D.S. Senanayake Samudra Irrigation Water Distribution and Optimization System Using AI

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ABSTRACT

Purpose: To design and implement an AI-based irrigation water distribution and optimization system for the D.S. Senanayake Samudra reservoir, ensuring efficient water usage, sustainable agriculture, and improved crop yields by utilizing advanced AI algorithms and real-time analytics.

Design/methodology/approach: The research involves developing a hybrid AI model combining Convolutional Neural Networks (CNN) and Gated Recurrent Units (GRU). The system integrates real-time sensor data with weather forecasts to dynamically optimize irrigation schedules. A mobile application complements the system for real-time monitoring and actionable recommendations. Findings: The system demonstrated significant reductions in water waste and improved irrigation efficiency. The CNN+GRU model outperformed other machine learning models, with optimal performance metrics for predicting water distribution needs.

Practical implications: This AI-driven system empowers farmers with precise irrigation management tools, enhancing agricultural productivity while conserving water resources. It also addresses infrastructure vulnerabilities through real-time monitoring and proactive maintenance.

Originality value: The research pioneers the integration of AI in large-scale irrigation systems, leveraging hybrid AI models and mobile applications to address real-world agricultural challenges. This innovation contributes to sustainable farming practices and efficient water management.

Keywords: ***Artificial Intelligence, Irrigation Optimization, Water Distribution, AI Algorithms, Crop Yield, Sustainable Agriculture, CNN, GRU, Real-Time Data Analytics, Water Management***

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