Journal of Computer Science and Information Systems,

ISSN 2535-1451

# Deep Learning and Quantum Algorithms for Water Resource Management Optimization in Smart Cities

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**Abstract:**

Efficient water resource management is a critical aspect of sustainable smart city development, particularly in the face of growing urbanization and climate variability. This study presents a novel optimization framework that integrates deep learning models and quantum algorithms to enhance the planning, distribution, and conservation of urban water resources. Utilizing IoT-based sensors, real-time data on consumption, leakage, and environmental conditions are collected and processed using deep neural networks for predictive analytics. Quantum algorithms are employed to solve complex optimization problems related to resource allocation and network design with superior computational efficiency. The hybrid model enables accurate forecasting of water demand, rapid detection of anomalies, and adaptive control strategies, leading to significant improvements in water use efficiency and sustainability outcomes. Experimental validation demonstrates the model's robustness and potential to inform smart urban water infrastructure.

**Keywords:**

Water management, deep learning, quantum algorithms, smart cities, resource optimization, IoT.

ISSN 2535-1451

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