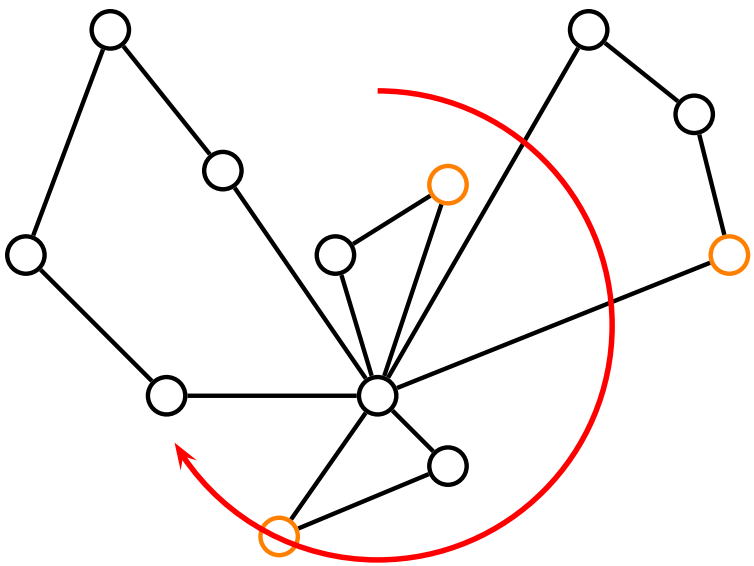

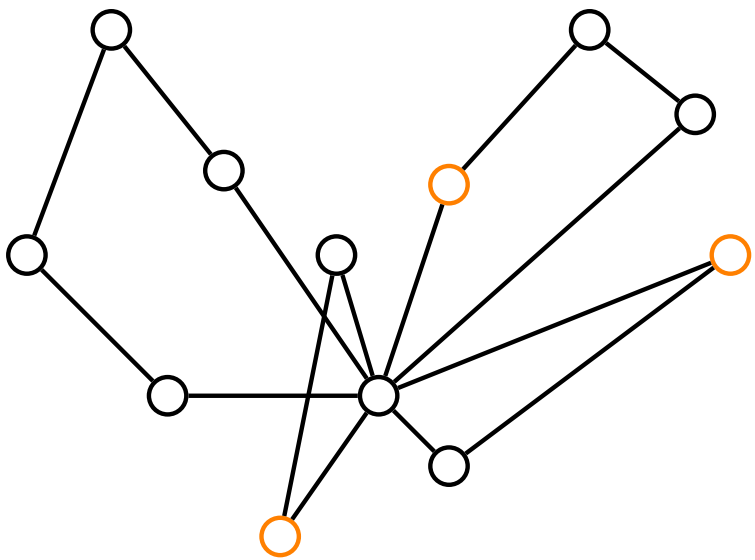

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Impact of parameter/operator choice on the final solution quality:

good vs. bad starting solution

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References

Paolo Toth, and Daniele Vigo (2002) The Vehicle Routing Problem, SIAM. (Chapter 5)

W. Domschke (1997) 'Logistik: Rundreisen und Touren' Oldenbourg.