

# Predicting Pump Failure in Tanzanian Water Wells

A project for The Government of Tanzania



Aaron Galbraith • 2023



# Background

- 23 million people in Tanzania lack access to safe drinking water
- 59% of government-funded wells fail, compared to 43% of wells funded by other orgs



# Project Goal

to help the Government of Tanzania identify trends associated with wells that become non-functional

1. adjust plans *before* installation
2. monitor at-risk wells *after* installation

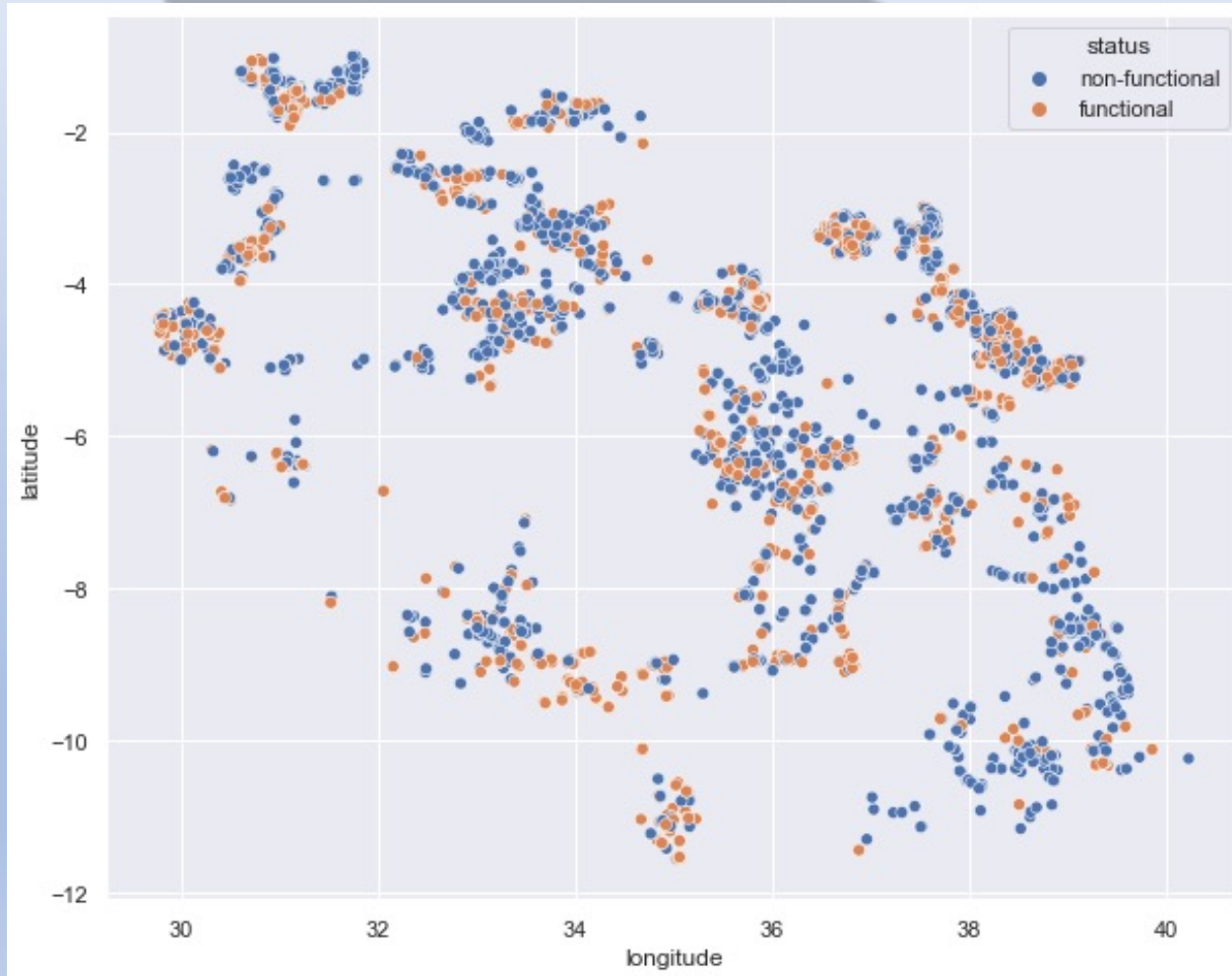
# Success Metrics

1. “recall”: identification of non-functional wells
2. overall accuracy

# Data Overview

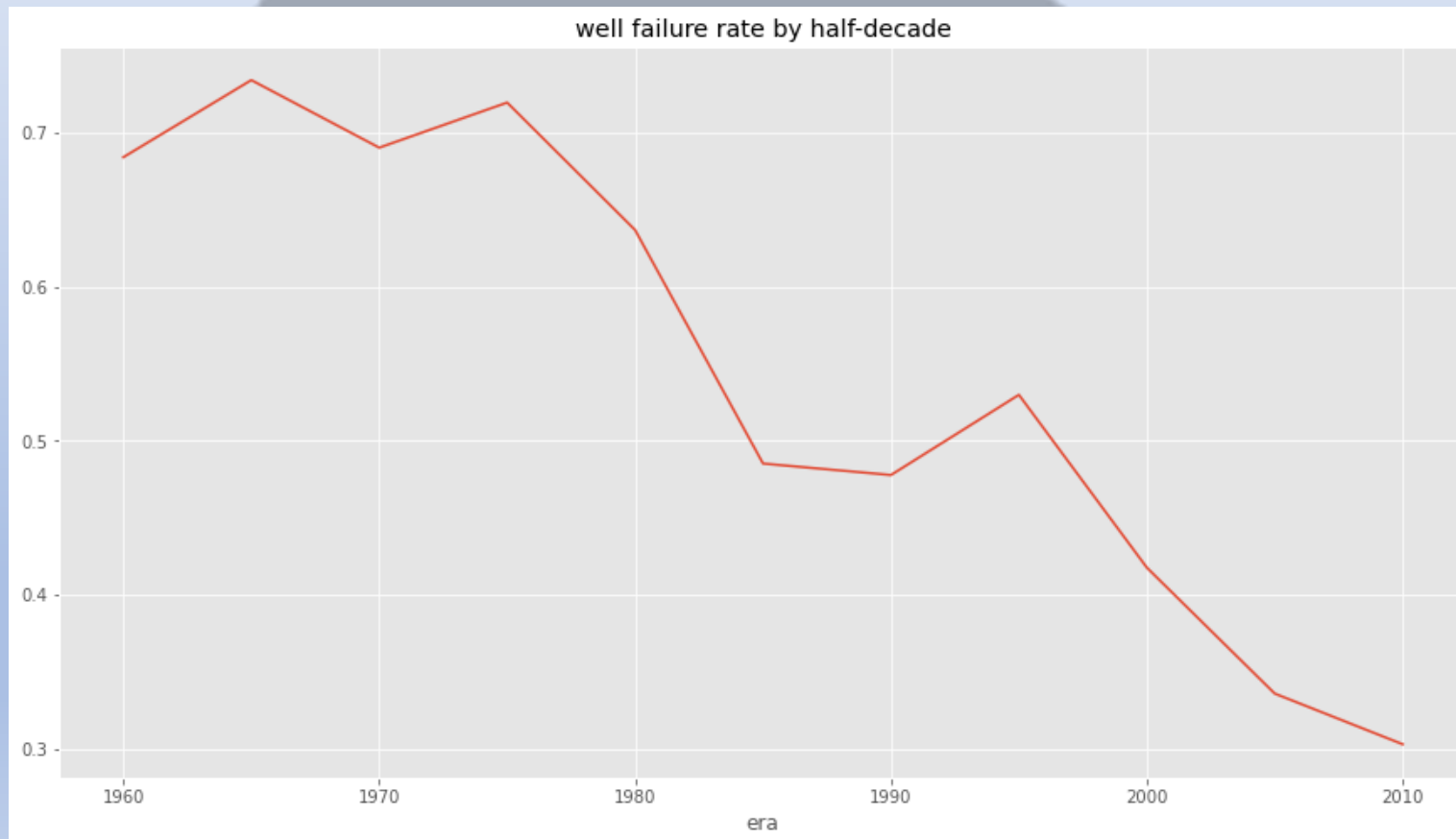
- location data
- natural conditions
- well structure
- installation and management

# Data Overview



# Data Overview

failure rate over time



# Modeling

model	recall	accuracy
logistic	77%	75%
XG boost	78%	78%
random forest	81%	76%

## random forest model statistics:

train recall: 83.0%

test recall: 80.9%

train accuracy: 80.2%

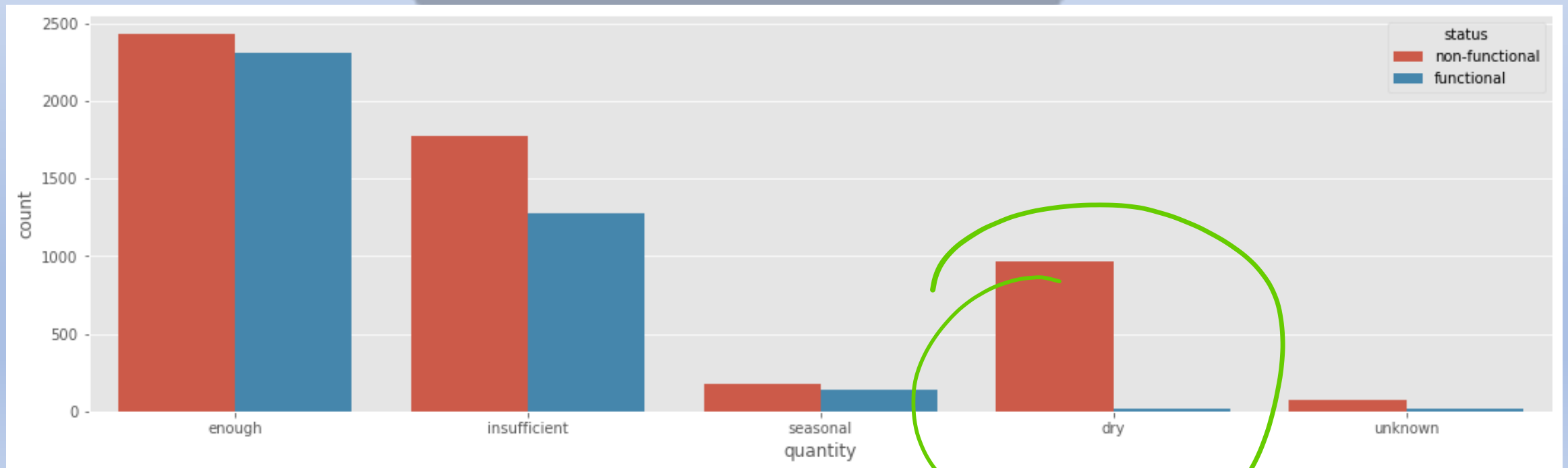
test accuracy: 76.3%



# Results

most predictive features

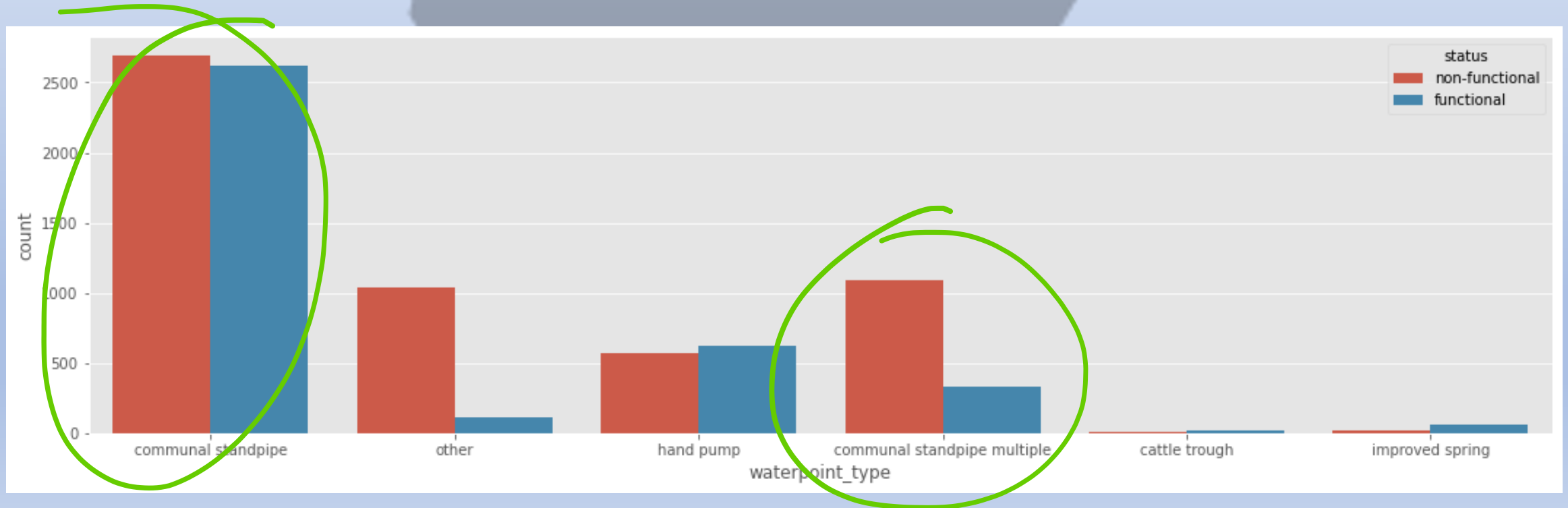
1. water quantity



# Results

most predictive features

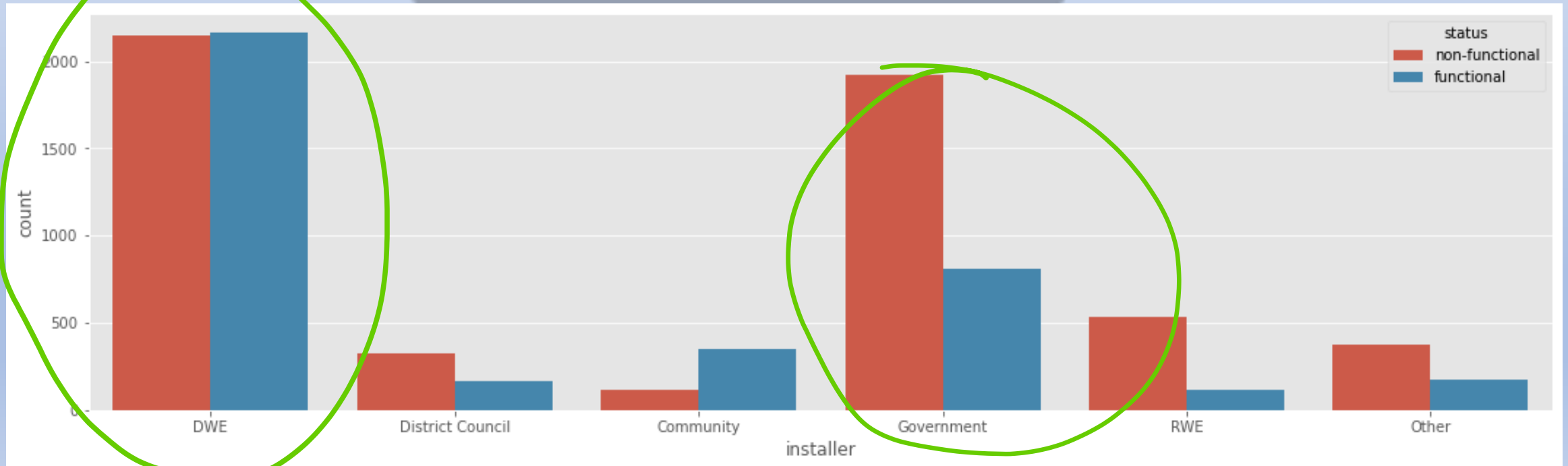
2. waterpoint type



# Results

most predictive features

3. installer



# Recommendations

1. *before* installing wells, prioritize, if possible
  - a. sufficient water quantity
  - b. using handpump or communal standpipe
  - c. installation by community or DWE

# Recommendations

2. *after* installing wells, commit resources to monitoring
  - a. wells with low water quantity
  - b. communal standpipe *multiple* types
  - c. government-installed wells
  - d. wells installed before 1985

# Further Inquiry

gather more complete data, particularly in water quantity, waterpoint type, and installer identity

acquire data on cost and availability of options

# Thank you



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