Optimal Shortest Path Selection Base on Multi-Criteria Decision Making in Vehicular Ad Hoc Network

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Abstract

Vehicular Ad-hoc Network (VANET) is the subtype of Mobile Ad-hoc Network (MANET) where every node is represented as the vehicle. Although, VANETs and MANETs have some common properties still have a difference in their properties and behaviors i.e. nodes of VANETs have unlimited resources in terms of energy, memory, and computational power. Advanced traffic management a vital role in maintaining the flow of traffic, using the latest technologies such as Intelligent Transport System (ITS). The congestion and best Optimal path selection are among the most prominent research issues in VANETs. Different researchers have worked on it and most of them such as Frictional Glow-Warm Swarm Optimization (FGWSO) and Stable CDS-Based Routing Protocol (SCRP) have solved the issue of best-path selection using shortest paths. In this research, we are selecting an optimal shortest path from all available paths through using Analytical Network Process (ANP) analysis and Multi-criteria Decision Making (MCDM) approach. The performance of the proposed Optimal Shortest Path Selection (OSPS) scheme for VANET is being evaluated by super decision-making tool. The parameters such as average speed, end to end delay, shortest path selection, Distance are compared pairwise with each other. The results are derived and shown through the limit matrix by taking four scenarios. These four scenarios are labeled by nodes B, O, K, and node Y, which are optimal nodes respectively, having the highest priority weight. The results show that the proposed OSPS scheme has minimized the end-to-end delay as compared to FGWSO and SCRП schemes.

Full Text

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Figures

Figure 1

Analytical Network Process model

Figure 2

Comparison of criteria and Alternatives

Figure 3

a proposed scenario for optimal path selection

Figure 4

Pairwise comparison of Nodes concerning parameter "Delay"

Figure 5

Pairwise comparison of Nodes concerning parameter "Direction"

Figure 6

Pairwise comparison of Nodes concerning parameter "Distance"

Figure 7

Pairwise comparison of Nodes concerning parameter "Speed"

Figure 8

Pairwise comparison of Nodes concerning parameter "Optimal"

Figure 9

Resultant table for Topology number 1

Figure 10

Resultant table for Topology number 2

Figure 11

Resultant table for Topology number 3th

Figure 12

Resultant table for Topology number 4th

Figure 13

Pairwise comparison of nodes concerning parameter Delay