TANZANIA WATER WELLS CLASSIFICATION

Understanding and Improving Water Access

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Introduction

Tanzania, home to 59 million people, faces a critical challenge in providing clean water to its population.
A staggering 47% of Tanzanians lack access to clean drinking water, highlighting the urgency of the water crisis.

Existing Water Points:

Many water points require repairs or have failed, exacerbating the water accessibility issue.
Inefficient well functionality poses a significant obstacle to achieving sustainable water access for all.

Tanzania Water Challenge

- *Tanzania, with a population of around 59 million, struggles to provide clean water to all.*
- *Approximately 47% of the population lacks access to clean drinking water.*
- *Many water points require repairs or have failed, creating a substantial challenge in ensuring clean water access.*

Project Objective

Purpose:

The project aims to build a classifier to identify patterns in non-functional wells.
Understanding the factors influencing well failures is crucial for improving the construction and longevity of new wells.

Audience:

Our target audiences include the Government of Tanzania and NGOs working towards optimizing resource allocation for well repairs.
The goal is to maximize the impact of clean water access by identifying and addressing non-functional wells.

Waterpoint Data

Our analysis is based on data from the Tanzanian Ministry of Water, including information on well locations, water quality, organizations involved, and population.

Classification Model

In our analysis, we employed classification modeling to categorize wells into three groups: functional, non-functional, and functional-need-repairs. Classification modeling helps us predict and understand the status of wells, guiding decision-making for resource allocation and maintenance strategies.

Why Classification Modeling?

Problem Context: Tanzania faces challenges in providing clean water, with a significant portion of the population lacking access. Classification modeling helps identify factors influencing well functionality, aiding targeted interventions.

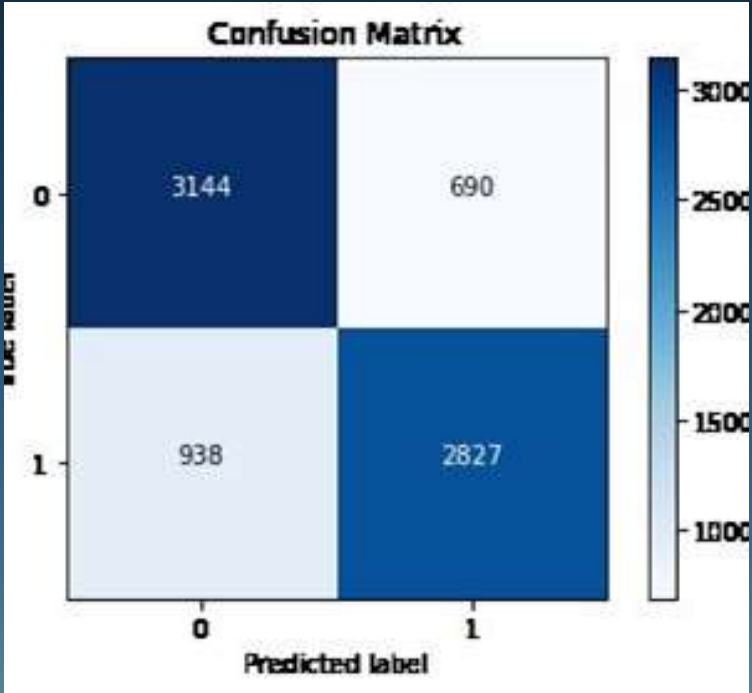
Predictive Power: By utilizing machine learning algorithms, we predict the status of wells based on features such as water source, well age, and the impact of public meetings. This predictive power informs strategies for improving well functionality.

Classification Model

Plain Language Implications:

Optimizing Resources: Efficiently allocate resources by identifying non-functional wells, ensuring impactful repair initiatives.

Improving Access: Enhance access to clean water by understanding and addressing factors affecting well functionality, supporting government and NGO efforts

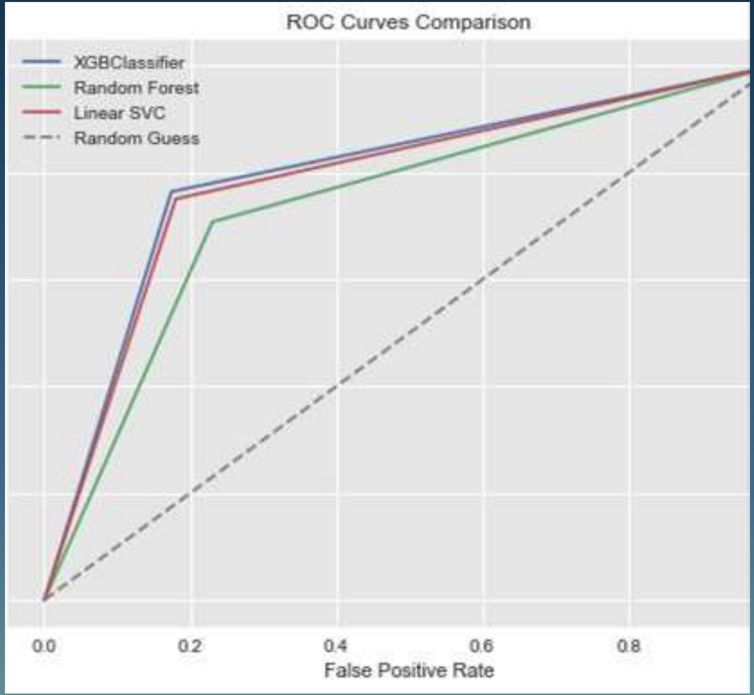


Model Evaluation

After evaluating various models, our analysis reveals that XGBoost outperformed others, achieving the highest accuracy score at 80%. Notably, it also exhibited strong precision and recall values, 82% and 78% respectively.

Why XGBoost?

Accuracy: Achieved the highest accuracy among all models tested.
Precision and Recall: Maintained high precision (82%) and recall (78%) values, ensuring a balance between correctly identifying functional and non-functional wells.



Findings

Our analysis revealed crucial insights into Tanzania's well functionality:

- Groundwater Dependency: Wells heavily rely on groundwater, emphasizing the need for sustainable practices like rainwater harvesting and soil conservation to maintain water levels.
- Payment Impact: Wells maintained through bucket or monthly payments exhibit better functionality, highlighting the importance of structured payment systems.
- Age Matters: Newer wells tend to be more functional, suggesting the significance of well age in predicting functionality.
- Public Meetings: Conducting public meetings correlates with higher well functionality, showcasing their role in community engagement.

Recommendations

Based on our findings, we propose the following recommendations:

- Sustainable Practices: Implement rainwater harvesting and soil conservation to ensure a stable and sustainable water supply.
- Structured Payments: Advocate for structured payment systems, such as monthly subscriptions, to enhance well maintenance.
- Focus on New Wells: Prioritize the construction of new wells to improve overall well functionality and water access.
- Community Engagement: Promote public meetings to involve communities in well maintenance, fostering a sense of ownership.

Next Steps

Moving forward, we suggest the following steps:

- Field Inspections: Dispatch designated personnel to inspect wells identified by our model, determining necessary actions.
- Data Refinement: Examine missing or zero values in population and GPS, and consider binning highly cardinal columns for better analysis.
- Static Head Evaluation: Investigate wells with static head values of zero, understanding their impact on functionality.

Thank You !

Any questions?