Tanzanian Water Crisis:

Predicting Functionality of Water Wells in Tanzania Using Machine Learning

By: Orin Conn

Table of Contents

- The Problem & Data Utilized
- OSEMN Modeling Process
- Best Machine Learning Model
- Most Important Features of Functionality
- Conclusions & Recommendations

The Problem:

- ⅓ of Tanzania is arid or semi-arid (desert)
- No access to clean water
- Pollution contaminates groundwater
- Pumps don’t always work.

Data Utilized:

- DrivenData dataset
  - Tanzanian Ministry of Water
  - Taarifa

OSEMN Process

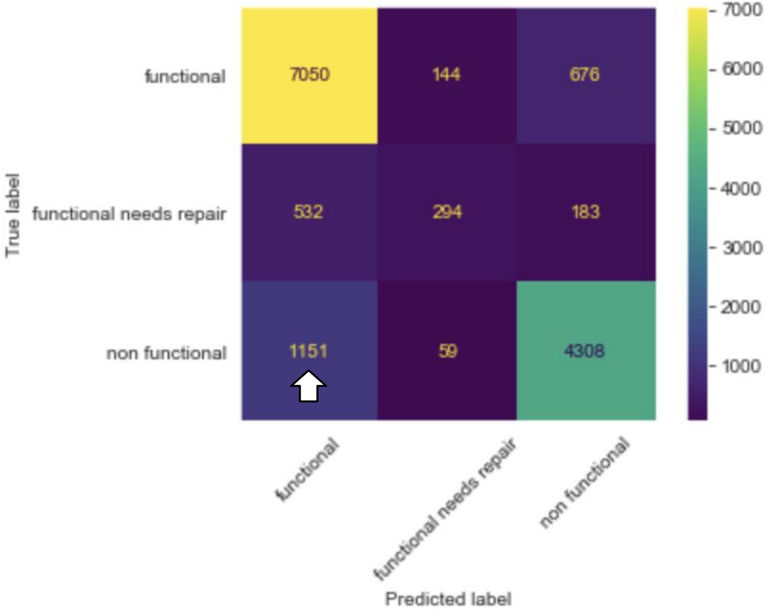
- Obtained Compiled Data from DrivenData
- Scrub missing values & duplicate variables
  - Converted categorical data to numeric
- Explored relationship to functionality
  - Water Quality
  - Pump Types
  - Location, etc.
- Modeling
  - Decision Tree
  - KNN
  - Random Forest
  - XGBoost
- iNterpreted best results!

Best Performer: Random Forest

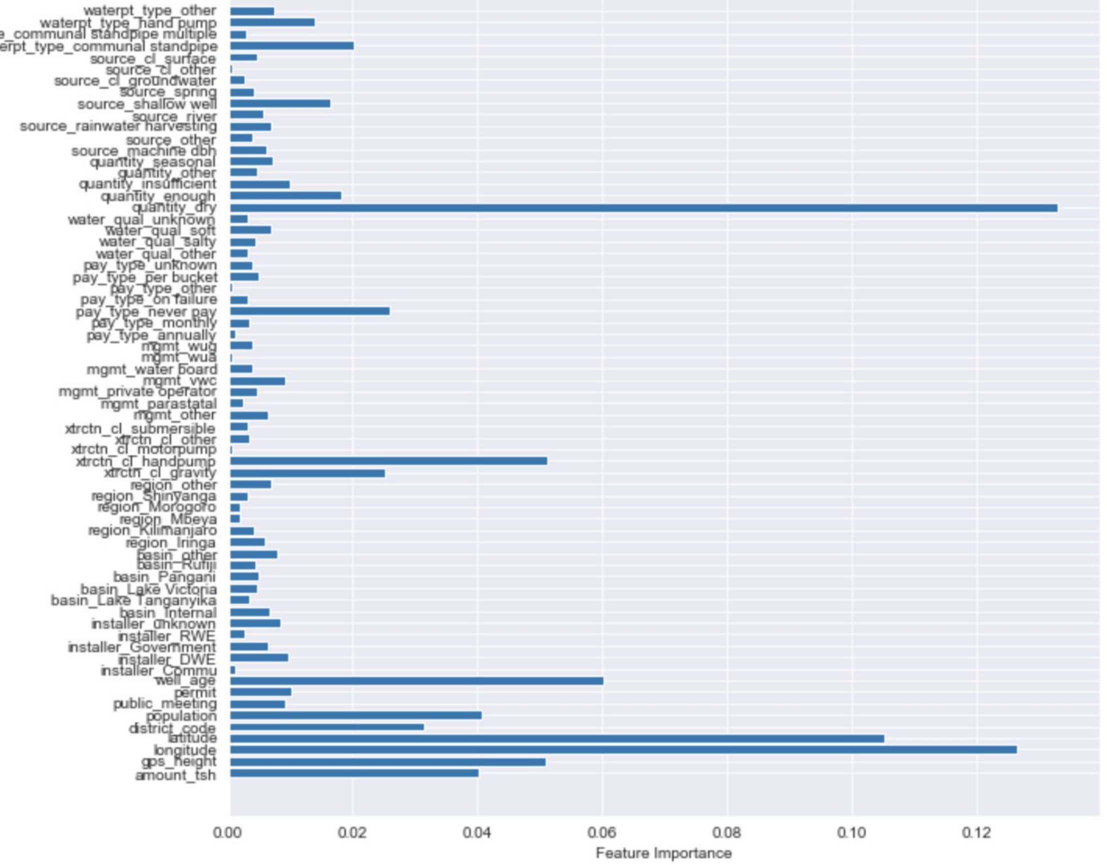
Highest Accuracy: **0.8095**

n_estimators = 200,

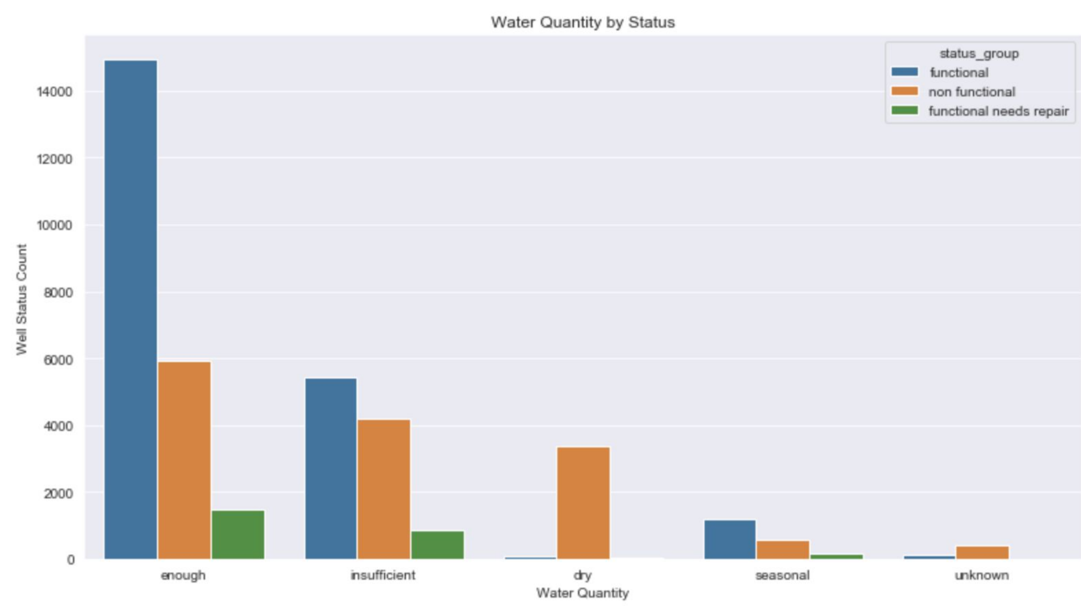
min_samples_split=8

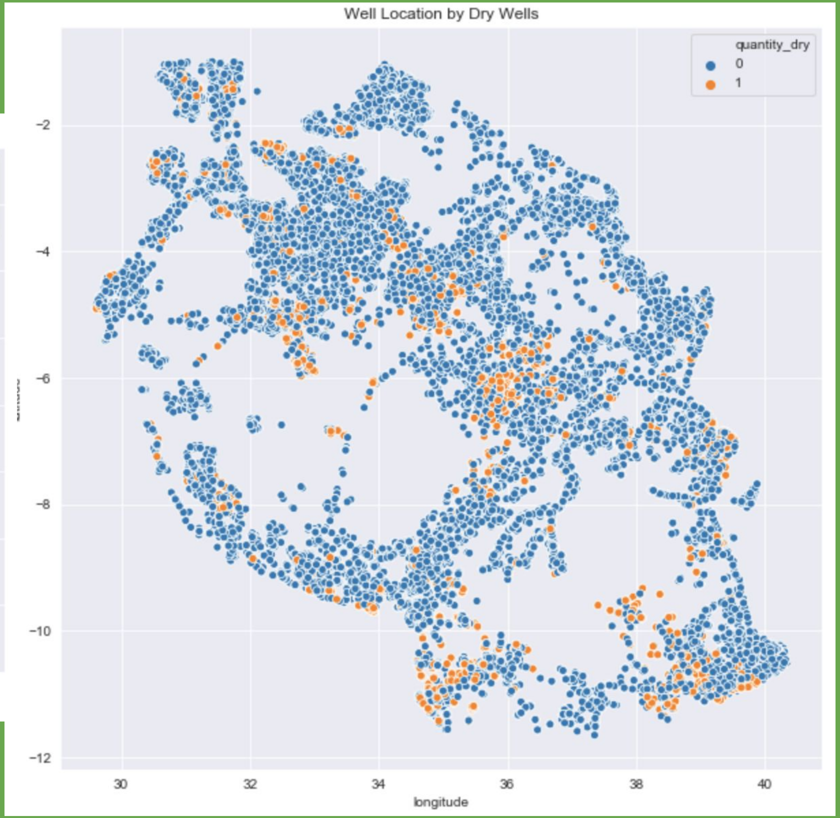


	functional	functional needs repair	non functional
functional	7050	144	676
functional needs repair	532	294	183
non functional	1151	59	4308

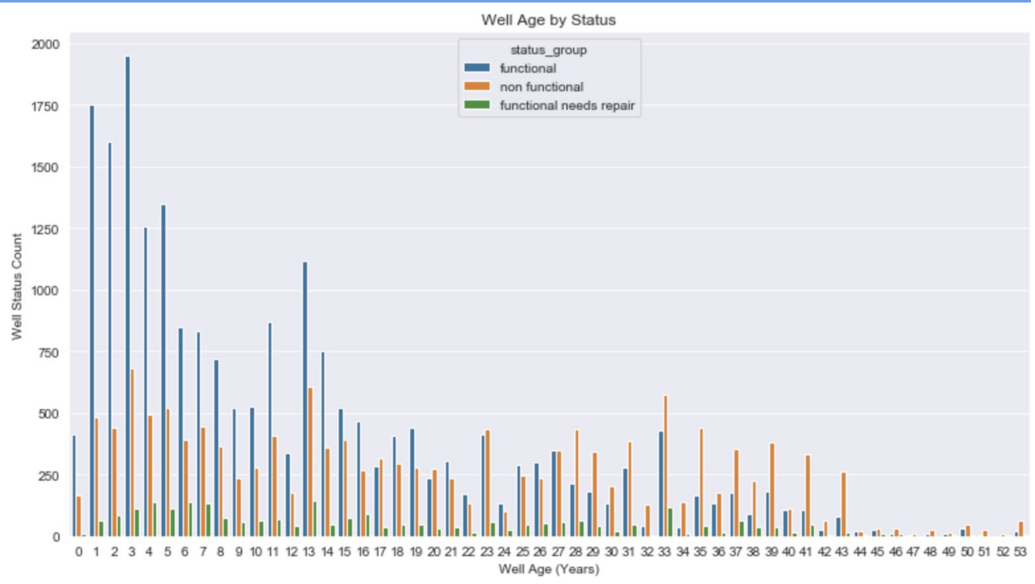


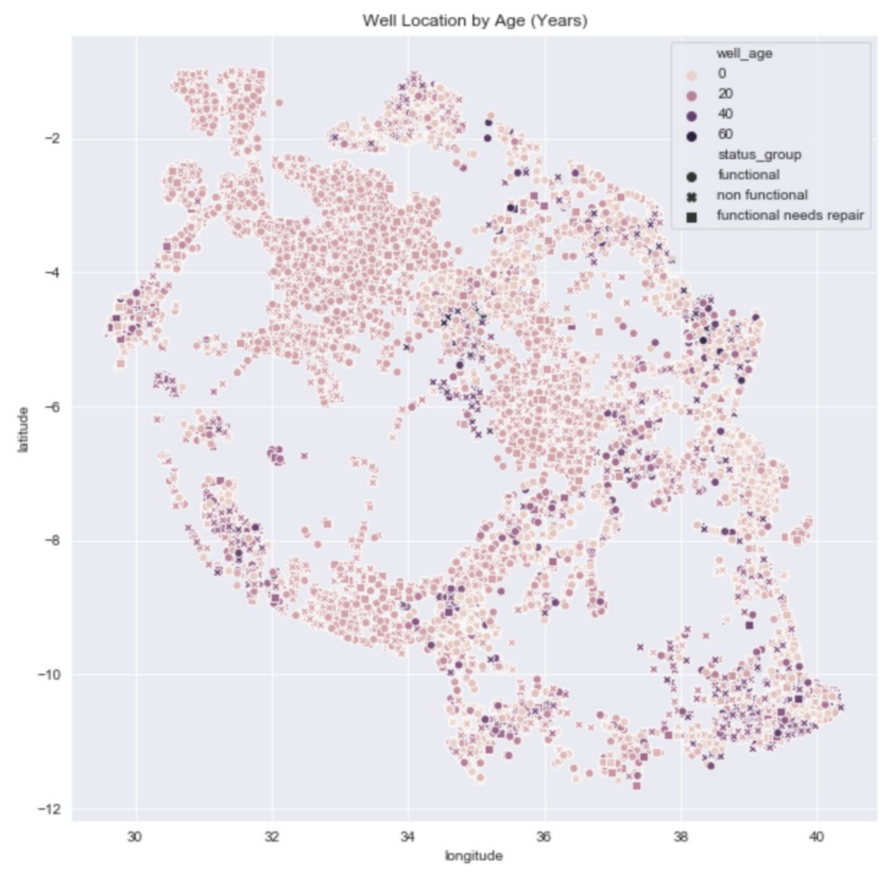
Water Quantity of Well: Dry = Non-Functional



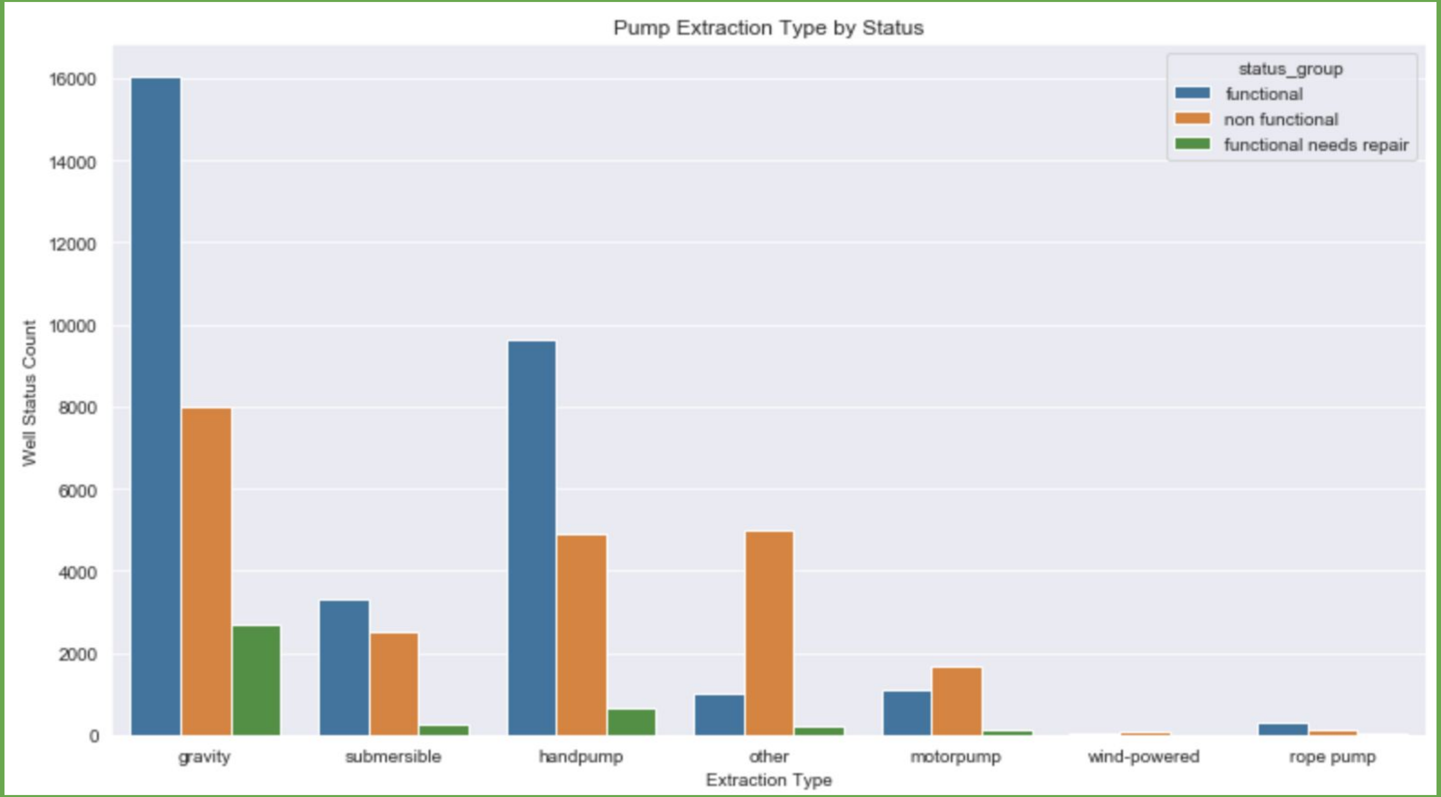


Age of the Well Pump: Date of Data Recorded - Construction Year





Pump Extraction Type: gravity, handpump - mostly functional



Conclusions

- ⇩ water quantity = ⇩ functionality
  - Dry wells are almost always not working
- ⇧ well age = ⇩ functionality
  - Older pumps should be refurbished
- Gravity pumps and handpumps are less prone to breaking
  - Only install these if possible

Future Recommendations

- Limit the redundancy of categorical data
- More time to explore amount of use per well, possibly population
- Exploration into cost associated with well type

Thank you!!