Bringing energy to your door

NIA ENWL020
Artificial Intelligence & Machine Learning

Progress Report

31 July 2019

VERSION HISTORY

Version	Date	Author	Status	Comments
V1.0	03.06.19	Geraldine Paterson	Final	

REVIEW

Name	Role	Date
Lucy Eyquem	Innovation PMO Manager	04.06.19
Paul Turner	Innovation Manager	26.07.19

APPROVAL

Name	Role	Date
Steve Cox	Engineering & Technical Director	29.07.19

CONTENTS

GLOSSARY

Term	Description
ML	Machine learning
AI	Artificial intelligence
DSP	Digital Signal Processing
LV	Low voltage
LCT	Low carbon technologies

1 PROJECT FUNDAMENTALS

Title	Artificial Intelligence and Machine Learning
Project reference	NIA_ENWL020
Funding licensee(s)	Electricity North West Limited
Project start date	October 2018
Project duration	3 years
Nominated project contact(s)	Geraldine Paterson (innovation@enwl.co.uk)

2 PROJECT SCOPE

This project will be a research piece investigating the application of machine learning (ML) and artificial intelligence (AI) to data already being collected by low voltage monitoring equipment and transformer monitoring equipment already deployed on the network. The research will investigate whether machine learning can be used to identify hidden trends and make recommendations for network investment.

3 OBJECTIVES

- Collate data from the various systems.
- Build, train and evaluate a model to classify and work with the data.
- Produce recommendations for network operation and investment.

4 SUCCESS CRITERIA

- Report on the methodology for collating the data.
- Production of a model to interrogate the data sets.
- Report detailing outputs from the model and recommendations for network operation and investment.
- Report detailing how the model can be transferred to business as usual.

5 PERFORMANCE COMPARED TO THE ORIGINAL PROJECT AIMS, OBJECTIVES AND SUCCESS CRITERIA

Project setup

The project partner resources required for the delivery of the project have been identified and placed. A number of these resources are from the Camlin Group Machine Learning and AI research centre based in Parma, Italy. They bring vast experience of applying ML/AI

techniques to real world datasets. In addition support from the DSP and Firmware team was put in place to enable additional data collection from field devices.

Additional Low Voltage (LV) Data Collection Activities

Data collation activities are currently underway, with large volumes of information from low voltage networks, as well as tap changer monitoring and transformer monitoring being transferred into a streamlined system implemented and utilised by the Parma group.

In addition new triggering methods for field deployed equipment have been developed by the DSP and Firmware engineering team, allowing additional information outside of the standard triggering/data gathering scope to be captured for analysis. This has undergone rigorous testing before being deployed to a large number of field devices. The new data collected by the new triggering methods will improve understanding of the signatures from the loads on the network.

LV Model Development

The need for three specific types of LV network models was identified. The first model is being developed and tuned to understand the classification of different types of loads on individual feeders, as well as predict growth of the load over time.

A second model uses information from standard monitoring devices to perform a basic health assessment and ranking of cables, and a third will be developed to identify the growth and issues created by Low Carbon Technologies (LCTs.)

Next Steps

The next stage of the project will see the models used initially for a static report of the different types of load on the network, identify load growth of LCTs and identify any unknown patterns and relationships that may exist in the data.

Later stages of the project will investigate methods for improving fault management, performing automatic analysis of tap changer monitoring data to provide actionable reports, as well as looking at predictive analytics for transformers.

6 REQUIRED MODIFICATIONS TO THE PLANNED APPROACH DURING THE COURSE OF THE PROJECT

There have been no changes to the planned approach.

7 LESSONS LEARNED FOR FUTURE PROJECTS

As the project is in its early stages, there are no lessons learned to date as yet.

8 THE OUTCOME OF THE PROJECT

Not applicable.

9 DATA ACCESS

Electricity North West's innovation data sharing policy can be found on our website.

There is currently no data available from the project.

10 FOREGROUND IPR

There is no foreground IPR associated with this project.

11 PLANNED IMPLEMENTATION

Not applicable.

12 OTHER COMMENTS

Not applicable.