

Machine Learning Platform for Intelligent Water Systems Management

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Objective

- Use a machine learning model to determine whether a building is at risk of a water leakage
 - Artificially extend Saya Life's raw data for training and testing
- Design and develop an online dashboard to generate a building assessment report
 - Dashboard consults the machine learning model for the risk assessment
 - Dashboard displays result and important water usage information

About Saya

Saya Life is a water information company specializing in providing water data from sensors. Their installations are used for water management in urban residential and commercial buildings.

One of Saya Life's business use-cases in utilizing the collected data to allow insurance companies to have insight into the buildings they insure. For this service, collected water data must be processed and analyzed to predict water usage patterns based on historical data.

Water Usage Dataset

Saya Life's dataset included information regarding:

- Waterflow duration
- Volume
- Flow rate
- Water Classification
 - High, Medium, Low Consumptions
 - Outliers

Our team tried to improve the data by adding:

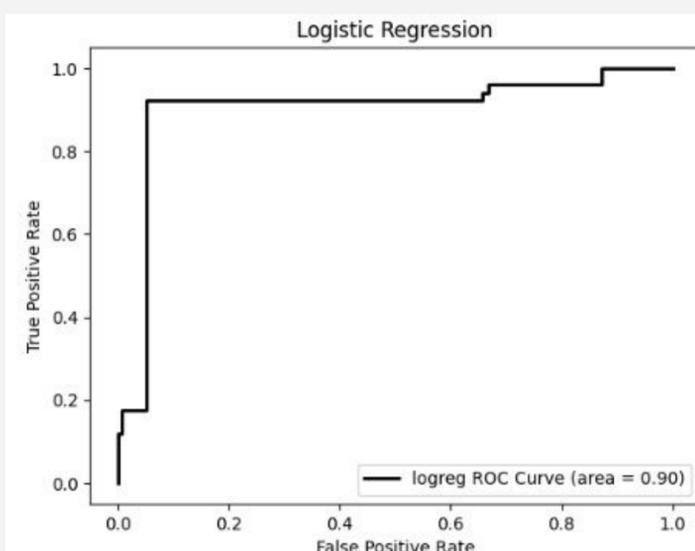
- Building type, size, and age
- Number of people in the building
- Climate region

Machine Learning Algorithms

We focused on two algorithms: Artificial Neural Network and Logistic Regression. ANNs mimic the human brain by connecting layers of digital neurons that learn patterns from data. Logistic regression classifies data by calculating the probability of an event happening.

Results

Logistic Regression gave us the best results with 93% accuracy and an AUC score of 0.90.



Dashboard

Designed an intuitive interface for data input, integrating with our machine learning server to process information swiftly and deliver accurate results.

The screenshot shows a web form titled 'Saya Leak Rating'. It contains several input fields: 'Duration' (text input with value 12), 'Volume' (text input with value 0.23), 'Event Flow Rate' (text input with value 0.012), 'Square Footage' (text input with value 24500), and 'Year Built' (text input with value 2006). There are also dropdown menus for 'Number of Workers' (value 150) and 'Water Classification' (radio buttons for High, Medium, and Low Concentration). Checkboxes are present for 'Building Type (Office)' and 'Climate Region (Very Cold/Cold)'. At the bottom, there is a yellow bar indicating 'Leak Status: Yes' and a blue 'Submit' button.

Technologies:

