NWG
living water

Work-Engine

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Date:
January 21, 2023

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Understanding

- Understanding chronic water waste throughout our system

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- Detailing our data-driven approach to a complex problem

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Part 1:

Understanding

Sustainable
Development Goals

Date:
March 21, 2023

NWG
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24% of the U.K's drinking water is lost to leaking pipes

1 in 4

2.4 Billion liters of water a day wasted

Sustainable
Development Goals

Date:
January 21, 20235

NWG
living water

Only 2.5% of Earths water is fresh water.

Sustainable
Development Goals

Date:
January 21, 20235

Climate

Reducing water leakage is critical as we strive to achieve carbon net zero and fight climate change.

Climate change itself affects water distribution; with colder winters and hotter summers, the stress our national infrastructure endures worsens by the year.

Smarter systems play a vital role in the solution to this systematic problem.

Sustainable
Development Goals

Date:
January 21, 2023

Objectives

01

Delivering an innovative system capable of highlighting critical weak points in infrastructure.

02

Produce a program capable of predicting asset failures, efficiently reducing actualised loss

03

Utilise logistic regression alogrithms to efficiently cultivate data-driven systems

Part 2:

Implementaion

Sustainable
Development Goals

Date:
January 21, 2023

Methodology

By simulating Northumbria Water Group's Clean water system as a directional tree, we've created a system capable of efficiently detecting leaks; one which can predict the failure of future assets, enabling NWG to act in advance, minimising disruption for consumers.

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Date:
January 21, 2023

Finding Faults

- By modelling the water distribution network as a graph, particularly a Directed Tree, we can calculate the differences in pressure between pipes and pumps.
- By spotting sudden loss in pressure we can easily find potential leaks, automatically flagging them for repair.
- While an increase in Capex may be required to facilitate the rollout of sensors on older assets, the real-term increase in profitability as a result of the decreased downtown of the system and loss of water will be worth it.

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Date:
January 21, 2023

Prediciting Problems

- Taking a combination of temperature and pressure data, we have created a linear regression model capable of detecting pipes of risk of failure

- By continuously comparing the tolerances of our assets with predicted conditions we can highlight high-risk areas

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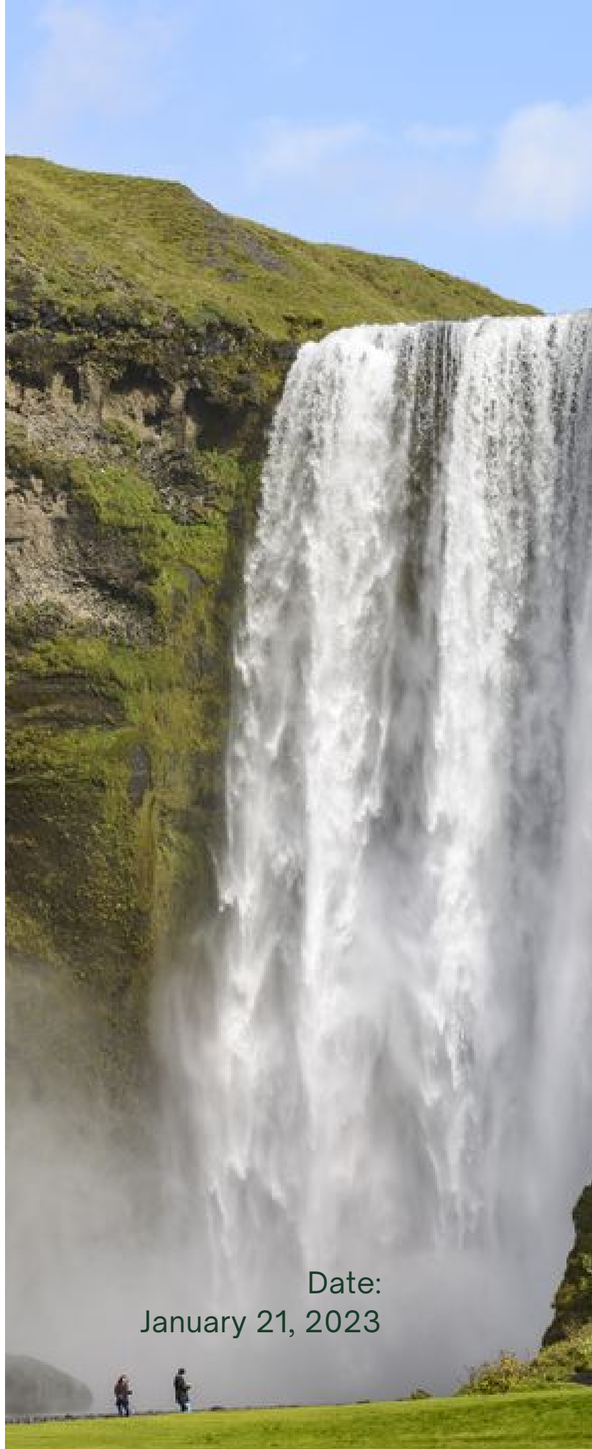
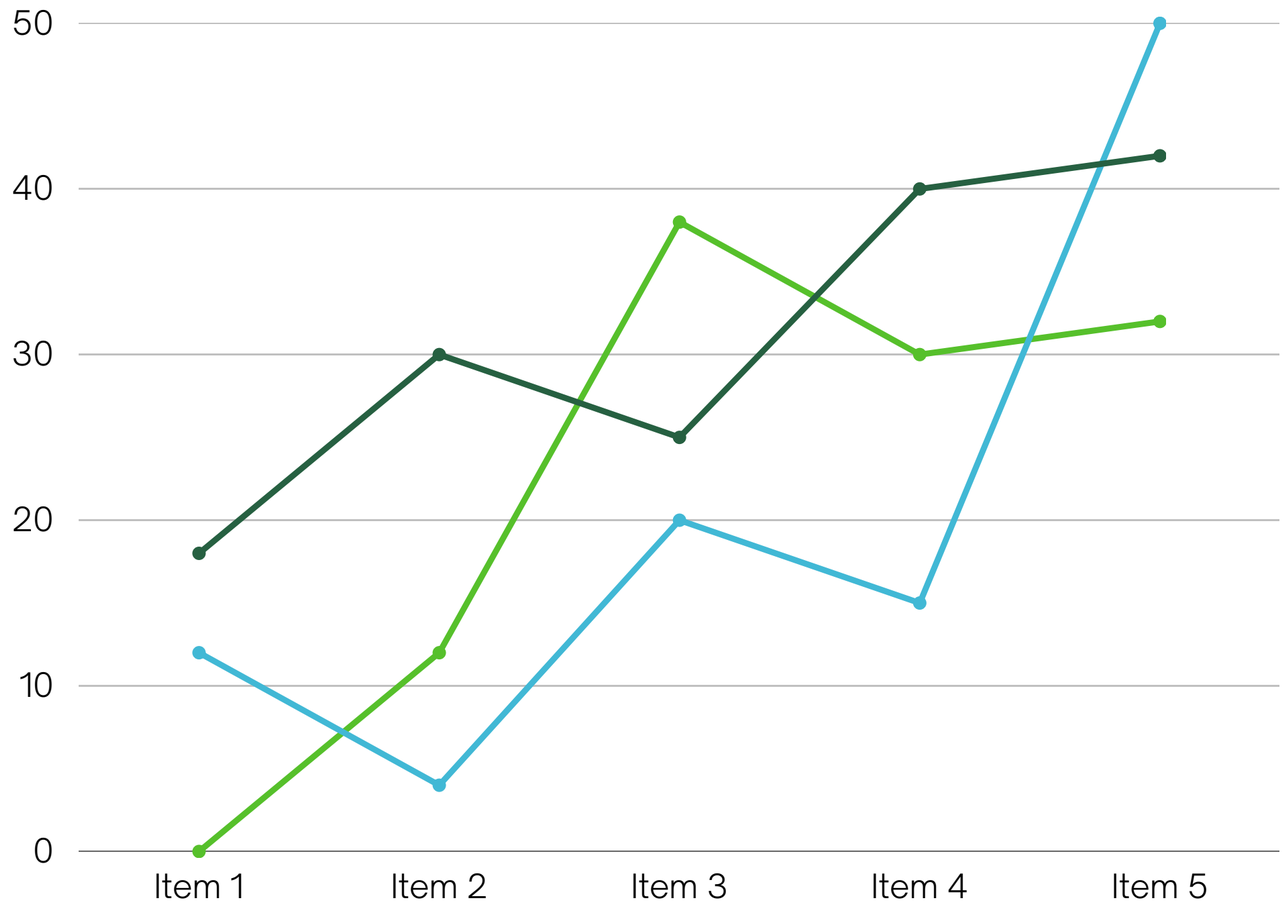
Date:
January 21, 2023



Linear Regression

The y-intercept of our linear regression model is the drop in temperature, in the next 12 hours, which would cause a pipe to leak, these are then ranked ordered by those with the least tolerance in temperature away from breaking.



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Part 3:

Measurement

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Date:
January 21, 2023

Next Steps

Action Step 1

Adjust model to utilise real data from assets

Action Step 2

IMap NWG assets utilisng our graph model

Action Step 3

mplement a broader range of sensor readings in predictions

Action Step 4

Incorporate waste management into the model

Action Step 5

Utilise more advance machine learning algorithms for better predicitions