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Forecasting Electricity Commodity Consumption and Pricing for Smart Buildings using Deep Learning Techniques

Objective

- This project proposes the use of an ensemble of models to be used for producing forecasts of home electric consumption data, considering total consumption, of schedulable equipment, and of non-schedulable devices, to be employed in Hybrid Deep Learning Model.
- This project aimed to propose a model that can accurately forecast monthly residential electricity demand based on the hybrid deep learning (DL) model is based on the stacking of fully connected layers, and unidirectional Long Short-Term Memory (LSTMs) on bi-directional LSTMs.

Abstract

Forecasting of energy consumption in Smart Buildings (SB) and using the extracted information to plan and operate power generation are crucial elements of the Smart Grid (SG) energy management. Energy consumption in buildings is one of the significant contributors to energy efficiency programs worldwide. Additionally, a major component of the energy consumed in the buildings is wasted through over-utilization of energy appliances such as exhaust fans, and Heating, Ventilation, Air Conditioning (HVAC) systems, ineffective control over thermal comfort, and not optimizing the start-up time and sequencing of electrical equipment. Prediction of electrical loads and scheduling the generation resources to match the demand enable the utility to mitigate the energy generation cost. Different methodologies have been employed to predict energy consumption at different levels of distribution and transmission systems. In this project, a

novel hybrid deep learning model is proposed to predict energy consumption in smart buildings. The proposed framework consists of two stages, namely, data cleaning, and model building. The data cleaning phase applies pre-processing techniques to the raw data and adds additional features of lag values. In the model-building phase, the hybrid model is trained on the processed data. The hybrid deep learning (DL) model is based on the stacking of fully connected layers, and unidirectional Long Short-Term Memory (LSTMs) on bi-directional LSTMs. The proposed model is designed to capture the temporal dependencies of energy consumption independent features and to be effective in terms of computational complexity, training time, and forecasting accuracy.

System Requirements

Minimum System Requirements

- Processors: Intel Atom® processor or Intel® Core™ i3 processor
- Disk space: 1 GB
- Operating systems: Windows* 7 or later, macOS, and Linux

Hardware's

- Laptop or PC

Software Requirements

- **Server Side** : Python 3.7.4(64-bit) or (32-bit)
- **Client Side** : HTML, CSS, Bootstrap
- **IDE** : Flask 1.1.1
- **Back end** : MySQL 5.
- **Server** : Wampserver 2i
- **OS** : Windows 10 64 –bit or Ubuntu 18.04 LTS “Bionic Beaver”

