

Study on Medical Waste Collection and Routing Problem

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Abstract

In recent years, Northern Taiwan has experienced a significant increase in both the production of medical waste and the number of medical facilities. This study aims to optimize the waste collection routes for these facilities by formulating the problem as an Electric Vehicle Routing Problem (EVRP), leveraging the benefits of electric vehicles for an environmentally sustainable solution. Due to the absence of EVRP benchmarks for waste collection in Taiwan, this research utilizes data from Far East Memorial Hospital (FEMH) in Banqiao, New Taipei, to simulate waste generation across various medical facilities in the region. The proposed EVRP benchmark will be addressed using the Harmony Search Algorithm (HSA) and compared with current waste collection practices. Additionally, the dissertation seeks to enhance the current waste collection schedule at FEMH. By installing IoT devices in waste bins, the amount of diaper waste from 30 ICU rooms will be monitored. This real-time data will be used to create a benchmark by formulating the collection process as a Dynamic Vehicle Routing Problem (DVRP) and solving it using HSA. Through these efforts, the study aims to demonstrate significant improvements in efficiency and sustainability in medical waste collection in Northern Taiwan.

Keywords

Metaheuristic, medical waste collection problem, dynamic vehicle routing problem, electric vehicle routing problem, internet of things, combinatorial optimization problem.