Project Report

Potabl. – *Water Quality Analysis Tool*

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ABSTRACT

Access to clean and safe drinking water is a fundamental requirement for human health and well-being. However, contamination from industrial discharge, agricultural runoff, and aging infrastructure continues to threaten water quality in both rural and urban areas. Traditional laboratory-based testing methods, though accurate, are often time-consuming, expensive, and inaccessible to communities with limited resources.

This project introduces a **Water Quality Analysis Tool**—a digital platform designed to evaluate drinking water quality quickly, accurately, and in a user-friendly manner. The system enables users to input measured water parameters such as **pH, turbidity, total dissolved solids (TDS), hardness, chloride content, fluoride levels, and microbial indicators**, among others. These inputs are compared against the permissible limits defined by the **World Health Organization (WHO)** and the **Bureau of Indian Standards (BIS)**. The tool then classifies water as *Safe*, *Marginal*, or *Unsafe* for drinking, providing parameter-specific alerts and recommendations for corrective measures.

Developed using **Streamlit** for an interactive and responsive web interface, the tool supports **bilingual operation (English and Tamil)** to ensure accessibility for diverse user groups. Its backend logic is powered by a rule-based evaluation engine, allowing for easy scalability and integration of additional parameters in the future. The solution is designed to work on desktops and mobile devices, making it usable by field workers, local authorities, NGOs, and community members.

By combining scientific standards with an intuitive design, the **Water Quality Analysis Tool** bridges the gap between laboratory precision and on-site usability. It has the potential to improve public awareness, support timely interventions, and contribute to long-term water safety monitoring strategies. Future enhancements could include sensor integration for real-time data collection, automated reporting to authorities, and AI-based anomaly detection to predict contamination trends.

Project Description

The project aimed on the design and deployment of an interactive Community Water Quality Analysis Tool aimed at monitoring and evaluating the safety of local water sources, with special emphasis on rural and underserved communities where access to laboratory testing is limited. The tool empowers users to enter water quality parameters—such as pH, turbidity, total dissolved solids (TDS), hardness, chloride, and microbial indicators—and instantly determine whether the water meets WHO and BIS drinking water standards. Beyond technical analysis, the project placed strong emphasis on public awareness and education. An informative article on the importance of clean drinking water was created to help communities understand the risks of contaminated water and the benefits of regular monitoring and a data visualization dashboard was also created to study, understand and raise awareness of the water quality in different parts of India. The web application was developed with bilingual support (English and Tamil) to break language barriers and ensure that the message reaches deeper into rural areas where Tamil is predominantly spoken.

Project Outcomes and Impact

Findings and Recommendations

- Access to water quality data significantly increases community awareness about safe water consumption practices.
- Visualization tools make it easier for non-experts to interpret technical results.
- Standardizing the data collection process to ensure consistency across different survey teams.

Outcomes

- A simple yet fully functional web-based tool capable of analyzing water quality parameters to determine the potability of water.
- Option to download data as a CSV file for storing and further use.
- Bilingual language support (English and Tamil).

Short-term Impacts

- Immediate analysis report on the potability of water with confidence level based on the number of inputs given for accurate results.
- Increased community awareness about water safety.
- Support for academic courses by enabling students to work on real, field-collected environmental datasets.

Long-term Impacts

- Potential collaboration with local municipalities, schools, NGOs, and research institutions.
- Contribution to public health improvements on the basis of water consumption.

Assessment Plan

The sustainability and the success of the project will be measured by

- Data volume and frequency – Number of data entries per month and consistency in updates.
- User Engagement – Number of active users, institutions, communities accessing the tool.
- Decision-making Impact – Instances where data from the tool led to interventions or water treatment actions across communities, especially in the rural areas.

Tools and Technologies Used

- Programming Language: Python – for backend logic and parameter evaluation.
- Framework: Streamlit – for building an interactive and user-friendly web-application.
- Data Handling: Pandas – for data processing and CSV exporting functionality.
- Bilingual Operations: JSON – for bilingual translations and UI text management.
- Frontend Visualization: Streamlit – built-in forms, tables for collecting and displaying results.
- Standards Referenced: WHO and BIS standards for potable water parameters.

References

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