

Power consumption analysis for households

using machine learning

Developed by:

- srujanareddy polaka
- sai prasanna shobannaboina
- kdarla Ramya
- vyshnavi pashikanti



Table Of Contents



01 INTRODUCTION



02 PURPOSE



03 ADVANTAGES
AND DISADVANTAGES



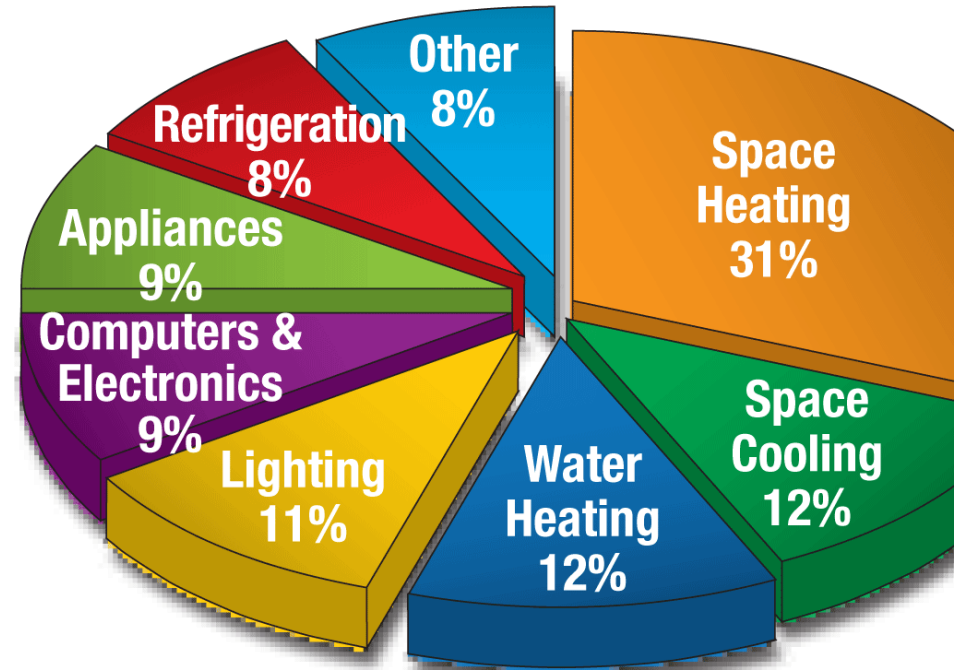
04 APPLICATIONS



05 CONCLUSION

INTRODUCTION

- Electricity load forecasting has gained sustainable importance nowadays in the modern electrical power management systems with elements of smart grid technology. A reliable forecast of electrical power consumption represents a starting point in policy development and improvement of energy production and distribution. At the levels of individual households, the ability to accurately predict consumption of electricity power significantly reduces prices by appropriate systems for energy storage.
- Therefore, the energy efficient power networks of the future will require entirely new ways of forecasting demand on the scale of individual household. There are several techniques of forecasting and these techniques provide forecasting models of different accuracy. The accuracy of the prediction is based on the minimum error of the forecast. In this research, we are interested in time series analysis with the popular forecasting technique that I used in this study; ARIMA (Auto regressive Moving Average). I applied this method for detecting patterns and trends of the electric power consumption in the households with real time series period in daily, weekly, monthly, and quarterly. I used python program for constructing the model



Purpose

- Power consumption analysis, is nothing but analysing the power consumption for appliances in households .Every appliance has its own consumption power based on the usage, but now a days the power consumption is more and we are facing the high electricity bill problem. Our aim is to make use of libraries from python to extract the libraries for machine learning for power consumption analysis .
- Secondly, to learn how to hyper tune the parameters using grid across the validation for the random forest machine learning algorithm.
- And finally, to predict the global active power consumption for next day, next week, next month and next year using ensemble techniques of combining the predictions from multiple machine learning algorithms and withdrawing the conclusions.

DESIGN MODEL

TYPES OF ALGORITHMS APPLIED:

*** Linear Regression:**

Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting.

*** Random Forest Regressor:**

Random forests or random decision forests are an ensemble learning method for classification, regression and other tasks that operate by constructing a multitude of decision trees at training time and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees.

*** Decision Tree Regressor:**

Decision Tree algorithm is one of the simplest yet powerful Supervised Machine Learning algorithms. Decision Tree algorithm can be used to solve both regression and classification problems in Machine Learning. That is why it is also known as CART or Classification and Regression Trees.

Sl.no	Algorithm Used	Accuracy
1.	Random Forest	65%
2.	Decision Tree	61%
3.	Linear Regression	80%

Advantages and Disadvantages

ADVANTAGES

- * It reduces greenhouse gas emissions which contribute to climate change. While renewable sources of energy, like wind, play an increasing role in our system, the vast majority of our electricity is still generated from fossil fuels like gas, oil and coal.
- * Saving money by reducing your power bills in the long term by reducing the need for more generators and network infrastructure (costs which get passed onto customers)
- * Reducing our electricity use reduces the flow of carbon dioxide into the atmosphere.

DISADVANTAGES

- * Unwanted Side Effects
- * Power plants that burn fossil fuel pump carbon dioxide into the atmosphere. Carbon dioxide is a greenhouse gas that causes Earth's temperature to rise.
- * Nuclear power plants must find ways to dispose of radioactive waste safely.

Global_active_power

Global_reactive_power

Enter Global_reactive_power

Voltage

Enter Voltage

Global_Intensity

Enter Global_intensity

Sub_metering_1

Enter Sub_metering_1

Sub_metering_2

Enter Sub_metering_2

Sub_metering_3

Enter Sub_metering_3

click

ACTIVE_POWER: Global_active_power is 4.31kWh

5 PRO

USER
INTERFACE
USING FLASK

Applications

- The use of applications or software on our computer systems consumes energy and it also affects how various hardware components and system resources consume energy. Consequently, running web browsers applications will utilize considerable energy and battery consumption.
- Generating the Many more resources for the upcoming generation.
- Limited usage gives more prediction of power

Conclusion

- Therefore in this individual house hold electricity consumption dataset, **ss** power consumption is used to build a UI model for predicting electric consumption of individual appliances and the results are compared to identify the power consumption patterns apply statistical modeling. The model shows the analysis of house holds energy prediction which performs best than the other two algorithms in the prediction of power consumption. There is no definitive guide of which algorithms to be used. What may work on some datasets may not work on others. Therefore, always check the accuracy and predict with the dataset values.

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THANK_YOU