

Monte Carlo Tree Search improved Genetic Algorithm for unmanned vehicle routing problem with path flexibility

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ABSTRACT

With the gradual normalization of the COVID-19, unmanned delivery has gradually become an important contactless distribution method around China. In this paper, we study the routing problem of unmanned vehicles considering path flexibility and the number of traffic lights in the road network to reduce the complexity of road conditions faced by unmanned vehicles as much as possible. We use Monte Carlo Tree Search algorithm to improve the Genetic Algorithm to solve this problem, first use Monte Carlo Tree Search Algorithm to compute the time-saving path between two nodes among multiple feasible paths and then transfer the paths results to Genetic Algorithm to obtain the final sequence of the unmanned vehicles fleet. And the hybrid algorithm was tested on the actual road network data around four hospitals in Beijing. The results showed that compared with normal vehicle routing problem, considering path flexibility can save the delivery time, the more complex the road network composition, the better results could be obtained by the algorithm.

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