

Pump It Up Project

Machine Learning Prediction of Status of Waterpoints

Author: Mercy Ngila



The problem

Client: Government of Tanzania In partnership with UNICEF

Problem Statement

- Water shortage in Tanzania has been a problem for years now.
- As part of its Vision 2025, the Government of Tanzania has pledged to increase access to improved sanitation to 95 per cent by 2025.
- UNICEF is working with the Tanzanian Government and development partners on ensuring sustainable and equitable access to safe drinking water in rural and periurban areas.
- Nangila Analytics, has been contracted to create a machine learning (ML) model to predict conditions of water points in the region



Objectives

Objective 1

To build a ML model that predicts the conditions of water pumps with an acceptably high accuracy.

Objective 2

To compare different ML models predictions to achieve highest accuracy

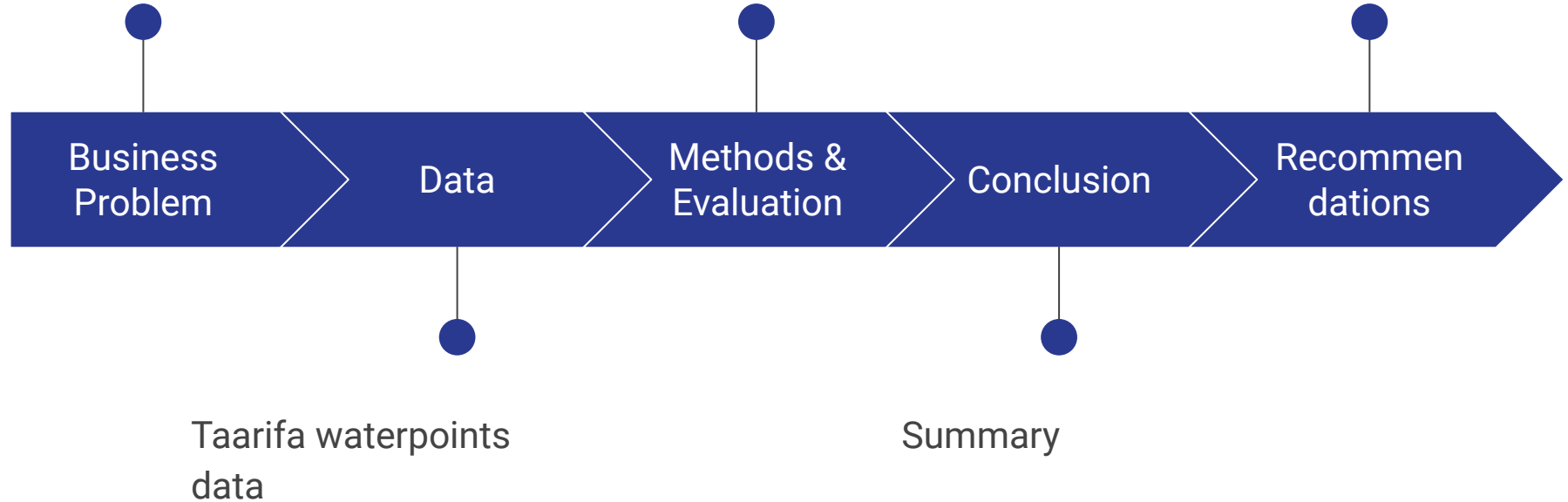
Objective 3

To advice on the best investment strategy

Best ML model to
predict water points
conditions

- Random Forest
- Decision Trees
- Logistic Regression

Best Investment
Strategy

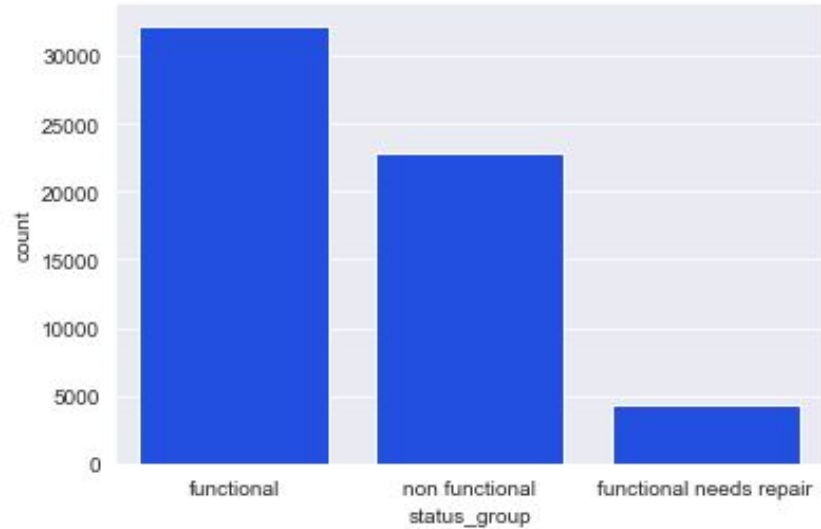


Data

- Data from Taarifa Water points dashboard
- Aggregated data from the Tanzania Ministry of Water

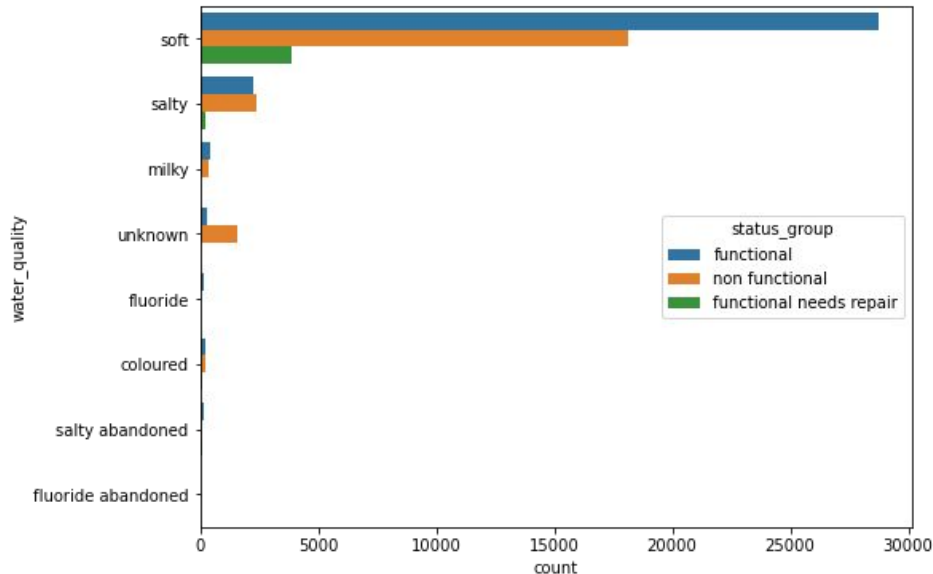
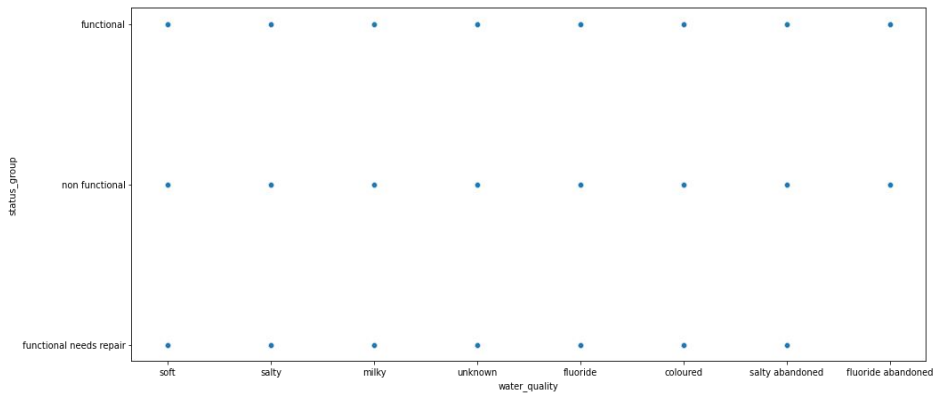
Key Factors

- Water Points Status
- Water Quality
- Extraction Types
- Regional Distribution



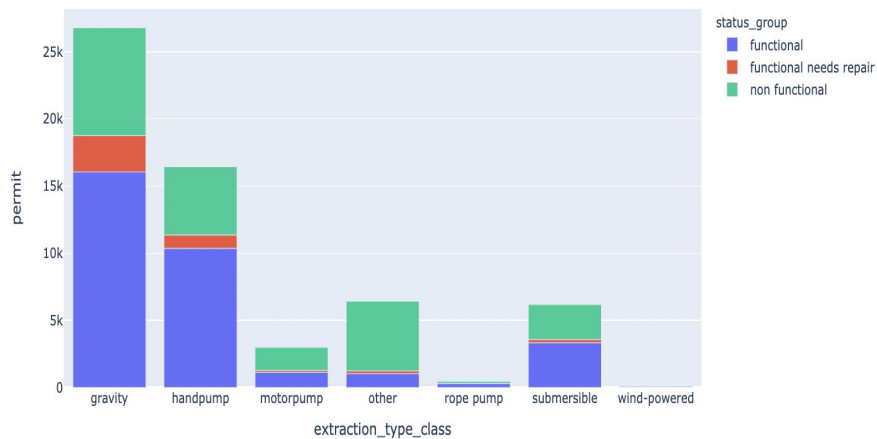
Status

- There are more functional waterpoints
 - Water points that need repair are fairly few
 - A significant amount of water points are non functional
-



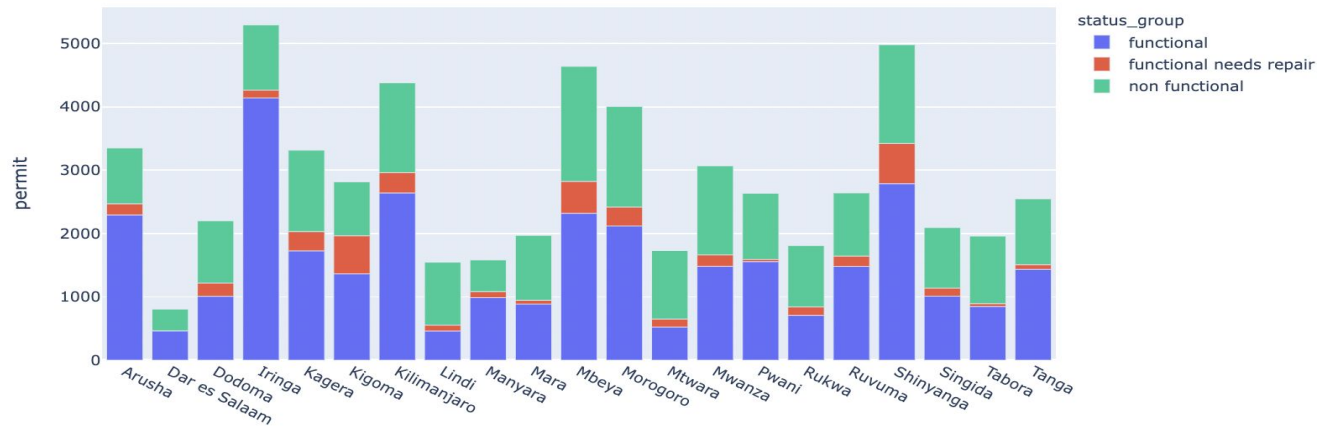
Water Quality

- There are different ranges of qualities of water for functional water points.
- Most of them have soft water though
- Some functional water points have water with fluoride contents



Extraction Types

- Water pumps relying on gravity and hand pumps are the most functional.
- Technologically advanced water pumps seem to have more non functionals e.g. motor pump
- It would be a great idea to explore if fuel shortage or maintenance could be a causal factor.



Regional Distribution

- Iringa has the highest number of functional water pumps.
- Most regions have more functional than non functional
- The ratio of functional need repair water pumps is smaller
— for all regions

Best Model

- Random Forest Model
- Accuracy = 80.03%

Conclusion

Summary

- The best model accuracy provides great insights on that aids planning, prioritising and investment.
 - There are different qualities of water in the different functional pumps though most have soft water
 - All waterpoints with huge investment costs are functional
 - Gravity and Hand pump water pumps are the most functional
 - It is concerning that there the number of non functional water pumps is a lot
-

Recommendations

Recommendation 1

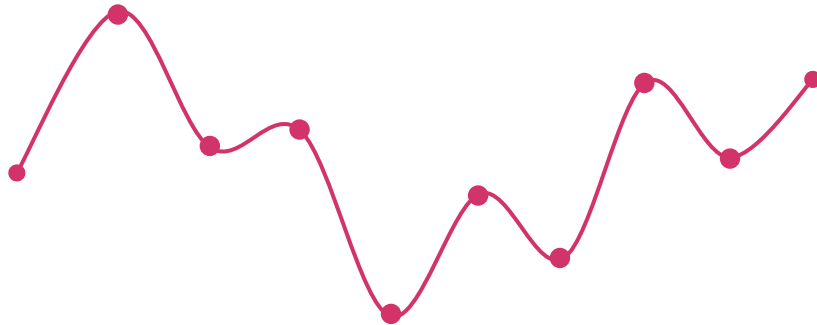
Great investment opportunity to make repairs before they turn non functional.

Recommendation 2

The repairs should however be accessed to know if it is cheaper repairing or having a new one.

Recommendation 3

investigation into highly technical water pumps to understand if communities need training on usage and if they are sustainable due to costs involved. e.g Fuel Purchase

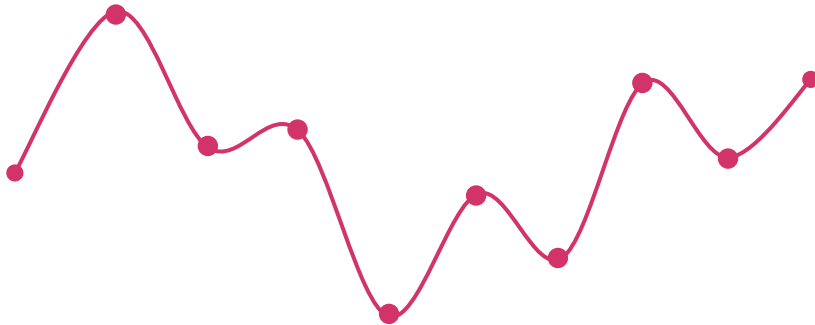


Recommendation 4

Priority could be placed on high population areas to get more access to water and monitoring their water pumps.

Recommendation 5

More research could be done to understand what causes water pumps to be non functional. This could help avoid setting up new water pumps in areas where there were already.



—



The End