ABSTRACT

Mobile ad-hoc network networks, known for their dynamic *routing*, require effective *routing* mechanisms to ensure optimal performance. One of the main challenges in *mobile ad-hoc network* networks is how to efficiently discover and maintain routes due to their dynamic nature and frequent topology changes. This study aims to address this issue by developing a *machine learning*-based *routing* mechanism, specifically using Q-learning, to optimize route discovery in *mobile ad-hoc network* networks.

The solution proposed in this study is the implementation of Q-learning as a *routing* mechanism for *mobile ad-hoc network* networks. Q-learning was chosen for its capability in experience-based learning, allowing for more adaptive and efficient route determination compared to conventional *routing* algorithms. By integrating Q-learning, it is expected to achieve improvements in *throughput*, *jitter*, and *delay* in *mobile ad-hoc network* networks compared to traditional *routing* protocols such as AODV, DSDV, and OLSR.

The research findings indicate that Q-learning provides better performance in route determination in *mobile ad-hoc network* networks. The tests were conducted using the NS3 simulator, comparing AODV, DSDV, and OLSR protocols in various scenarios, including variations in the number of *node*s (20-100), *node* speed (1-5 m/s), and *node* pause time (5-25 seconds). Quantitative data analysis revealed that Q-learning significantly improves *throughput*, reduces *jitter*, and decreases *delay* compared to conventional *routing* algorithms like Dijkstra and Bellman-Ford. In conclusion, Q-learning is a more effective solution for *routing* mechanisms in *mobile ad-hoc network* networks.

Keywords : *mobile ad-hoc network* networks, Q-learning, *routing*, *machine learning*, NS3