Power Consumption Analysis for Households

Project Description:

Electricity sector in India. India is the world's third largest producer and third largest consumer of electricity. The gross electricity consumption in 2018-19 was 1,181 kWh per capita. Energy use can be viewed as a function of total GDP, structure of the economy and technology. The increase in household energy consumption is more significant than that in the industrial sector.

To achieve reduction in electricity consumption, it is vital to have current information about household electricity use. This Guided Project mainly focuses on applying a machine-learning algorithm to calculate the power consumed by all appliances. This will help you track the power consumed on regular intervals for all kinds of appliances which use heavy loads such as Air Conditioners, Oven or a washing machine etc.

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You will go through all the steps mentioned below to complete the project.

- User interacts with the UI (User Interface) to enter Data
- The entered data is analysed by the model which is integrated
- Once model analyses the input the prediction is showcased on the UI

To accomplish this, we have to complete all the activities and tasks listed below.

- Data Collection.
  - Collect the dataset or Create the dataset
- Data Pre-processing.
  - Import the Libraries.
  - Importing the dataset.
  - Checking for Null Values.
  - Data Visualization.
  - Taking care of Missing Data.
  - Label encoding.
  - One Hot Encoding.
  - Feature Scaling.
  - Splitting Data into Train and Test.
- Model Building
  - Training and testing the model
  - Evaluation of Model
- Application Building
  - Create an HTML file
  - Build a Python Code

Project Objectives:

- Regression and Classification Problems.
- To grab insights from data through visualization.
- Applying different algorithms according .
- Evaluation metrics.
- How to build a web application using the Flask framework.

Data Collection and Pre-processing:

ML depends heavily on data, without data, it is impossible for an “AI” to learn. It is the most crucial aspect that makes algorithm training possible. In Machine Learning projects, we need a training data set. It is the actual data set used to train the model for performing various actions.

Data pre-processing is a process of cleaning the raw data i.e. the data is collected in the real world and is converted to a clean data set. In other words, whenever the data is gathered from different sources it is collected in a raw format and this data isn’t feasible for the analysis.

Therefore, certain steps are executed to convert the data into a small clean data set, this part of the process is called as data pre-processing Follow the following steps to process your Data,

- Import the Libraries
- Importing the dataset
- Taking care of Missing Data
- Label encoding
- One Hot Encoding
- Feature Scaling
- Splitting Data into Train and Test

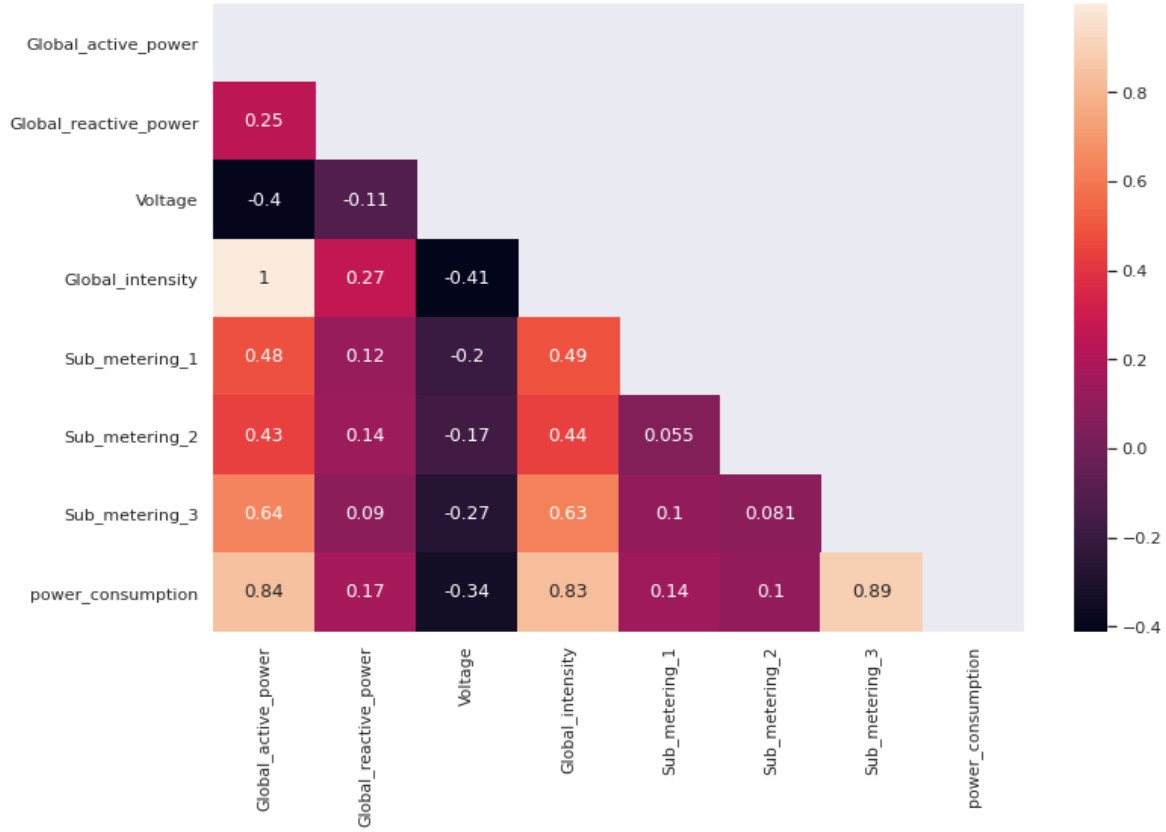


Fig: Heatmap of the dataset.

Model Building:

There are several Machine learning algorithms to be used depending on the data you are going to process such as images, sound, text, and numerical values. The algorithms that you can choose according to the objective that you might have it may be Classification algorithms are Regression algorithms.

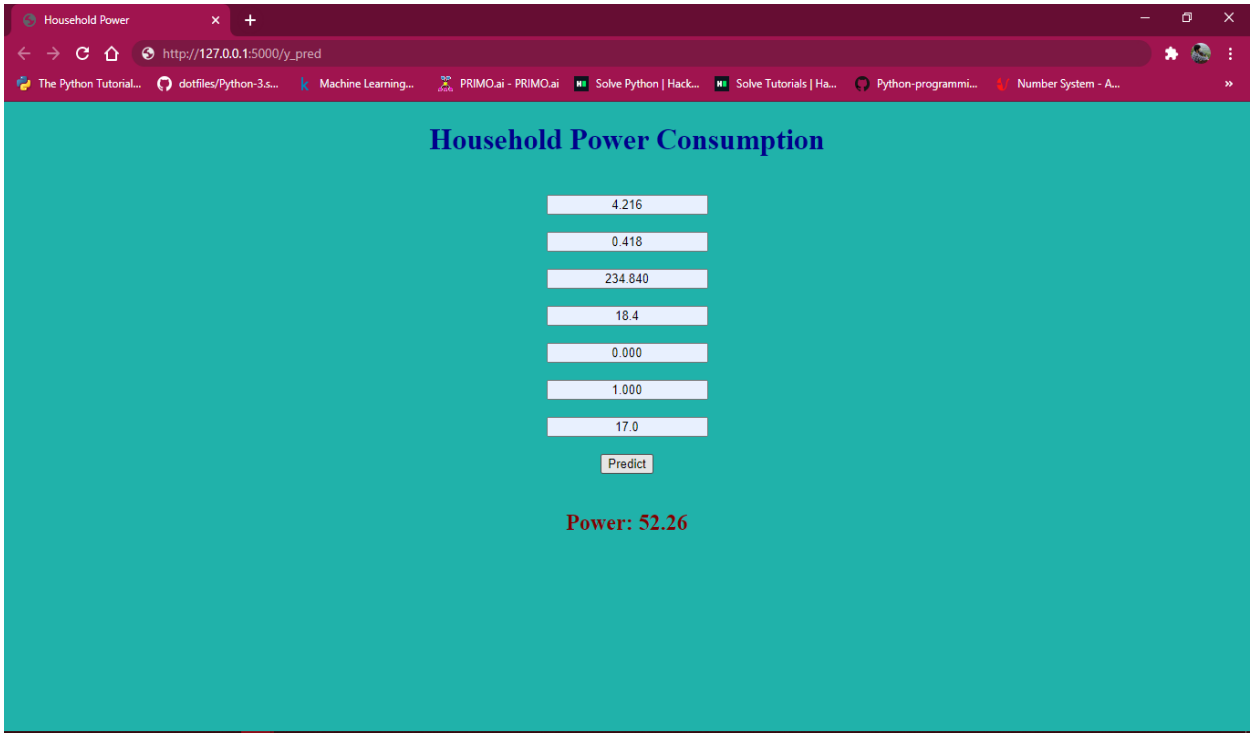
For this project, we will use '**Polynomial Regression Model**' as we got more accurate predictions with lesser error obtained from the metrics. We are predicting a numeric value, which is the power consumed by the mentioned appliances in the house.

Application Building:

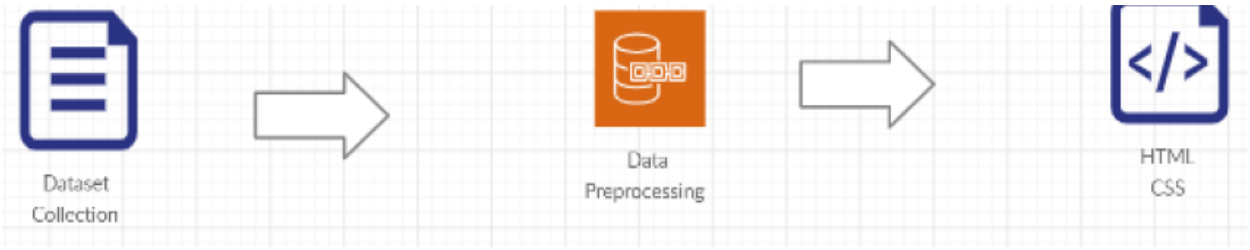
We will be building a web application that is integrated to the model we built. A UI is provided for the uses where he has to enter the values for predictions. The enter values are given to the saved model and prediction is showcased on the UI.

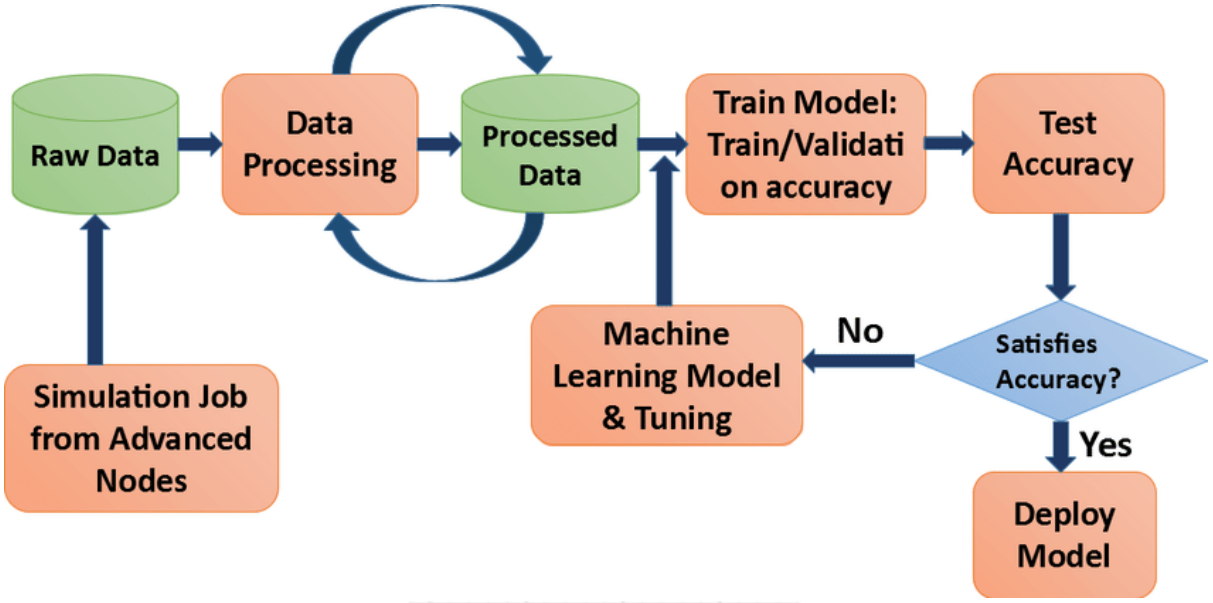
This section has the following tasks

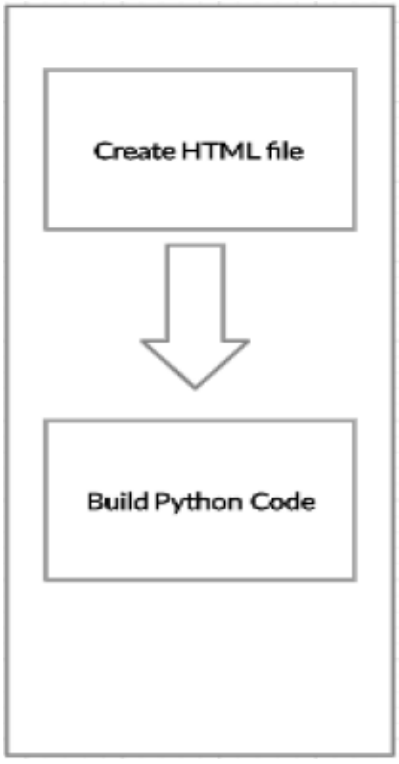
- Building HTML Pages.
- Building server-side script.



Flowchart:


Dataset
Collection
Data
Preprocessing
HTML
CSS


Raw Data
Data Processing
Processed Data
Train Model: Train/Validati on accuracy
Test Accuracy
Simulation Job from Advanced Nodes
Machine Learning Model & Tuning
No
Satisfies Accuracy?
Yes
Deploy Model


Create HTML file
Build Python Code

Conclusion:

The machine learning model was thus built to help the user to get the prediction whether he or she gets a chance to get admitted in their desired university or not. The predicted output gives them a fair idea about their admission chances in a particular university. This analysis should also help students who are currently preparing or will be preparing to get a better idea.