

Comparative Study of Weighted Product–Dijkstra’s Algorithm and All Possible Path Approach Based on Multiple Criteria and Multi-Dimensions

ABSTRACT

In this uncertain environment, most of the decision making involved multiple criteria and multidimension instead of single criterion or dimension. The focus of this paper was the decision making in choosing the best path within a network based on multiple criteria. Therefore, Weighted ProductDijkstra’s Algorithm (WPDA) was introduced in this paper for optimal path identification with involvement of multiple criteria. It was a combined algorithm of Weighted Product Method (WPM) and Dijkstra’s Algorithm. Weighted product method was one of the algorithms in Multi-Criteria Decision Making (MCDM) that was used to combine multiple criteria into new scores for further evaluation. Dijkstra’s algorithm was one of the shortest path algorithms that would be used to identify the path with the least cost. All Possible Path Algorithm (APPA) was another algorithm that was also used to rank all the alternatives path based on multiple criteria. WPDA and APPA were reviewed and compared. WPDA can handle both single dimension and multi-dimension problems. Besides, it can identify the optimal path without consideration of all the possible alternatives. Overall, WPDA performed better compared to APPA in terms of efficiency and simplicity. In a larger scale network problem, Maple software can be used as a tool to ease the computation, instead of manually.