Tanzanian Water Wells

A Machine Learning Model - Jan. 2023

Water Aid - UK

An NGO based in the United Kingdom that works on access to clean water around the world, especially the African continent.

Access to clean water, decent toilets and good hygiene are basic human rights.

Works in partnership to improve access to these three essentials through a combination of programmatic and policy work.

CHALLENGES

Around 60% of the population in Tanzania and bordering countries have access to improved water. *

Water access, quality and quantity varies.

Drought, landscape change, and climate change are straining existing surface water supplies.

Identifying and Repairing water wells is resource intensive.

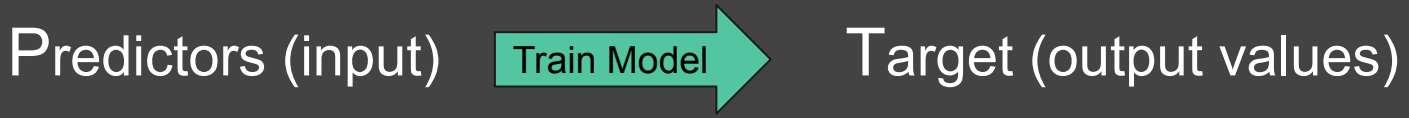
*According to the World Sector Report (2019)

Organizational Case

- **Water Aid** is launching a groundwater infrastructure initiative.
- Where are the non-functioning wells and wells in need of repair?
- Who should Water Aid partner with for targeted success?

Why Machine Learning?

Machine learning algorithms use historical data as input to train a model to predict new output values.



The Data

60,000 Water Well Records

Taarifa Waterpoints Dashboard

Tanzanian Ministry of Water

Predictors

26 Well Features

9 Water Basins

Water Access/Quality

Pump Tech

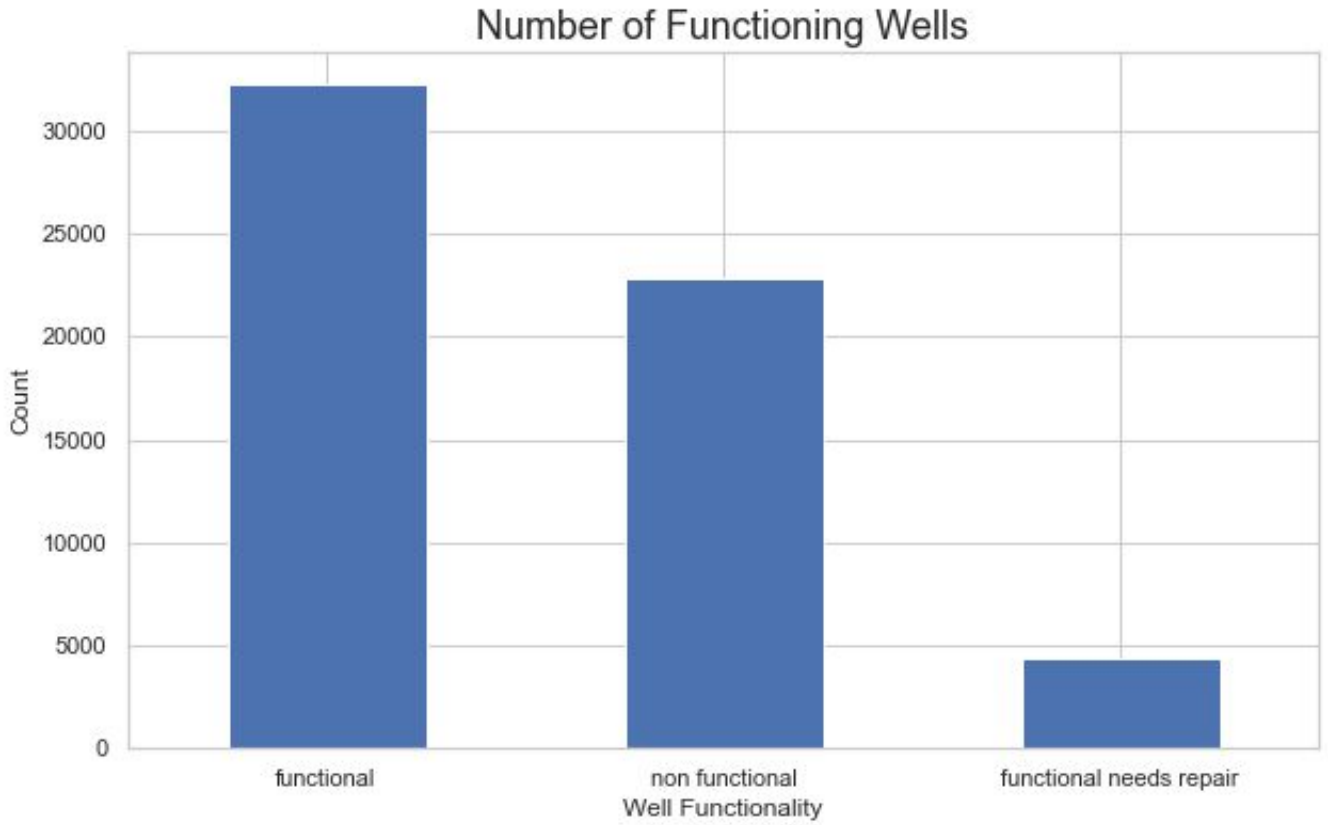
Management

Target

Functioning Wells

NonFunctioning Wells

Functioning but need repair


Number of Functioning Wells
Count
30000
25000
20000
15000
10000
5000
0
functional
non functional
functional needs repair
Well Functionality

PRECISION

Out of all positive predictions, the amount that are actually positive.

Of all wells predicted to be non-functional, how many really are nonfunctional?

Model Results -Precision

Functioning Wells

82%

Nonfunctioning Wells

83%

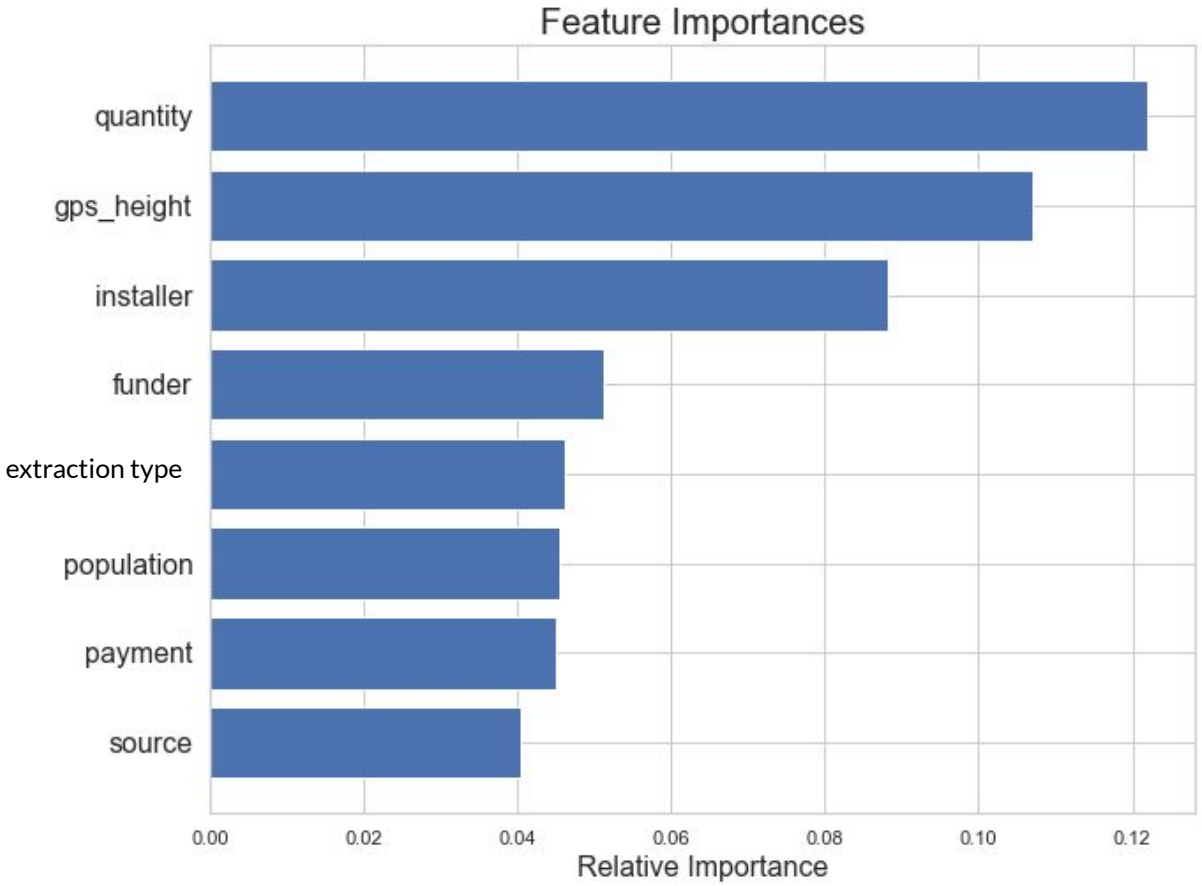
Functioning in Need of Repair*

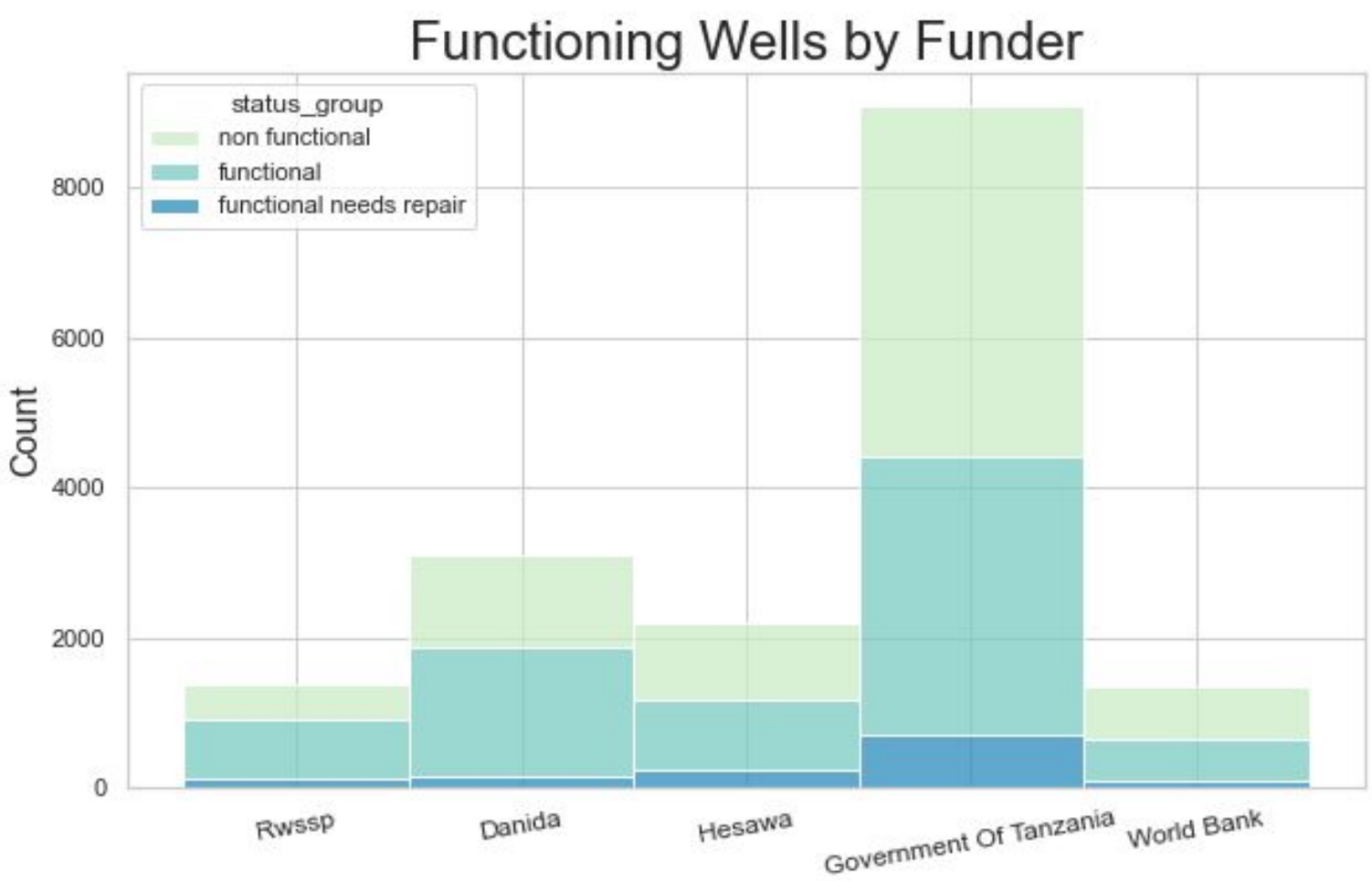
44%

* often are actually functioning, don't need repair

Recommendation

Focus on non-functioning wells rather than functioning wells in need of repair.


Feature Importances
quantity
gps_height
installer
funder
extraction type
population
payment
source
0.00
0.02
0.04
0.06
0.08
0.10
0.12
Relative Importance


Functioning Wells by Funder
status_group
non functional
functional
functional needs repair
Count
8000
6000
4000
2000
0
Rwssp
Danida
Hesawa
Government Of Tanzania
World Bank

Among top 5 funders, 47% of wells are non-functional

Recommendation —

Partner with the World Bank.

- Existing relationship
- 52% of wells funded are non-functional
- Install 20% of wells they fund

World Bank Funded Wells

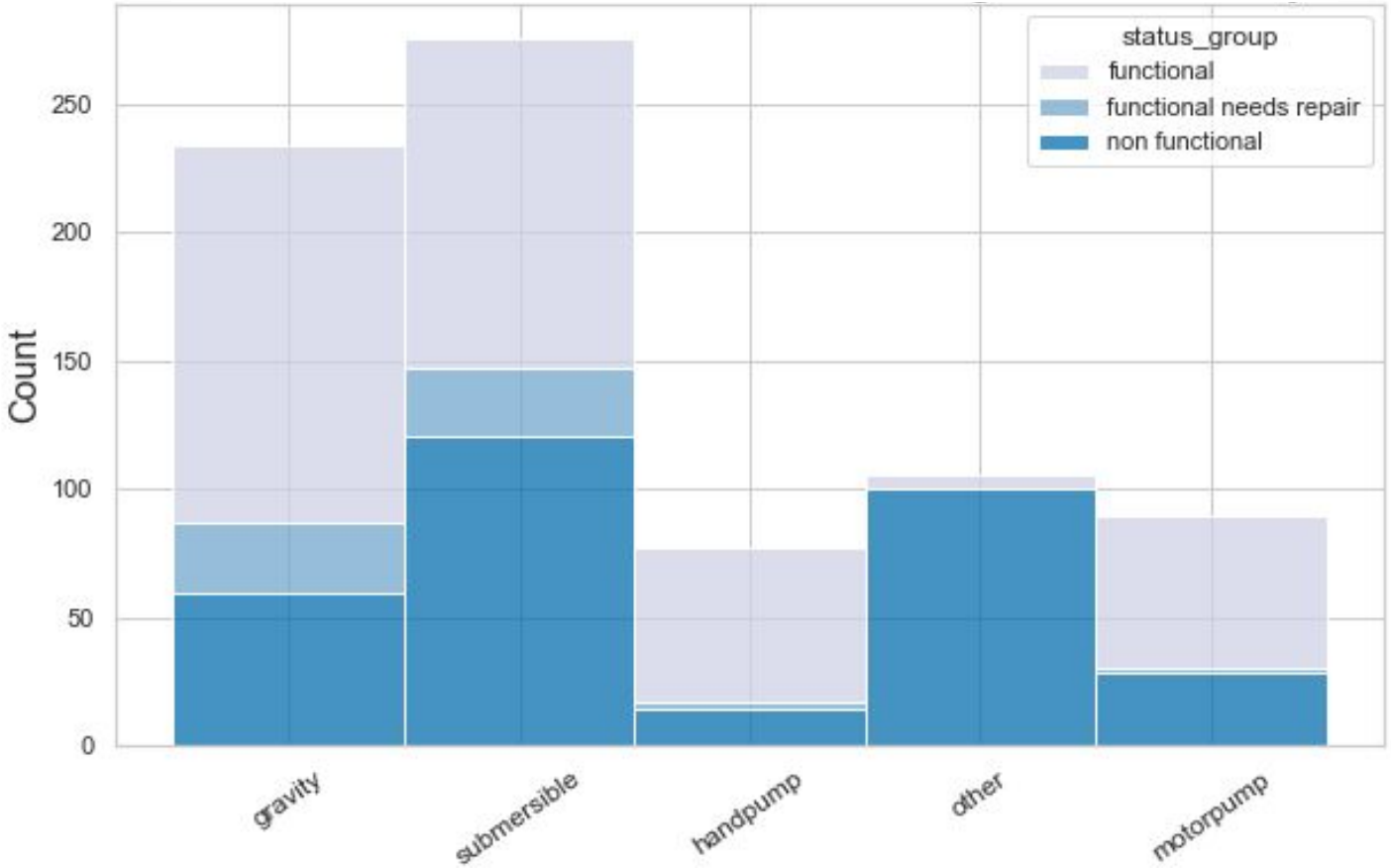
Wells labeled with Enough water:

51% Functional

41% NonFunctional

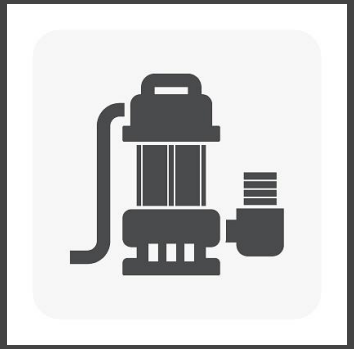
8% Functional needs repair

Well Functional Status with Enough Water - Pump Type



Recommendation —

Target non-functioning wells that have enough water but utilize submersible pump technology.



Thank you

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