Electricity Consumption Forecasting

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Aim: Investigating the use of Machine Learning techniques to predict short term electricity consumption using crowdsourced smart meter data

Motivation & Need

Government rollout of all 26 million UK homes to be fitted with smart meters, resulting to increasingly available and valuable energy consumption data

Increasing electricity demand and the energy crisis in the UK has led to rising prices

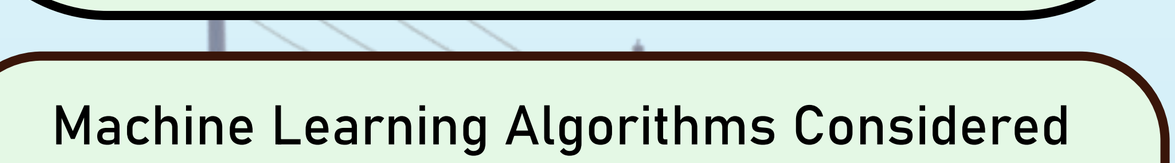
Better tools for analysis should be made available to consumers to help them understand their trends

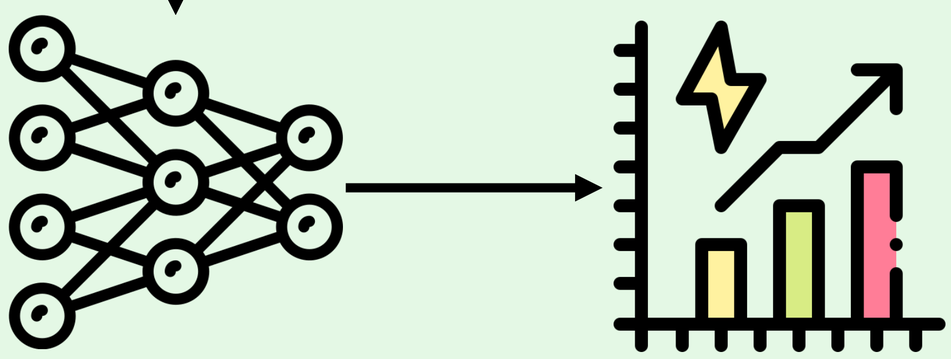
Project Challenges

⇒ Analysing over 5,000 households electricity consumption

⇒ Is it possible for a model to forecast for a specific home?

⇒ Which external factors influence energy forecasts most?





Optimizing Machine Learning algorithms

Getting accurate and reliable forecasts

Project Objectives

⇒ **Summarise** published findings on types of machine learning algorithms applied to forecasting consumption

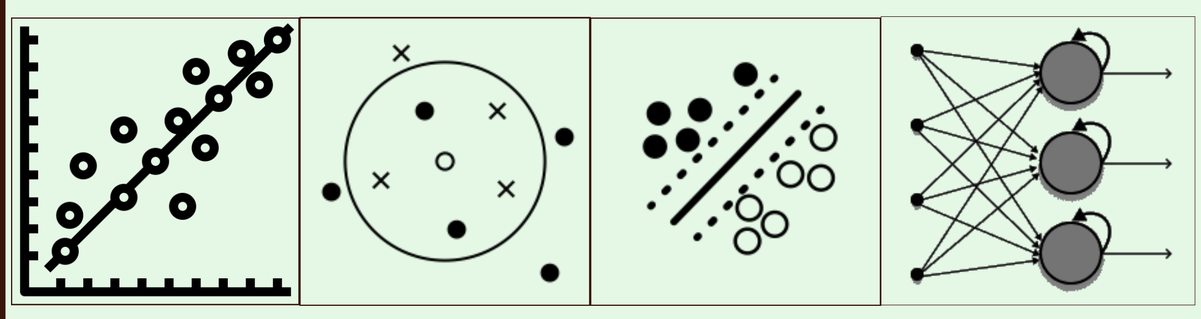
⇒ **Evaluate** each type of machine learning algorithm referenced

⇒ **Analyse and pre-process** the crowdsourced London household smart meter dataset

⇒ **Train** each of the chosen machine learning algorithms

⇒ **Evaluate** the effectiveness of generalisation in the models developed for forecasting electricity consumption on certain households

Machine Learning Algorithms Considered



Linear Regression

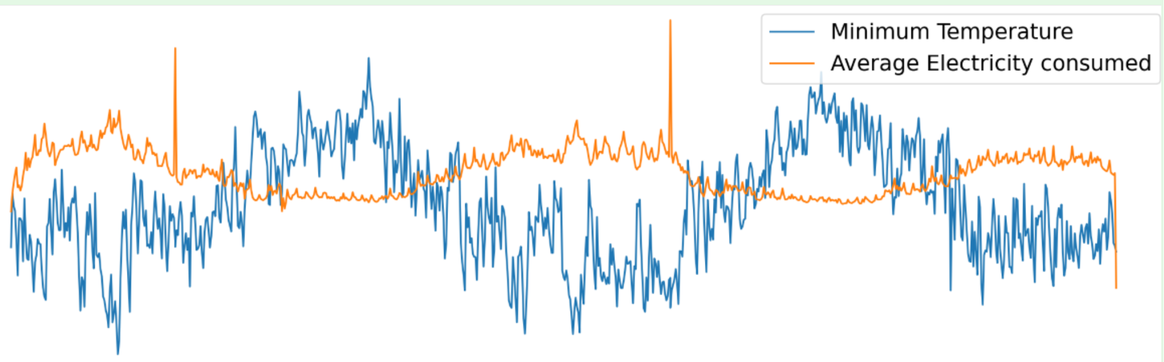
K-Means Nearest Neighbors

Kernel Support Vector Machine

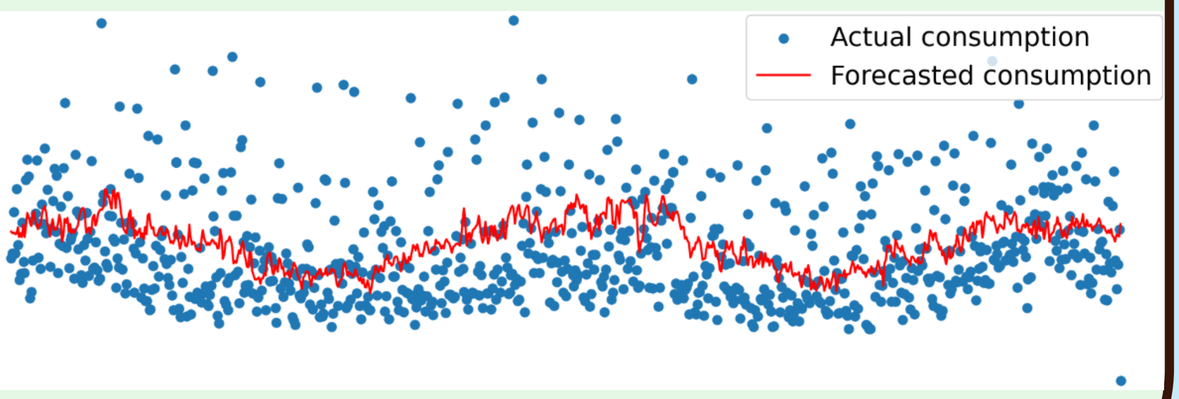
Recurrent Neural Network

Current Progress

Initial trend analysis of consumption vs temperature



Multiple Linear Regression forecast vs actual consumption

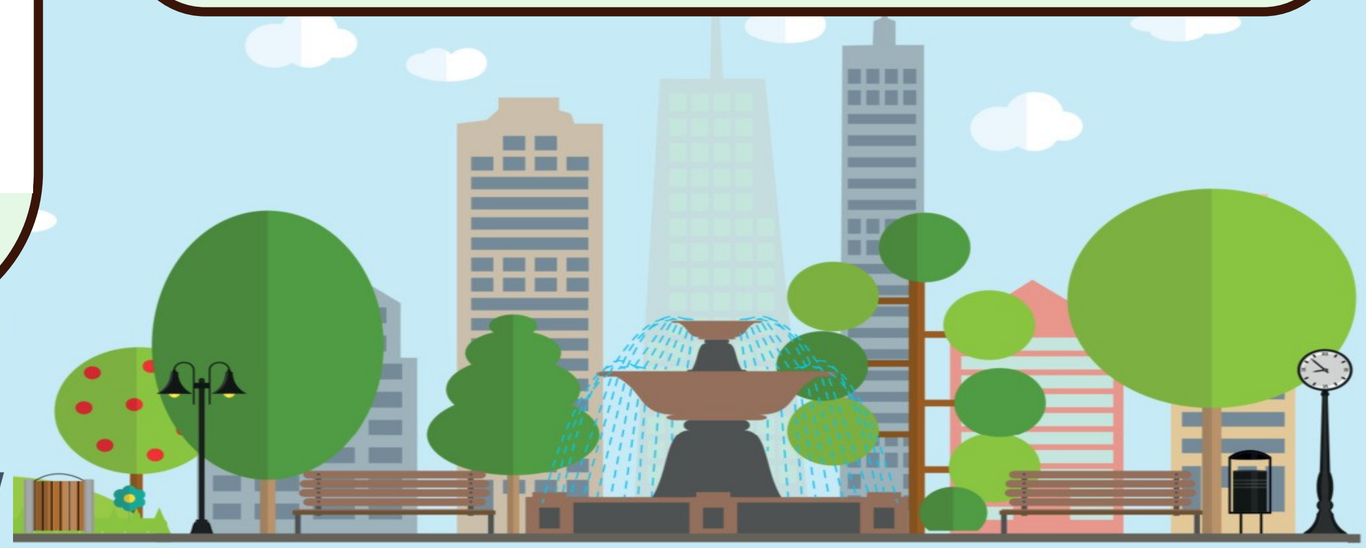


RMSE 4.06, performance could be better in other models

Future Work

⇒ Providing recommendations and learning for further work and optimisation of the models produced

⇒ A web app that consumers could use to be able to help them enter their own consumption data and see their forecasted usage



Newcastle University

python™ NumPy colab pandas scikit learn TensorFlow