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## IoT-Based Machine Learning Architecture for Monitoring Water Quality in South Indian Rivers

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Abstract: South Indian rivers are under increasing pressure from urbanization, industrialization, and agricultural runoff. With traditional laboratory-based water quality monitoring proving inefficient for large-scale deployment, this paper introduces a novel IoT-based architecture augmented by machine learning for real-time monitoring and classification of water quality. Key parameters such as pH, turbidity, temperature, and total dissolved solids (TDS) are collected using smart sensors and transmitted via NodeMCU ESP8266 microcontroller. The data is analyzed using a Random Forest classifier to determine whether the water is potable and suitable for agriculture. A Flask-powered web dashboard provides real-time data visualization, including predictions and river-specific mapping. This system is validated through simulations and demonstrates high accuracy, responsiveness, and scalability.

**Keywords**: IoT, Water Quality Monitoring, Potability, Agriculture Suitability, Smart Sensors, ESP8266, Real-Time Dashboard, South Indian Rivers, Machine Learning, Random Forest



