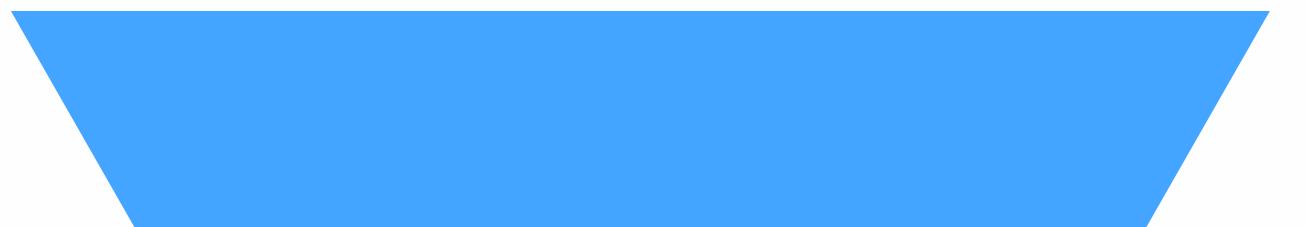


CALVINE DASILVER

TANZANIA WATER WELLS

Predicting conditions of water wells with a Machine Learning Classifier



We urge the Tanzanian government to adopt our improved water point maintenance model, ultimately ensuring citizens' water needs are met.



Project Goal



BUSINESS UNDERSTANDING

- Nearly 24 million people in Tanzania struggle to find clean water.
- Water wells have emerged as a crucial solution to water scarcity, providing a reliable source for many communities.
- We need to develop a model to identify areas for improvement in well maintenance operations.

DATA UNDERSTANDING



- **Taarifa and Tanzanian Ministry of Water provided original data**
- **Data has 59,400 data points and 41 column**
- **will follow the OSEMN framework**
 1. Obtain
 2. Scrub
 3. Explore
 4. Model
 5. Interpret

DATA CLEANING



1

We did Dimensionality Reduction. we dropped features that we won't use to model.

2

we checked for missing values and we did imputation to solve them.

3

There were outliers in the data. We capped outliers to the upper bound of the interquartile range (IQR).

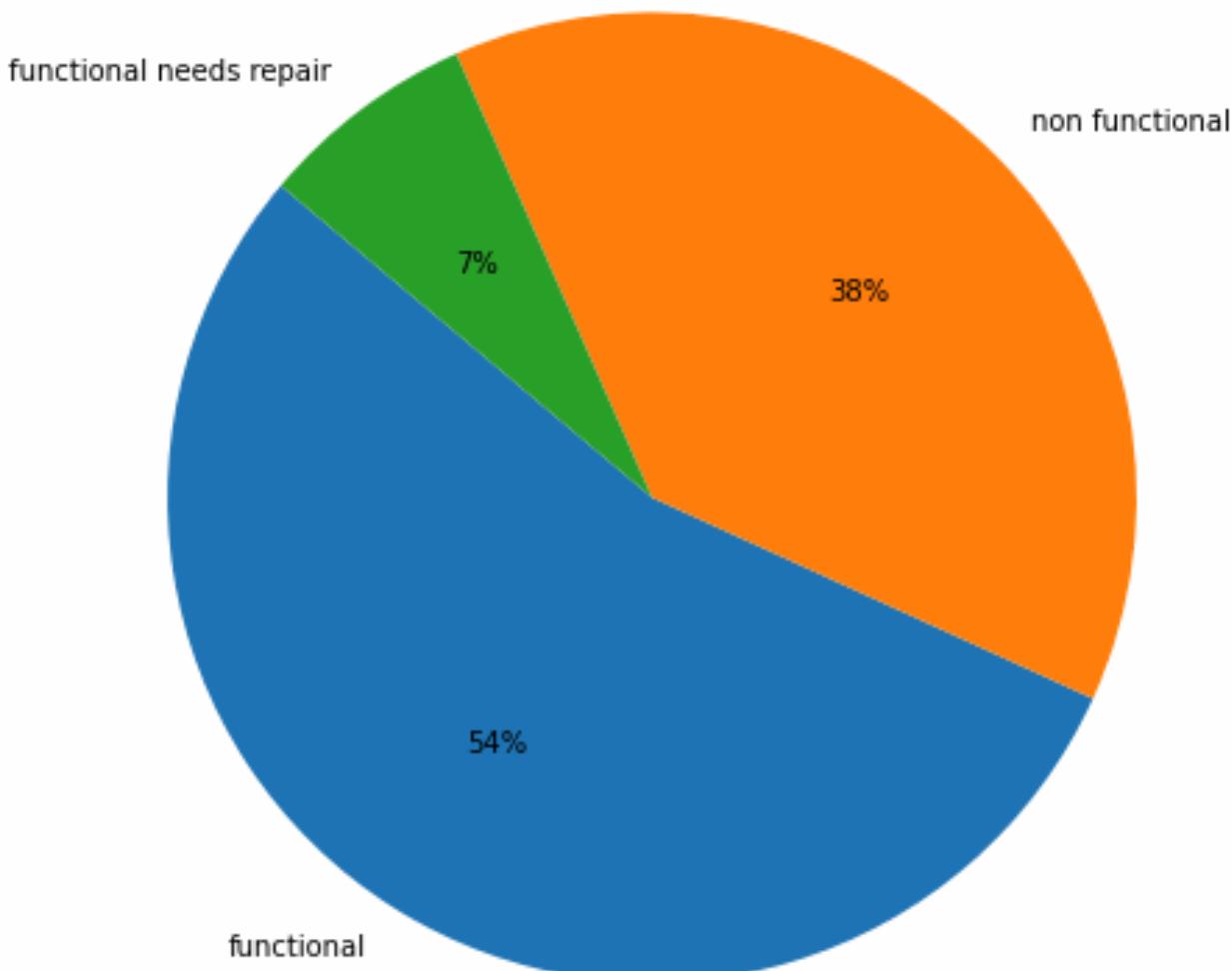
4

Lastly, we did a correlation using a heat mat to check if features were still correlating to each other, 75% and above.

DATA VISUALIZATION

Target variable (status_group)

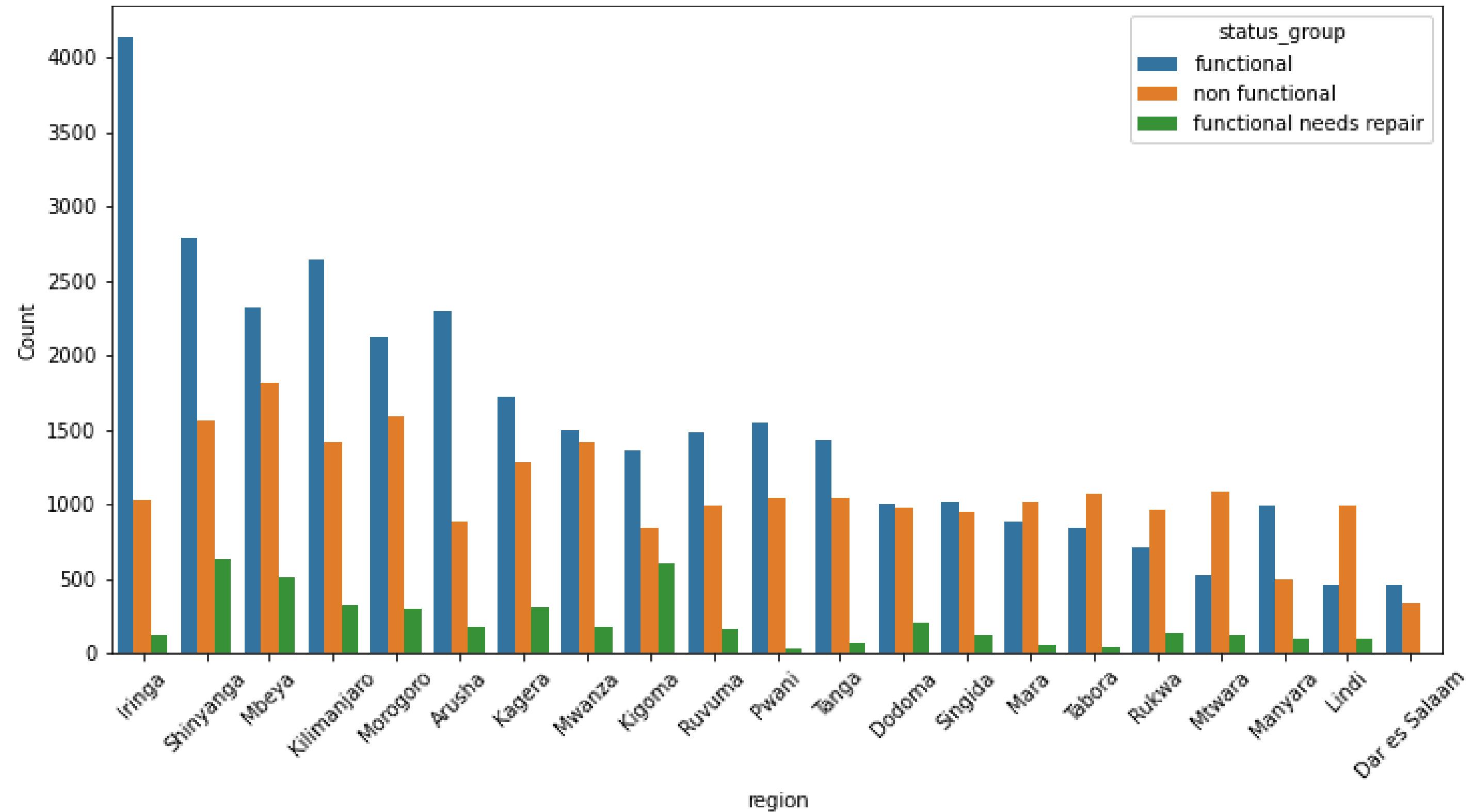
Water Point Functionality Distribution



From our observation:

- 54% of water points are functional,
- 38% are non-functional
- 7% are functional and need repair

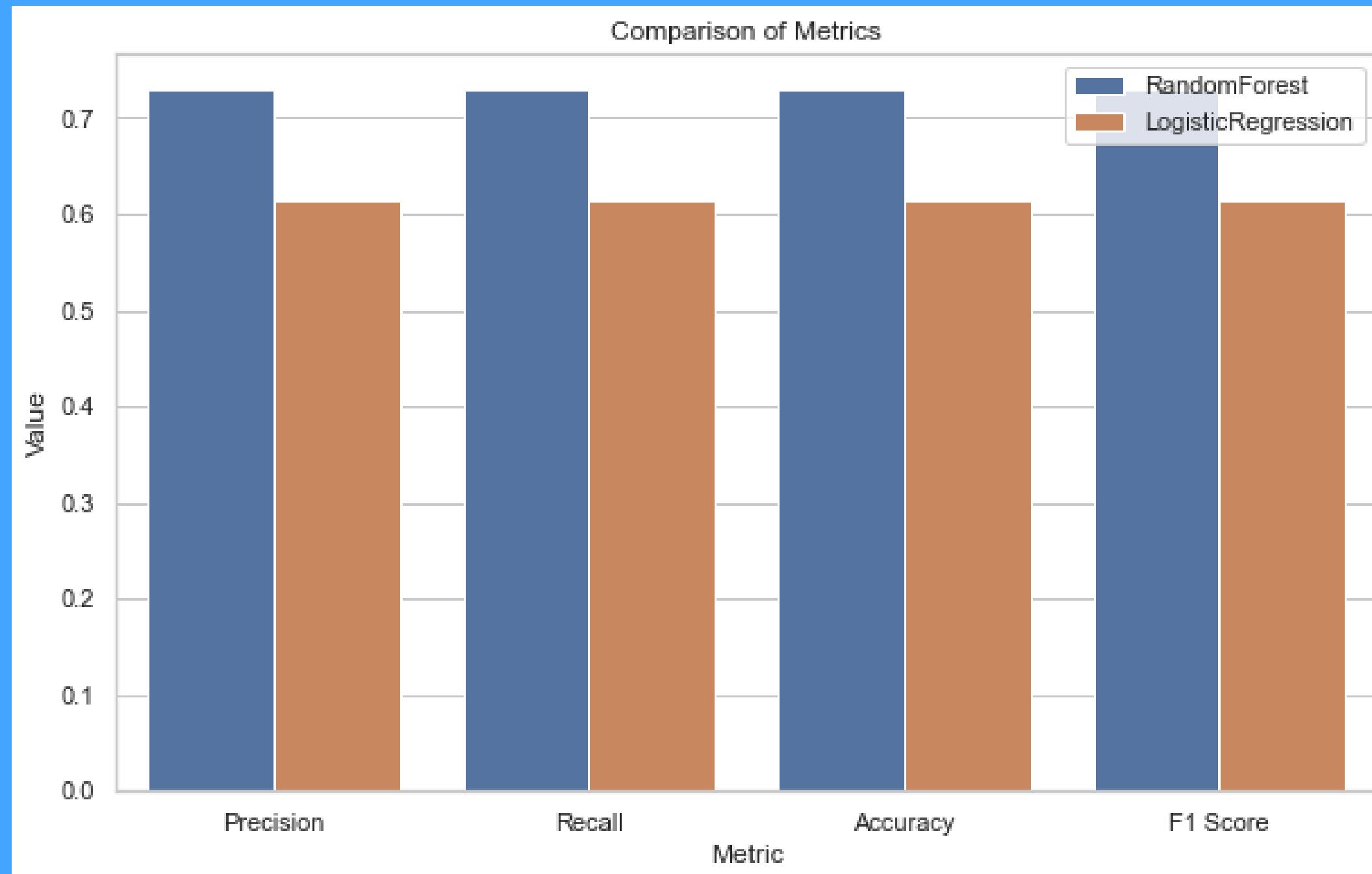
region count plot



Analysis shows regional pump functionality varies. Iringa, Shinyanga, and Kilimanjaro have the most functional pumps, while Kilimanjaro and Morogoro have the most non-functional. Kigoma has the most functional pumps needing repair, suggesting targeted maintenance efforts there.



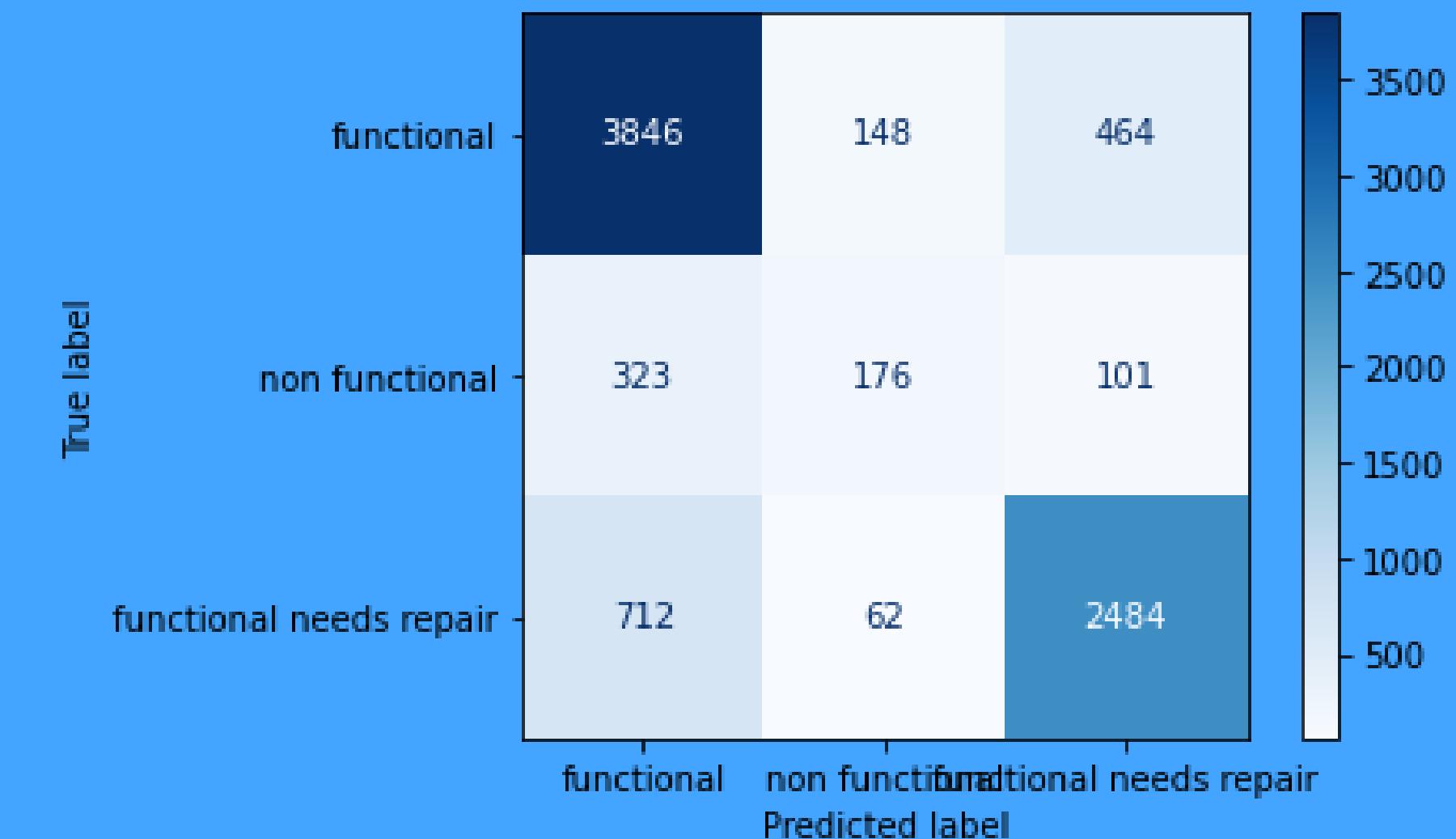
Model Selection



- Developed 4 different classifiers based on the metrics.
- Out of the 4 RF was our best model while LR had the lowest Accuracy.

The Classifiers are:
RandomForest
LogisticRegression
KNN
XGboost

RandomForestClassifier model



model report:

Validation accuracy: 78%

Streamline Maintenance and Repairs

Use Funding Efficiently and Effectively

RECOMMENDATIONS

- Prioritize Springs: Build new water points near springs whenever possible to extend pump life.
- Monitor Abundant Sources: Keep a close eye on high-water table wells to prevent overuse and pump failure.



Future Improvement



IMPROVE DATA

Enrich the model with coded qualitative data

MONITOR WELLS

Continuously improve the model to predict maintenance needs for well pumps

GEOGRAPHIC REGION

The model has to consider regional factors like rainfall, climate, etc.

Clean water changes absolutely **everything.**

When a community gets access to clean water, it can change just about everything. It can improve:



THANK YOU