A Hybrid Metaheuristic for Pollution Travelling Salesman Problem

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Abstract. Pollution Travelling Salesman Problem (PTSP) is an extension of the well-known Travelling Salesman Problem (TSP) which aims to find a suitable tour that minimizes fuel consumption. Since the problem is NP-hard, this paper presents a hybrid algorithm between Differential Evolution (DE) and Large Neighborhood Search (LNS), called HDELNS, for solving PTSP which its objective function considers fuel consumption in terms of vehicle engine efficiency, transmission, vehicle load, vehicle speed, road angle, distance and driver wages. In HDELNS, the use of LNS is to enhance the exploitation ability of DE. The performance of HDELNS is tested using a set of generated instances with the number of cities varying from 5 to 80 cities. The numerical results show that the proposed HDELNS is an efficient alternative approach for solving PTSP as it yields optimal solutions in small-size problems and provides competitive solution quality, especially in the large size problems, with fast computing time.

Keywords: Hybrid metaheuristic, Differential evolution, Large neighborhood search, Pollution traveling salesman problem.