

# Design of intelligent rainfall trend prediction system based on Internet of Things

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## Objectives

In this paper, a real-time rainfall prediction system was established by analyzing and studying the rainfall data of each station in the hydrological monitoring points of small and medium-sized reservoirs in Shandong Province. The functions realized by the system include real-time data storage, rainfall trend prediction, spatial analysis of disaster range, early warning prompt, reservoir optimization and scheduling, etc.



Figure 1 Small reservoir flood control application system interface display

## Methods

1. Summarize and count the real-time data collected by the rainfall and water level sensors of monitoring points in various regions, establish a logical database, and carry out distributed storage processing.
2. Integrate WebGIS to make map calls, draw corresponding isorain lines, rainwater trend maps according to coordinate parameters.
3. Combine multi-task learning with deep learning models to build short-term rainfall prediction models. Real-time comparison, correction and update of rain information in official weather forecasts based on relevant data.
4. According to the historical data analysis of the critical rainfall of each monitoring point, the early warning information is issued according to the threshold.
5. According to buffer analysis and overlay analysis, explore the scope of possible disasters and the route of feasible solutions, and provide technical services for management decisions.
6. Taking small reservoirs as the research object, based on a long series of rainfall and flood data, formulate different standard flood control schemes.

## Results

1. The system provides intuitive water and rain information, which is compared and updated with the weather forecast to achieve more accurate rainfall tracking. It not only provides early warning analysis means for system administrators, but also provides channels for the public to view early warning tips and specific information of water and rain conditions.
2. By drawing the critical rainfall distribution map and the average rainfall contour map in Shandong Province, and comprehensively analyzing the reservoir information based on geomorphology, humanities and other factors, the modern management level of the reservoir is effectively improved.

## Conclusions

Through the analysis and processing of real-time rainwater data, the system improves the accuracy of rainfall forecast information, and applies it to the scheduling and optimization of reservoirs, provides technical indicators for the safe operation of reservoirs and flood prevention and disaster reduction, and enhances the pertinence and predictability of flood control work. Due to the complexity of the rainfall prediction process, more predictors should be further selected for research in the future.

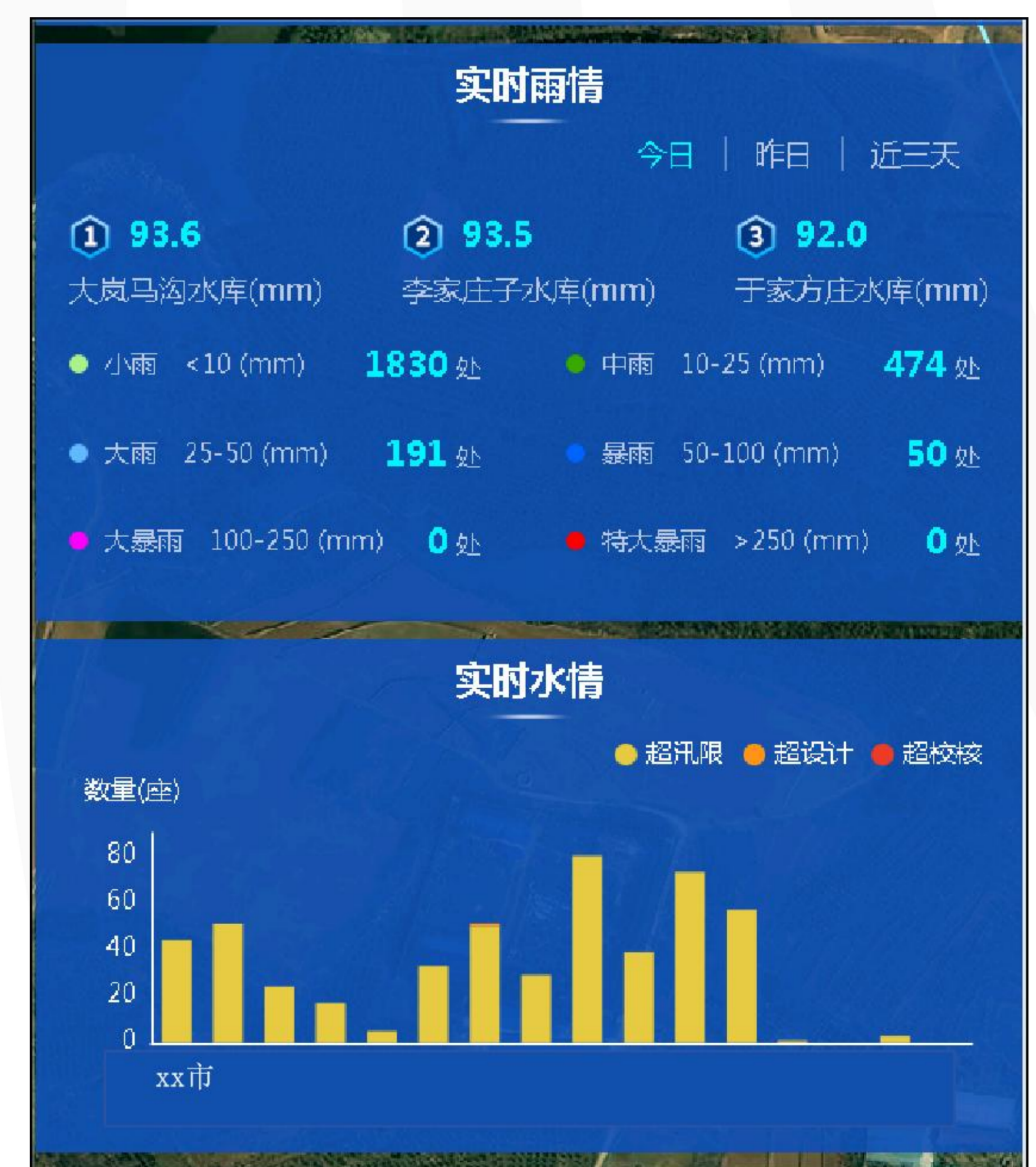


Figure 2 Real-time rainwater data statistics chart of each small reservoir