Well Functionality in Tanzania

PREDICTING WATER WELL STATUS FOR EFFICIENT RESOURCE ALLOCATION

Summary

- Develop an efficient system to predict failing water wells in Tanzania.
- Utilize machine learning models to classify well functionality.
- Improve resource allocation and maintenance planning.

Outline

- Business Problem
- Data & Methods
- Results
- Conclusions

Business Problem

- Develop an efficient system to predict failing water wells in Tanzania.
- Utilize machine learning models to classify well functionality.
- Improve resource allocation and maintenance planning.

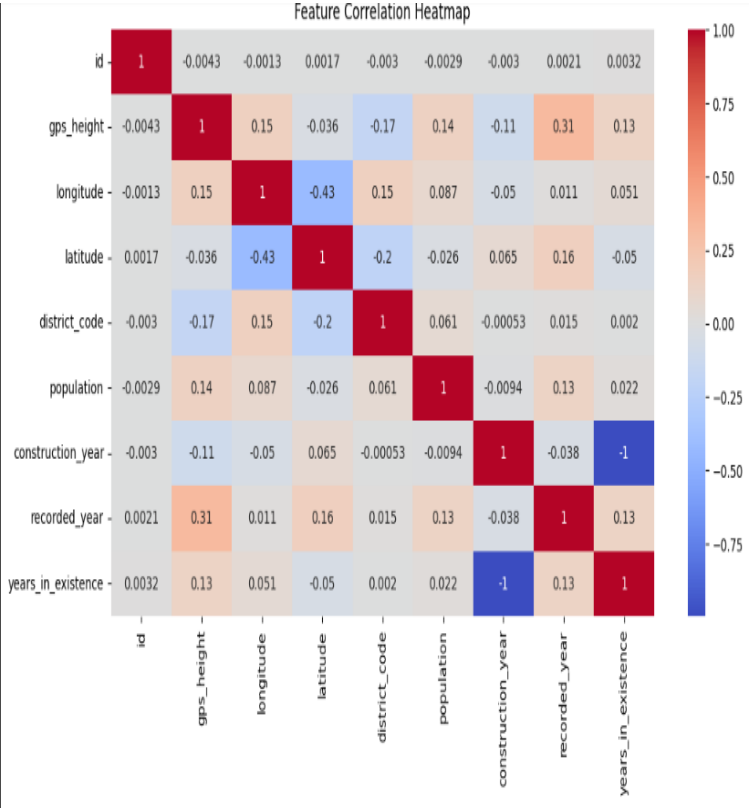
Data and Methods

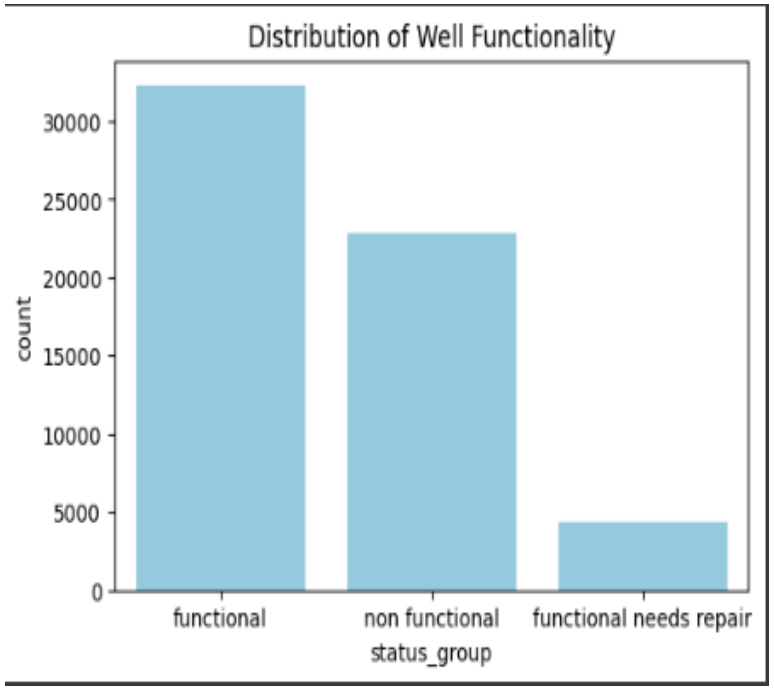
- Performed Exploratory Data Analysis (EDA) to identify trends.
- Utilized machine learning models for classification.
- Dataset includes location, depth, construction year, and water quality attributes.

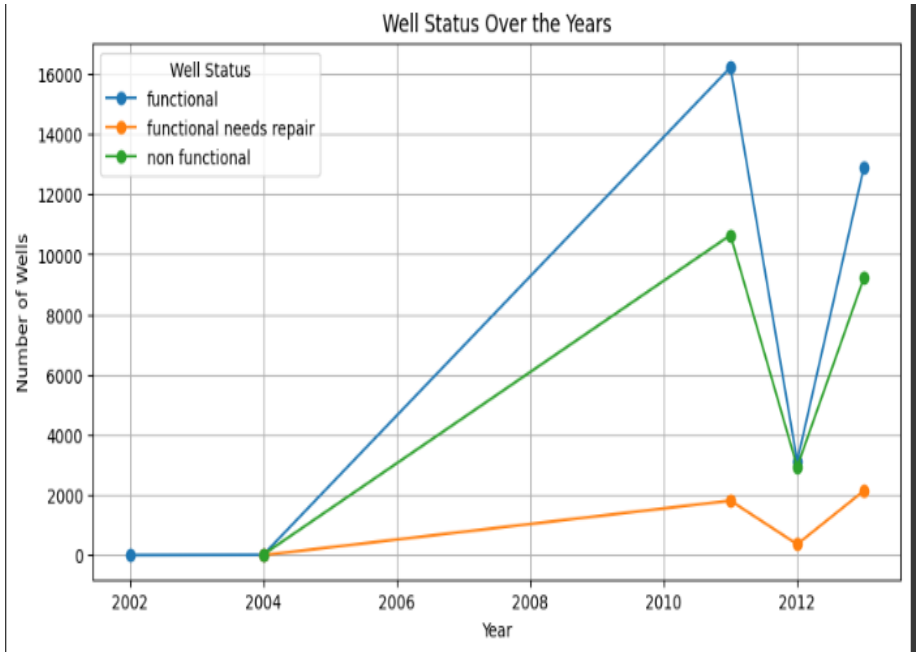
Results

- Identified key factors contributing to well failure.
- Developed a model to accurately classify well functionality.
- Predictions enable proactive maintenance planning.

Results


Feature Correlation Heatmap
id 1 -0.0043 -0.0013 0.0017 -0.003 -0.0029 -0.003 0.0021 0.0032
gps_height -0.0043 1 0.15 -0.036 -0.17 0.14 -0.11 0.31 0.13
longitude -0.0013 0.15 1 -0.43 0.15 0.087 -0.05 0.011 0.051
latitude 0.0017 -0.036 -0.43 1 -0.2 -0.026 0.065 0.16 -0.05
district_code -0.003 -0.17 0.15 -0.2 1 0.061 -0.00053 0.015 0.002
population -0.0029 0.14 0.087 -0.026 0.061 1 -0.0094 0.13 0.022
construction_year -0.003 -0.11 -0.05 0.065 -0.00053 -0.0094 1 -0.038 -1
recorded_year 0.0021 0.31 0.011 0.16 0.015 0.13 -0.038 1 0.13
years_in_existence 0.0032 0.13 0.051 -0.05 0.002 0.022 -1 0.13 1
id
gps_height
longitude
latitude
district_code
population
construction_year
recorded_year
years_in_existence
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75


Distribution of Well Functionality
count
30000
25000
20000
15000
10000
5000
0
functional
non functional
functional needs repair
status_group


Well Status Over the Years
Well Status
functional
functional needs repair
non functional
Number of Wells
16000
14000
12000
10000
8000
6000
4000
2000
0
2002
2004
2006
2008
2010
2012
Year

Conclusions

- Machine learning improves well maintenance efficiency.
- Predictive modeling aids in resource allocation and decision-making.
- Future work includes expanding datasets and refining models for higher accuracy.

Recommendations

- Prioritize maintenance efforts on wells predicted to fail.
- Allocate resources efficiently based on predicted risk levels.
- Integrate predictive modeling into national water management systems.
- Regularly update the model with new well data for better accuracy.