Review of: "Generative Artificial Intelligence Using Machine Learning on Wireless Ad Hoc Networks"

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Potential competing interests: No potential competing interests to declare.

The paper explores the application of Generative Artificial Intelligence (GenAI) and Machine Learning (ML) to improve the efficiency and performance of Wireless Ad-Hoc Networks (WANETs). It proposes the use of Generative Neural Networks, particularly Multilayer Perceptron (MLP) and Radial Basis Function (RBF) models, to optimize metrics like bandwidth, signal strength, and data load balancing while addressing issues such as dead spots and signal interference. The paper includes experimental validation using SPSS and outlines results from different neural network configurations.

Key Contributions

Introduction of GenAI in WANETs:

- The paper innovatively applies GenAI, a cutting-edge area of AI, to the domain of wireless networks, aiming to enhance connectivity and signal reliability in WANET environments.

Metric Selection and Normalization:

- Comprehensive identification and normalization of critical metrics (e.g., signal-to-noise ratio, overlapping channels, and noise levels) for wireless communication optimization.

Use of MLP and RBF Models:

- Detailed application of MLP and RBF neural networks to predict and resolve signal-related issues such as interference and low signal levels.

Experimental Validation:

- Conducted experiments with varying neural network architectures (e.g., double hidden layers with 4 and 8 units) to assess performance in real-world scenarios.

Practical Implications:

- Highlights the potential of GenAI to revolutionize WANET design and optimization by offering scalable solutions to persistent challenges in network infrastructure.

Strengths

Timeliness and Relevance:

The paper addresses a critical need for improving WANETs, especially in the context of the Internet of Things (IoT) and high-bandwidth demands.

Detailed Methodology:

The inclusion of experimental setups, data normalization equations, and neural network models adds credibility and replicability to the research.

Focus on Security and Performance:

By tackling issues like signal interference and low bandwidth, the paper provides actionable insights for improving network reliability and security.

Extensive References:

The work is well-supported by prior literature, offering a strong theoretical foundation for the research.

Recommendations for Improvement

Real-World Validation:

- Incorporate real-world testing environments to validate the proposed models and their impact on WANET performance.

Explore Advanced Architectures:

- Extend the study to include state-of-the-art neural network models, such as transformers or graph neural networks, for a more comprehensive analysis.

Benchmarking:

- Compare the proposed approach against traditional optimization methods (e.g., heuristic algorithms) and existing GenAI applications in similar domains.

Scalability Analysis:

- Include simulations or studies demonstrating the scalability of the proposed methods in larger or more dynamic network environments.

Broader Metric Evaluation:

- Evaluate additional metrics, such as latency, energy efficiency, and user experience, to provide a holistic assessment of network performance.