

Guidance system based on Dijkstra-ant colony algorithm with binary search tree for indoor parking system

ABSTRACT

A common algorithm to solve the single-source shortest path (SSSP) is the Dijkstra algorithm. However, the traditional Dijkstra's is not accurate and need more time to perform the path in order it should visit all the nodes in the graph. In this paper, the Dijkstra-ant colony algorithm (ACO) with binary search tree (BST) has been proposed. Dijkstra and ACO are integrated to produce the smart guidance algorithm for the indoor parking system. Dijkstra algorithm initials the paths to finding the shortest path while ACO optimizes the paths. BST has been used to store the paths that Dijkstra algorithm initialled. The proposed algorithm is aimed to control the shortest path as well as guide the driver towards the nearest vacant available space near the entrance. This solution depending on applying the optimization on an optimal path while the traditional ACO is optimizing the random path based on the greedy algorithm hence we get the most optimal path. Moreover, the reason behind using the BST is to make the generation of the path by Dijkstra's algorithm more accurate and less time performance. The results show a range of 8.3% to 26.8% improvement in the proposed path compared to the traditional Dijkstra's algorithm.

Keyword: Ant colony optimization; Binary search tree; Dijkstra's alogrithm; Single-source shortest path