

Tanzanian Wells

Predicting non functional water wells



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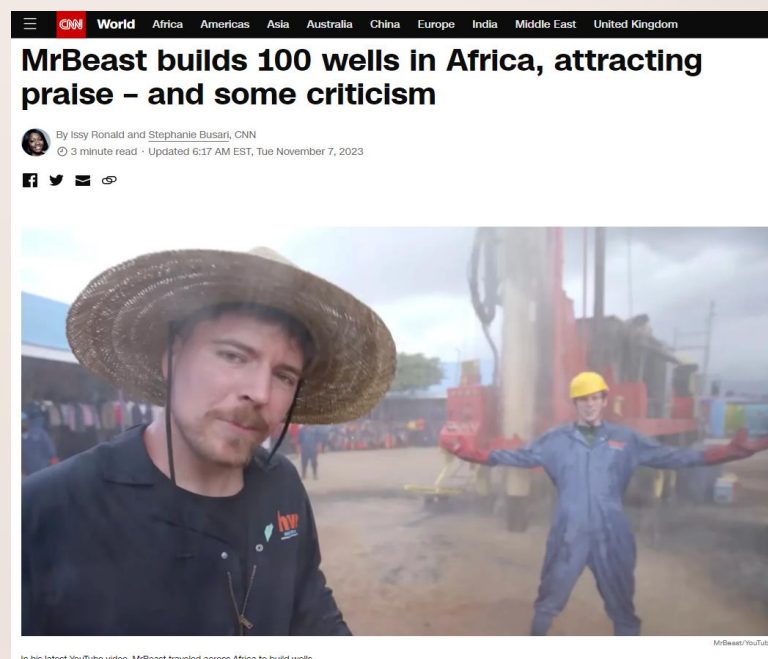
Limits and
Overcoming
Them



1. Overview

Objectives and
Context

A Predictive Tool for Wells in Tanzania



Current Situation:

In Tanzania, only **61%** have basic **water access**, **32%** have basic **sanitation**, and less than half enjoy basic hygiene.

Source: [World Bank](#)

Objectives:

- Develop a machine learning classifier
- To **predict non-functionality** of water wells in Tanzania

Intended Users:

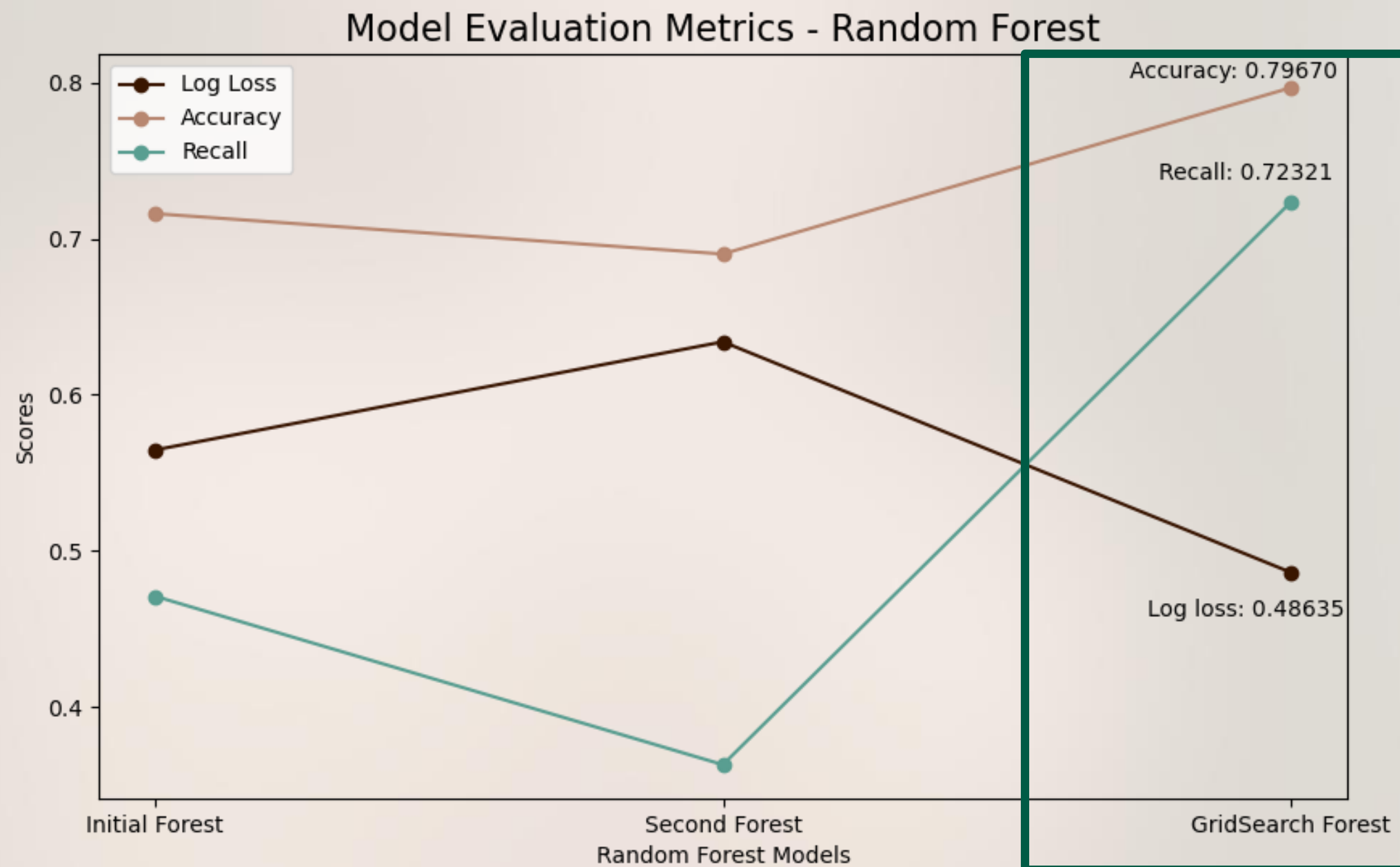
- Organizations involved in water & infrastructure management
 - Non-Governmental
 - Non-Profit
 - YouTubers?



2. *Modeling*

Models and Tuning
Techniques

Predictive Models to Assess Well Functionality



4 models:

1. Logistic Regression
2. K-Nearest Neighbor
3. Decision Tree
4. Random Forest

Preprocessing:

- Missing values handling
- Categorization
- Encoding categorical features
- Scaling

Modeling Techniques

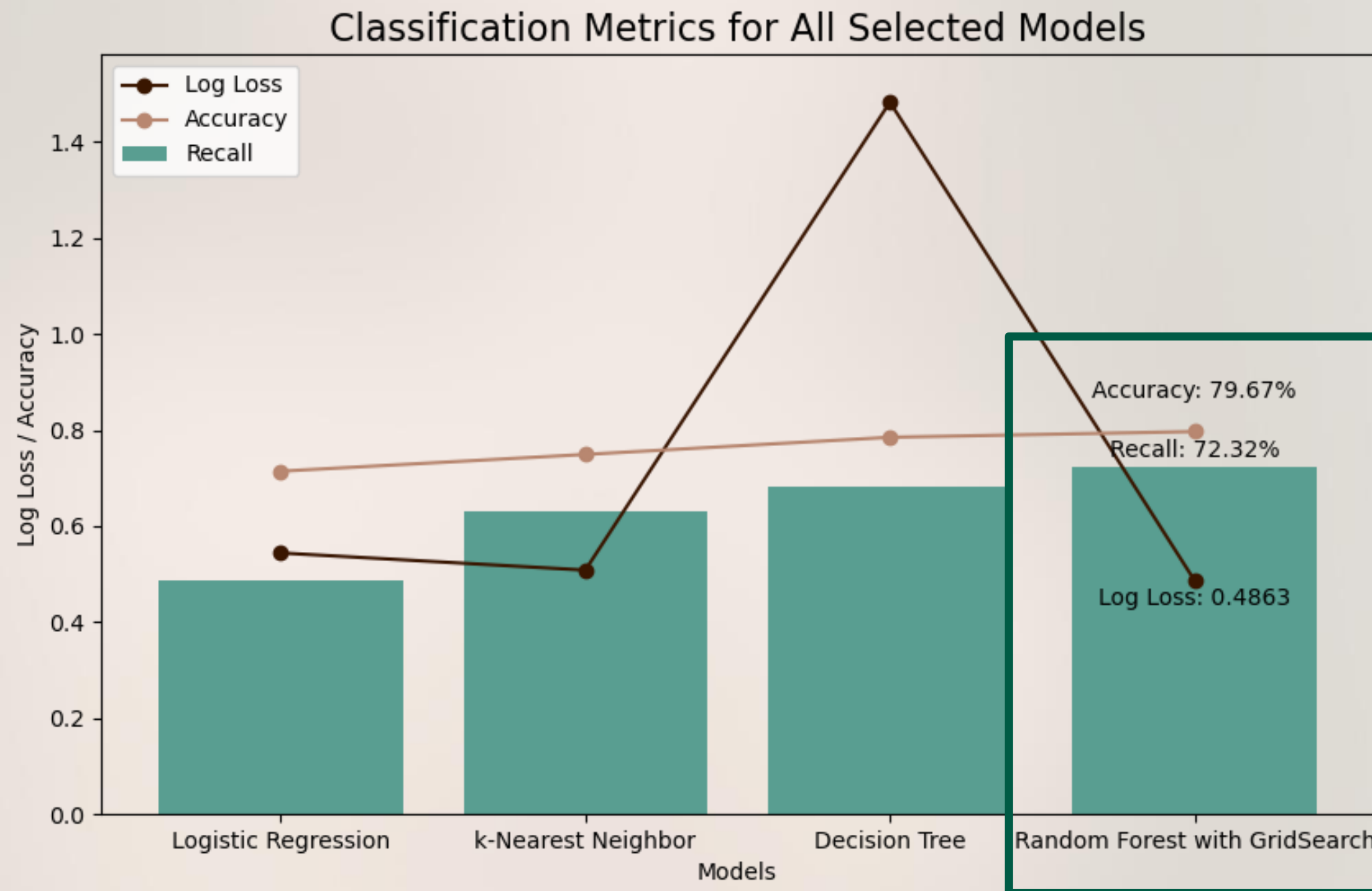
- Synthetic Minority Over-sampling Techniques (SMOTE)
- Recursive Features Elimination
- Combinatoric Grid Searching



3. *Evaluation*

Best Model's
Classification
Metrics

Best Model Selection: Classification Metrics



Classification Metrics:

1. Recall
2. Accuracy
3. Log loss

Risk for populations' health & lives if a well is predicted functional when it was not (false negative).

Best model results:

1. The model **correctly identified** over 72% of the actual **non-functional** water wells
2. Model's predictive power: 79% of **all** water **wells** were **correctly predicted**
3. High **probability** that a well **predicted** as non-functional **is actually** non functional



4.

Recommendations

How to Achieve
Better Predictions

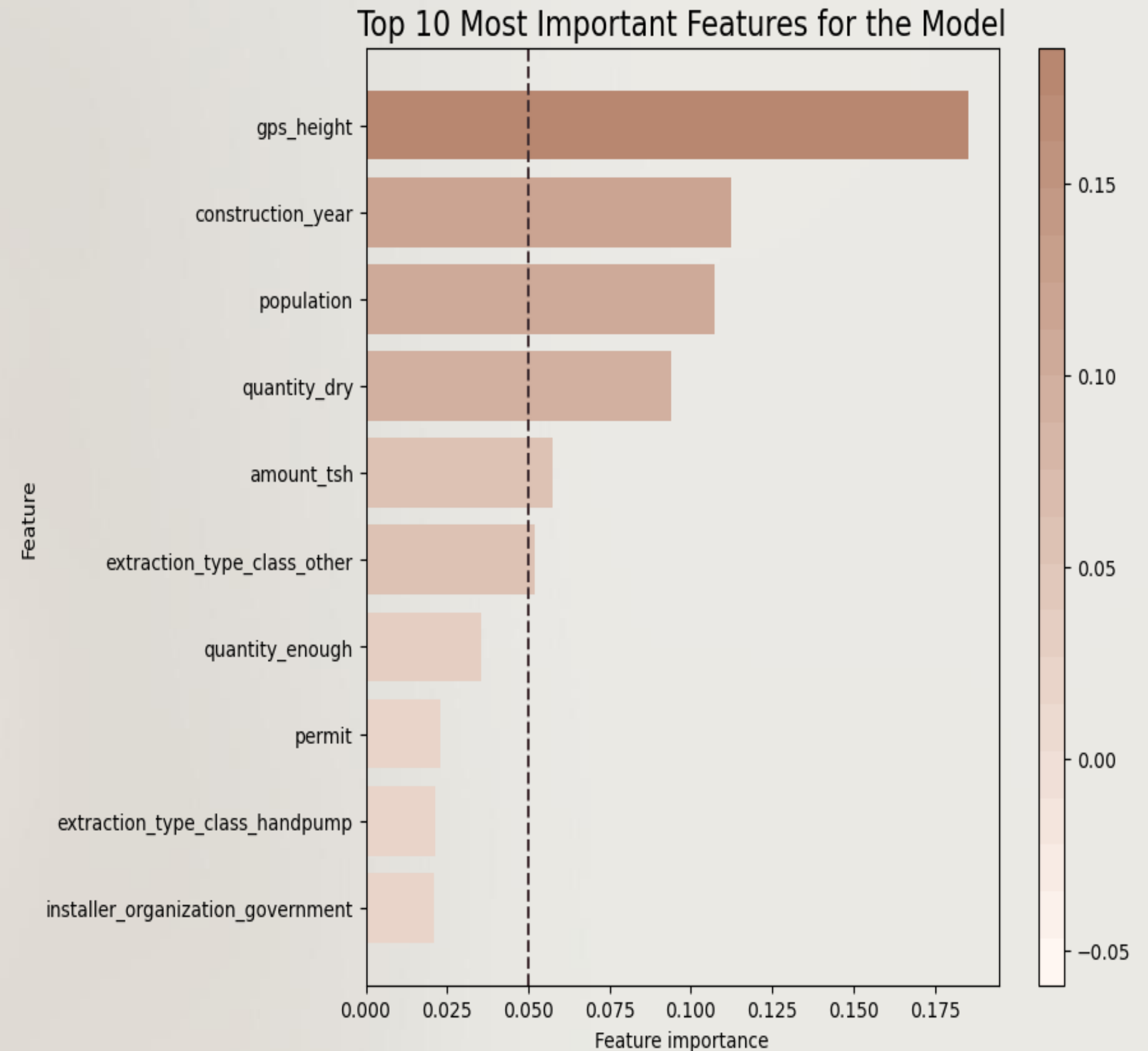
Recommendations

Purposes of Model's Predictions

- Useful
 - Prioritize maintenance efforts
 - Allocate resources and funding
- Not Useful
 - Data is outdated or inaccurate
 - Most important features are not reported

How to Achieve Better Predictions

1. Enhance **quality**: collect recent & accurate data
2. Include **local knowledge**
3. Share knowledge with other NGOs: **open data**
4. Implement a **feedback system**





5. *Next Steps*

Limits and
Overcoming Them

5. *Next Steps*



1. **Collect More Recent Data:** Data recorded is outdated: it is from 2011 to 2013. More recent information must be collected for more accurate predictions.
2. **Verify Actuals Before Relying on Predictions :** Accuracy is good, over 79%. Nevertheless, room for error still exist.
3. **Scalability Concerns:** Consider optimizing the model with more efficient algorithms or modifying processing techniques to predict larger datasets.



Contact Information

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The background of the image is a solid brown color, densely populated with numerous water droplets of varying sizes. Each droplet is rendered with a 3D effect, featuring a dark brown outline and a lighter brown highlight on its upper left side, giving them a realistic, glistening appearance. The droplets are scattered across the entire frame, creating a textured, organic pattern.

Thank you!