High Level Design (HLD)

ENERGY EFFICIENCY PREDICTION

Revision Number – 1.0

Last Date of Revision – 16-05-2023

SHAHIN ANJUM

K M SUMANTH

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**Abstract**

Buildings are responsible for 40% of energy consumption and 33% of greenhouse gas emissions. We should design buildings with improve energy efficiency that way we can contribute to the environment.

When it comes to efficient building design, the computation of the heating load and the cooling load is required to determine the specifications of the heating and cooling equipment needed to maintain comfortable indoor air conditions. To estimate the required cooling and heating capacities, architects and building designers need information about the characteristics of the building and of the conditioned space (for example occupancy and activity level). For this reason, we will investigate the effect of eight input variables: relative compactness, surface area, wall area, roof area, overall height, orientation, glazing area, and glazing area distribution, to determine the output variables heating load and cooling load of residential buildings.

**1 Introduction**

**1.1 Why this High-Level Design Document?**

The main purpose of this HLD documentation is to feature the required details of the project and supply the outline of the machine learning model and the written code. This additionally provides the careful description on however the complete project has been designed end-to-end.

**1.2 Description**

**Problem Perspective**

The Energy Efficiency prediction may be a machine learning model that helps users to predict the cooling heating load of a building or apartment etc., so they design buildings, apartments etc which are good for our environment.

**1.3 Problem Statement**

The most goal of the project is to form a programme that predicts the heating and cooling load by taking bound input from the user like height of wall, area of roof, glazing area etc.

**1.4. Project Solution**

Project requires the desired input of user from the created interface and method all the provided information to satisfy the wants of the machine learning model and at last show the expected output.

**1.5 Answer enhancements**

we will even predict the Energy Efficiency as calculate heating and cooling amount. It helps to making buildings which is environment friendly.

**1.6 Technical needs**

There are not any hardware needs needed for victimization this application, the user should have AN interactive device that has access to the web and should have the fundamental understanding of providing the input. And for the backend half the server should run all the package that's needed for the process and provided information to show the results.

**1.7 Information needs**

The info demand is totally supported the matter statement. and, the information set is accessible on the UCI within the type of standout sheet(.xlsx), because the main theme of the project is to induce the expertise of real time issues, we have a tendency to once more mercantilism {the information into the prophetess data base and commerce it into csv format.

**1.8 Tools Used**

* Python 3.8 is employed because the programming language and frame works like numpy, pandas, sklearn and alternative modules for building the model.
* Vscode is employed as IDE(integrated development environment).
* For visualizations seaborn and components of matplotlib are getting used.
* For information assortment prophetess info is getting used.
* Front end development is completed victimization HTML/CSS.
* Flask is employed for each information and backend readying.
* GitHub is employed for version management.
* Deployed on AWS Beanstalk.

http://energyefficiency-env.eba-tnvcvgwe.eu-north-1.elasticbeanstalk.com/predict

**1.9 Constraints**

The Energy Efficiency prediction answer should be user friendly, as automatic as attainable and also the user should not be needed to understand any of the operating.

**1.10 Assumptions**

The most objective of the project is to implement the utilization cases as for the new dataset that user provides through the programme. Machine learning model is employed for process the on top of computer file. It's additionally assumed that each one aspects of this project have the flexibility to figure along within the approach as the designer is expecting.

**2.3 Logging**

Each step is being logged within the system that runs internally, that shows the date time and therefore the processed that has been performed, work is completed in several layers as information, DEBUG, ERROR, WARNINGS. this provides US the perceive of the logged info.

**2.4 Error Handling**

Once ever a slip is occurred, the reason is logged in its several log file, in order that the developer will rectify the error.

**3 Performance analysis**

**3.1 Reusability**

Elements of the code written is accustomed different applications and therefore the rest is changed and be reused.

**3.2 Application Compatibility**

The various parts for this project are exploitation python as associate interface between them. every element can have its own tasks to perform, and it's the work of the python to make sure correct transfer of data.

**3.3 Resource Utilization**

Once any task is performed, it'll doubtless; use all the process power offered till that performs is finished.

**Conclusion**

The Energy Efficiency prediction will predict the worth supported the trained knowledge set within the rule. therefore, the user will understand that design of buildings is environment friendly or not.