Dsc-Phase 3 Project

# Water Pump Status Predictions in Tanzania

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# BRIEF


- The aim of this project is to develop various machine learning models using different techniques. The models will help to categorise the water points into 3 different groups:

  1. Functional
  2. Non-Functional
  3. Requires Repair

- The stakeholders for this project include:

  1. Government of Tanzania
  2. NGOs in the country
  3. Private Limited Companies

# BUSINESS UNDERSTANDING


- Tanzania is a third world country. As of 2024 December, the country has a population of 67.44 million people. As with many third world countries, access to clean water is a major challenge. Through both public and private participation, the country has been able to install water pumps across the country. Unfortunately, a number of these water points require repairs or are completely not functional.
- A lot of factors affect the functionality/availability of the water points including:

1. Geographical Location
2. Environmental conditions
3. Water pump specifications
4. Maintenance schedules
5. Water quality

# BUSINESS UNDERSTANDING

- With this classification, the stakeholders can take corrective action to improve the situation. The results will significantly increase the efficiency of the implementation plan as the associated parties will be able to:
- Introduce preventative maintenance
- Create an effective resource allocation plan
- Improve future water points installations
- The project hopeful will lead to an increase in socio-economic development in Tanzania by ensuring sustainability through clean water sources across the country.

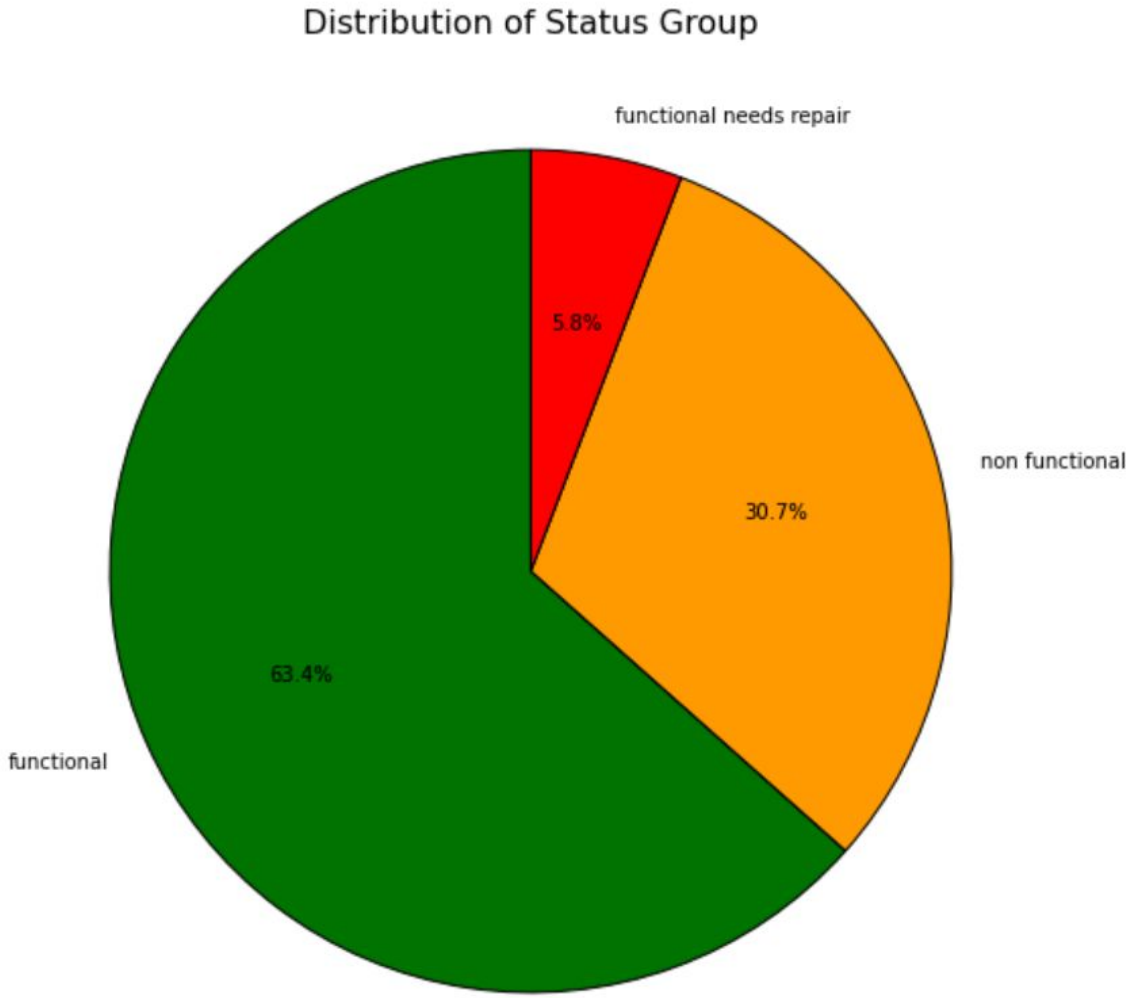
# DATA CLEANING/ANALYSIS

The following steps were taken to ensure that the data was cleaned:

1. Columns that had no relevance to the business problem were dropped.
2. Empty rows were also dropped.
3. Using appropriate data analysis methods, certain categorical columns with empty entries were replaced with the mode. Empty numerical columns were replaced with average figures.
4. Age was created as a column

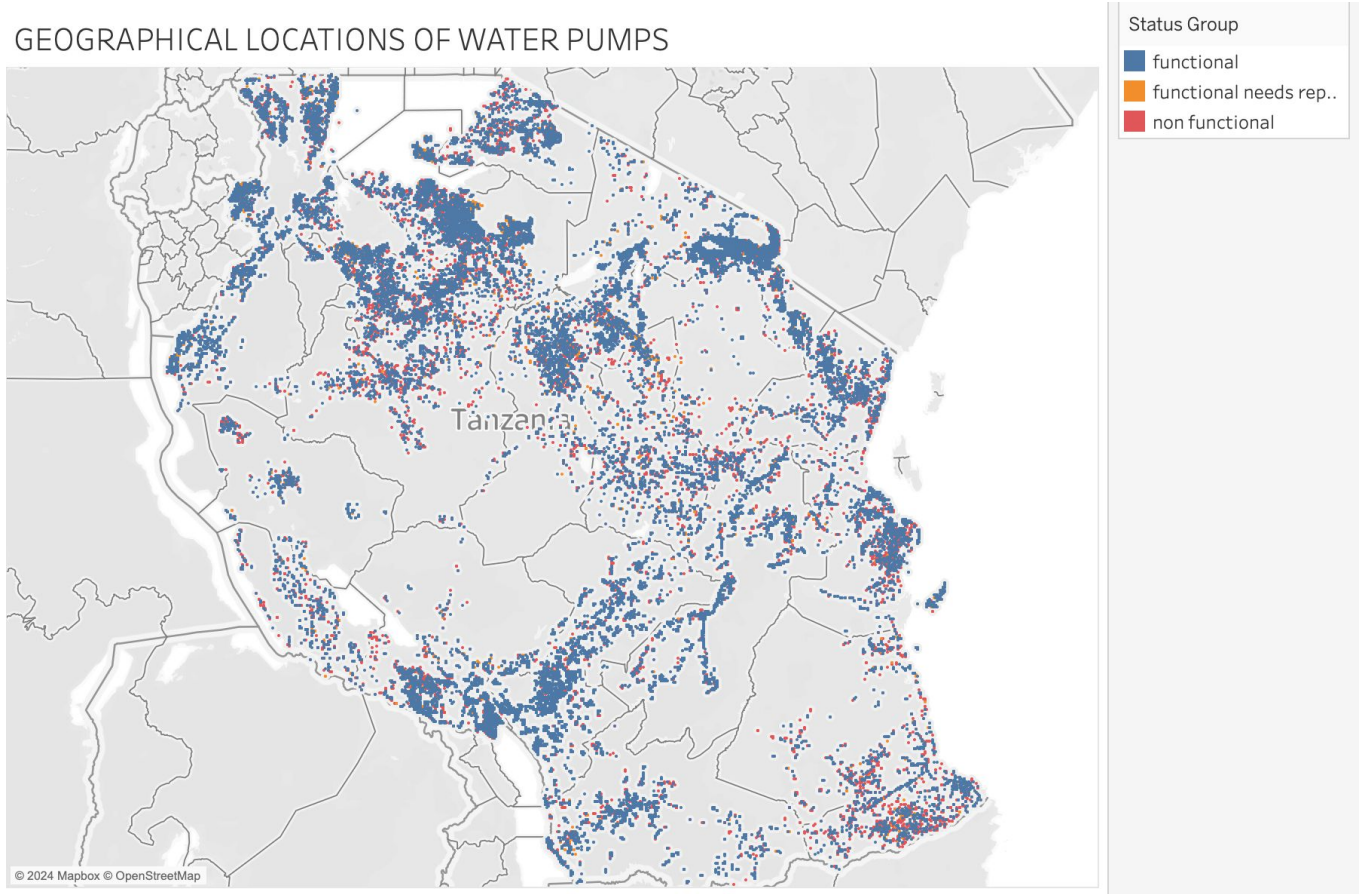
# WATER PUMP STATUS

- Graph shows that majority of the pumps are still functional.



# WATER PUMP GEOGRAPHICAL LOCATION

- This graph shows the graphical representation of the water pump's locations.



# RECOMMENDATION

- Establish continuous data collection to improve the performance of predictive models and support proactive maintenance of water points.
- Decision Tree Models have proven to be more effective than regression models in predicting waterpoint conditions.
- Resources should be focused on further enhancing and deploying this model for practical use.
- Direct resources towards high-risk waterpoints in need of repairs or maintenance.
- Work with NGOs to create a fund or organization focused on reviewing and repairing aging wells.
- Develop financial support systems, such as subsidies from local governments or districts, to assist with maintenance costs and ensure a sustainable water system.

**THANK YOU**

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