PREDICTING FAULTY PUMPS

DATA MINING FOR SUSTAINABLE WATER MANAGEMENT

MIGUEL BARRIOLA ARRANZ

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INTRODUCTION

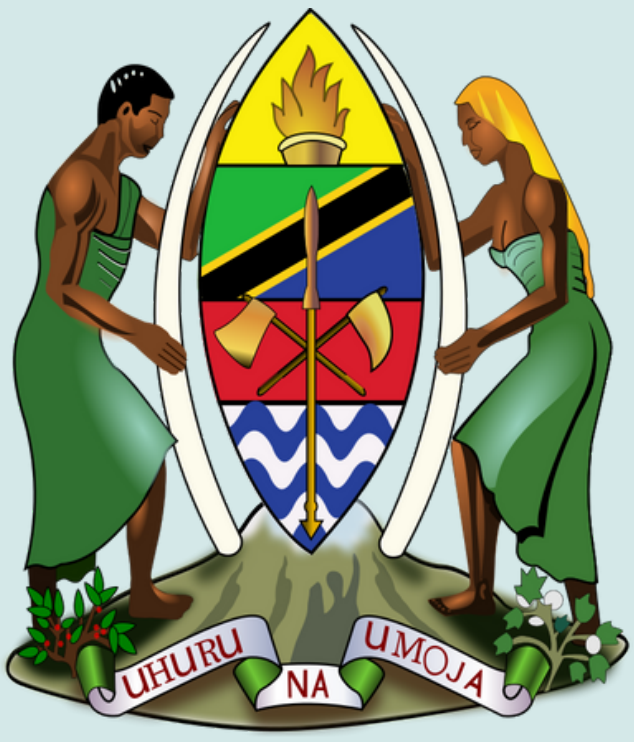
- Project to predict the status of water pumps in Tanzania

- Objectives of the analysis:
  - Classify pumps in Tanzania as functional, or non-functional
  - Improve water access in Tanzania

STAKEHOLDERS

- Stakeholders, including government agencies and NGOs, will use these findings to prioritize and streamline efforts towards ensuring reliable water access.

- Primary stakeholders for this project are the Tanzanian government and international development organizations focused on improving water access in the region.



BUSINESS CASE

- Core objective:

1. Enable the identification of functional and non-functional pumps in Tanzania

- Results implications:

1. Guide decisions on maintenance, investments, and resource allocation.
2. Support sustainable water management in Tanzania.

DATA

DATASET OVERVIEW

Driven Data provided the following datasets:

- SUBMISSIONFORMAT
- TEST_SET_VALUES
- TRAINING_SET_LABELS
- TRAINING_SET_VALUES

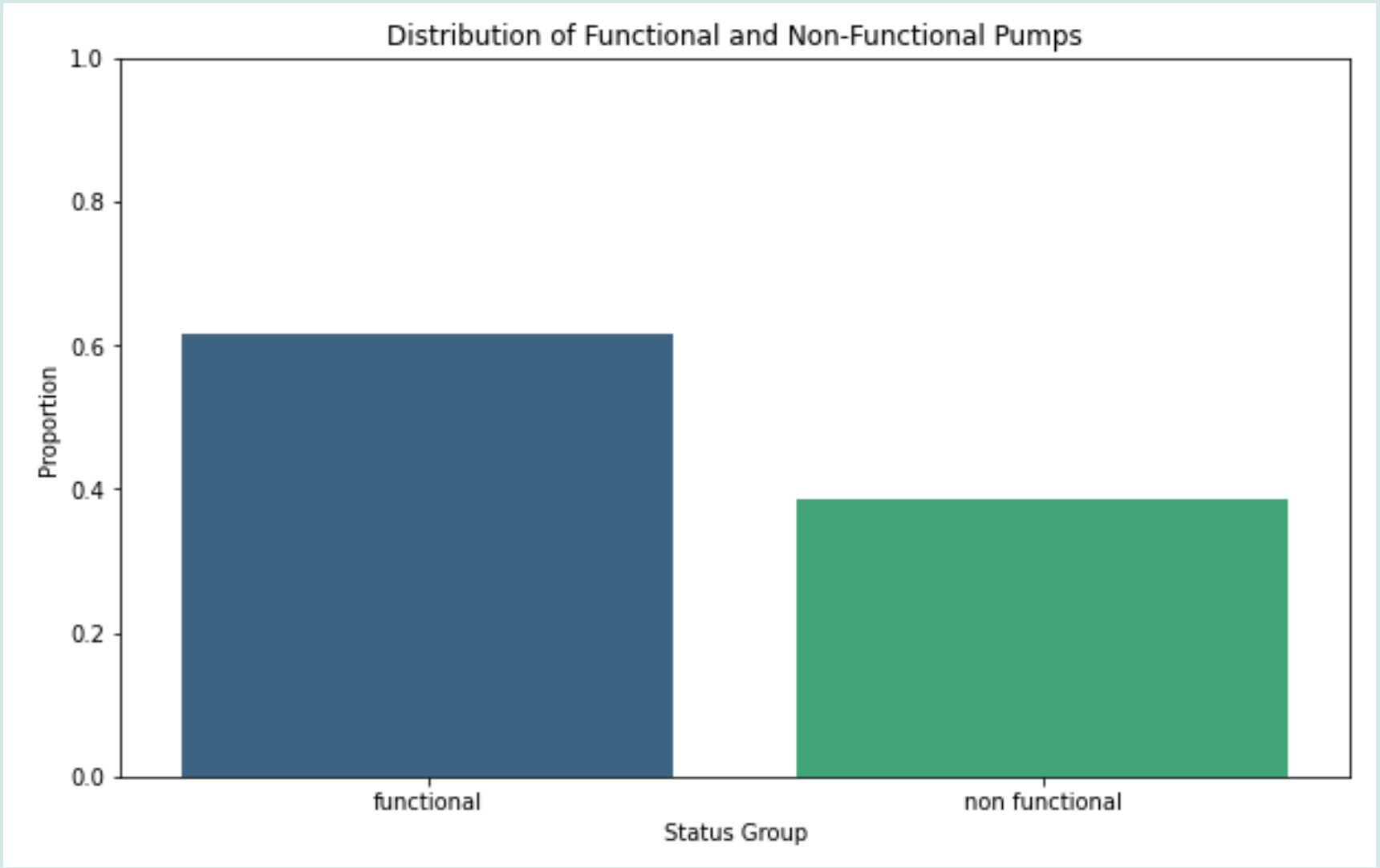
DATASET DESCRIPTION

- TRAINING_SET_LABELS and TRAINING_SET_VALUES were transformed for model building

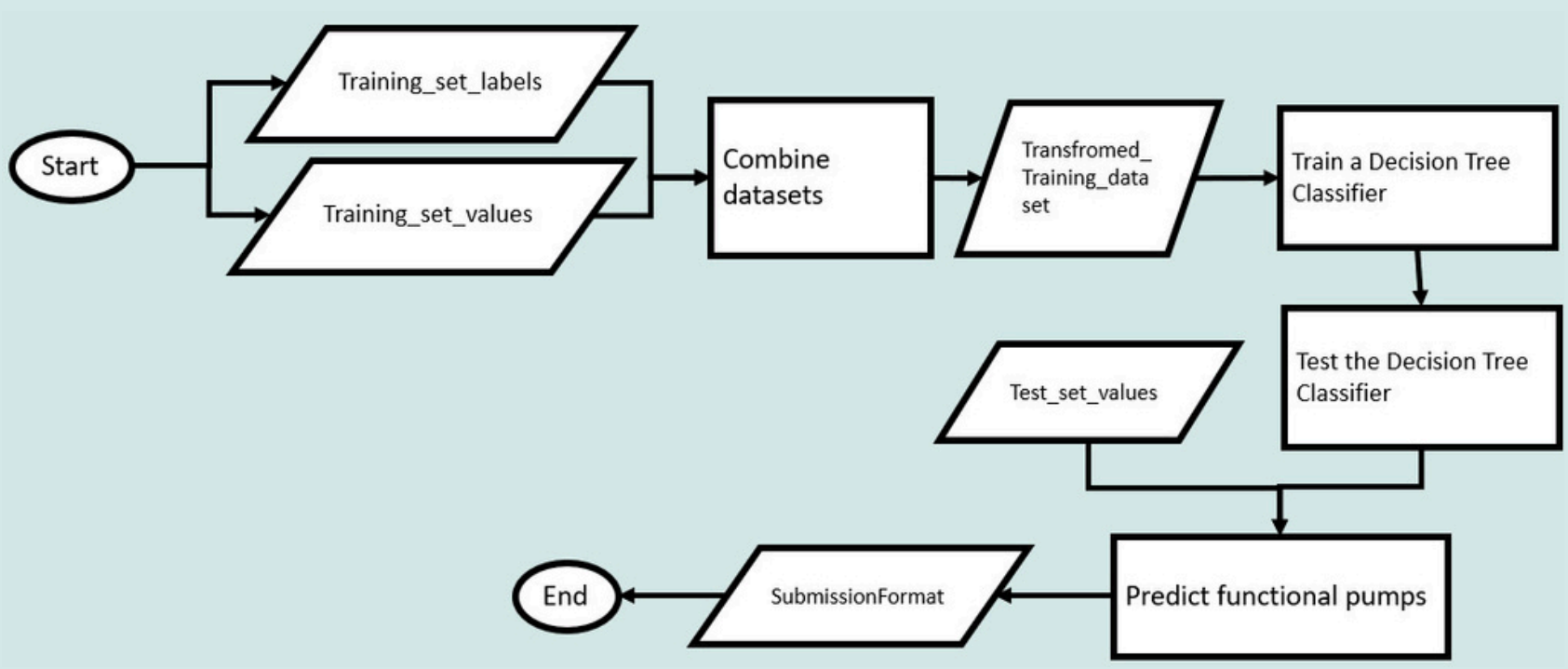
- Same transformations applied to TEST_SET_VALUES for predictions

- SUBMISSIONFORMAT contains the predicted pump status

PUMPS STATUS

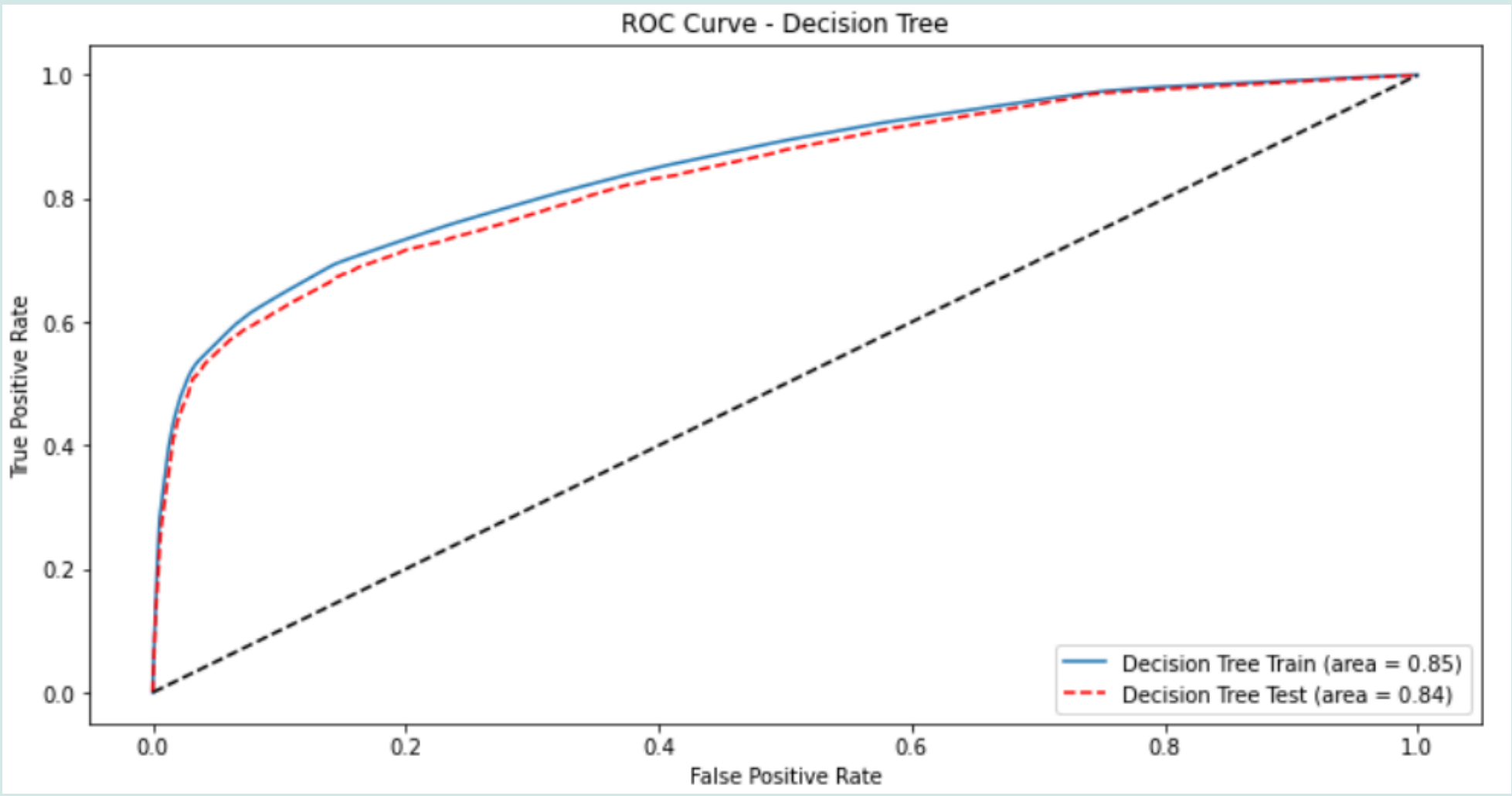


PROJECT OVERVIEW



MODELING APPROACH

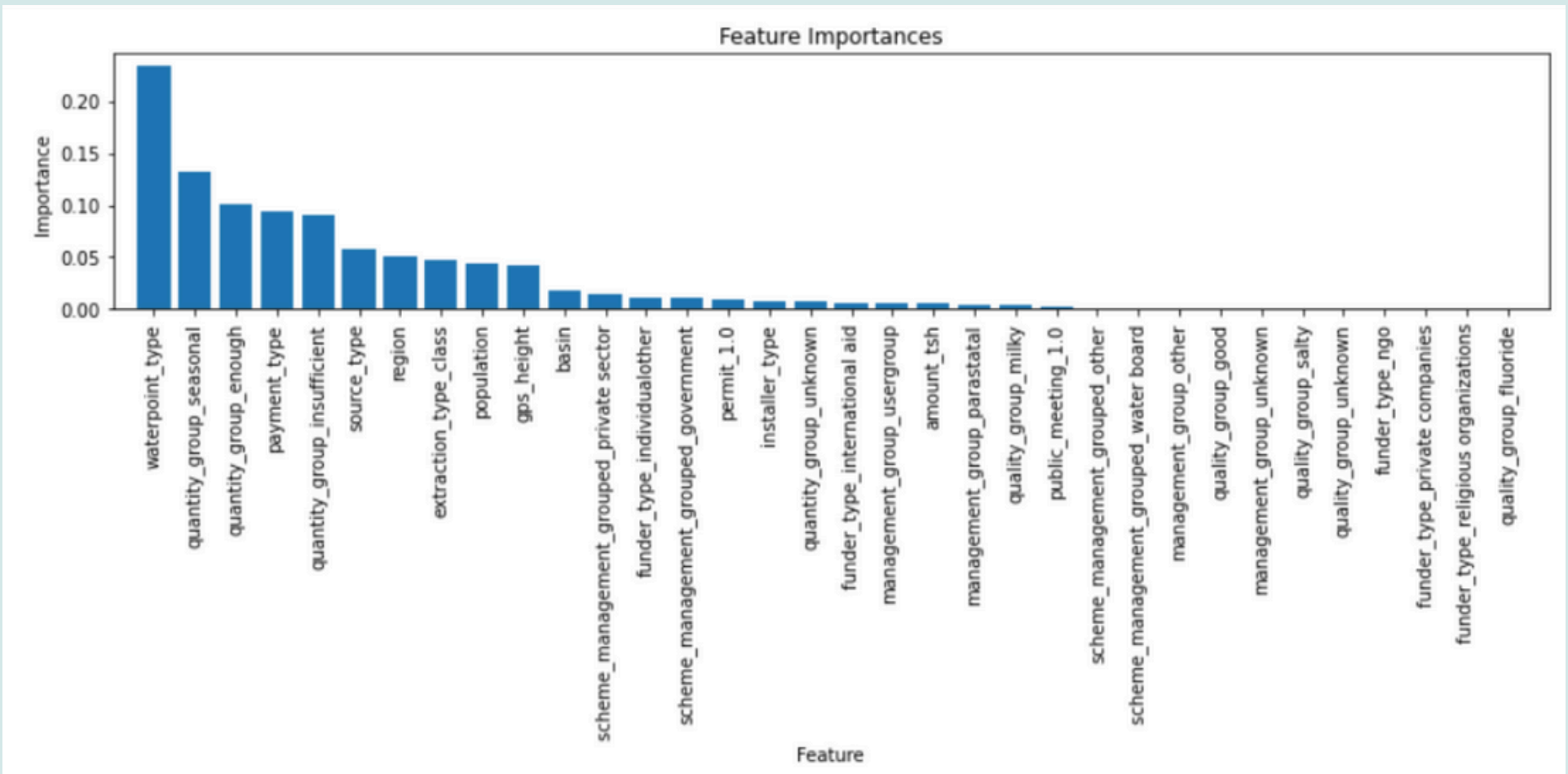
- Models tested:
  - Logistic Regression
  - Decision Tree
- Evaluation metrics considered were ROC and AUC
- Hyperparameter tuning process to get the optimal parameters



FEATURE IMPORTANCE

- Here are the most important variables that better discriminate between functional and non-functional:

  a. waterpoint_type
  b. quantity_group
  c. payment_type



RECOMMENDATIONS

- **Align Payment Plans:** Use monthly or per-bucket payment plans like those of functional pumps to increase functionality

- **Use Dry Pumps as Indicators:** Identify non-functional pumps using the presence of dry pumps to focus repair efforts

- **Identify Non-Common Types:** Use pumps without common water point types (e.g. cattle trough) to find and prioritize non-functional pumps for repairs

THANK YOU VERY MUCH

Miguel Barriola Arranz

- LinkedIn: https://www.linkedin.com/in/miguel-barriola-arranz/

- Medium: https://medium.com/@mbarriolaarranz