

# A Kernel Search Approach for the Time-Dependent Rural Postman Problem

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The Time-Dependent Rural Postman Problem (TDRPP) is a variant of the well-known Rural Postman Problem, in which the arc travel times may vary over time. Practical applications of this problem are fairly intuitive, especially when traffic conditions (severely congested zones in specific times of the day) come into play. In Calogiuri et al. [1], the authors propose a very effective branch-and-bound algorithm to solve problem instances with up to 60 nodes and 120 arcs. In this work, we introduce a variant of the matheuristic framework Kernel Search, originally presented in Angelelli et al. [2], to deal with problem instances of larger size. Kernel Search is a general purpose method for the solution of mixed integer linear programming problems based on the concept of kernel as a subset of variables which are likely to take a non-zero value in an optimal solution. The method solves a sequence of restricted mixed integer subproblems involving the variables in the kernel plus some additional ones opportunely selected. Proposed approach exploits the arc-path formulation introduced in Tan and Sun [3], and uses it to formulate restricted subproblems solved by means of a MIP solver (Gurobi). Specific measures are implemented to ensure that the final solution meets the first-in first-out condition. Preliminary results on new benchmark instances are very promising: the proposed solution approach seems to be efficient and effective even when instances size grows steady.

## References

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