Swissgrid Data Analysis

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Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education.

Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Dedication

This Dissertation is dedicated to my loving husband, my loving mother and my darling son for always encouraging me and being by my side.

Acknowledgement

This project would not have been a success if not for the many people in my life. Their encouragement and guidance has helped me immensely to complete the project. I take this opportunity to express my gratitude to the people who have been instrumental in the success of the completion of this research.

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Abstract

The swissgrid is the national power grid in Switzerland which is the largest in that area. Not only does it supply power to Switzerland it also exports and imports power from its neighboring countries. The power grid must be kept at a balance of 50Hz frequency. In order to help the operators maintain and take necessary action to maintain this frequency, monitoring the grid is vital. Currently, studies do not clearly show of any prediction models that the swissgrid uses. Hence this study is focused on assisting the operators monitor the grid and help them predict the energy consumption for the swiss control block.

In order to assist the operators, and interested parties, the grid data has been analyzed in order to derive real-time and batch analytics using the WSO2 Data Analytics Server. The real-time analytics computed based on the Siddi engine and batch analytics based on the Apache Spark engine is able to be viewed on a central dashboard powered by WSO2 Data Analytics Server. Moreover the solution also provides the ability to configure to detect any anomalies in the power grid and alarm any interested parties via SMS or E-mail.

The research goes on to find a model to predict the total energy consumption of the swiss control block. A model was successfully built in order to predict the energy consumption using the Liner regression with rolling window analysis. Using a 30 day window it was found that the model's optimal training data set is of 1.5 years worth data. The research expanded to find any co-relation between multiple factors that would affect the energy consumption. Using the season, and whether or not the date is a holiday, a model was built based on the multiple regression algorithm. This model was found to be trained better with the least Absolute Mean average for a data set of 2 years of data. The models built were tested against the predicting data set which proved to have predict the energy consumption easily.

The aim of the project is achieved by providing centrally viewable statistics and a tested model to predict the total energy consumption for the swiss control block.

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