

## 7. SYSTEM TESTING RESULTS



Screen 7.1: Output Screen -1

The following screen is the main screen. This screen contains the buttons that the user can click on to either give the input data or to compute the classification/tests to find out whether its optimized or not and to see the accuracies.

A screenshot of a software window titled "Harvesting factors". It contains a form for inputting data. At the top, "Building ID:" is followed by a text box containing "000001". Below this are five rows of questions, each followed by a spin box containing the value "1":  
1. "Electrical Applinaces are under the annual maintenance contract with a standard vendor?(0 for No, 1 for Yes)"  
2. "Solar Power Support to the building?(0 for No, 1 for Yes)"  
3. "BioMass Power Support to the building?(0 for No, 1 for Yes)"  
4. "Wind Power Support to the building?(0 for No, 1 for Yes)"  
5. "Residents of the building are aware of power saving guide lines?(0 for No, 1 for Yes)"  
At the bottom of the form is a button labeled "Store Harvesting Factors in Data base".

Screen 7.2: To Input the Harvesting Factors

Design Factors

Building ID: 000001

Are the roofs covered by False Ceilings?(0 for No, 1 for Yes) 1

Does all the doors have Auto-Close Facility?(0 for No, 1 for Yes) 1

Does electricity is chargeable for all?(0 for No, 1 for Yes) 1

Is the slab system of charges implemented?(0 for No, 1 for Yes) 1

Old Appliances are replaced after a predefined period? (0 for No, 1 for Yes) 1

Store Design Factors in Data base

Screen 7.3: To Input the Design Factors

```
Administrator: Anaconda Prompt (anaconda3) - python bldgelec1.py

(base) C:\Windows\System32>cd ../../

(base) C:\>cd 7001maj

(base) C:\7001maj>dir *.ui
Volume in drive C is Windows-SSD
Volume Serial Number is 0008-FC81

Directory of C:\7001maj

10-02-2023  06:43 PM                2,833 bldgelec.ui
10-02-2023  07:48 PM                4,669 design.ui
10-02-2023  07:49 PM                4,720 harvest.ui
               3 File(s)            12,222 bytes
               0 Dir(s)  161,080,610,816 bytes free

(base) C:\7001maj>python bldgelec1.py
```

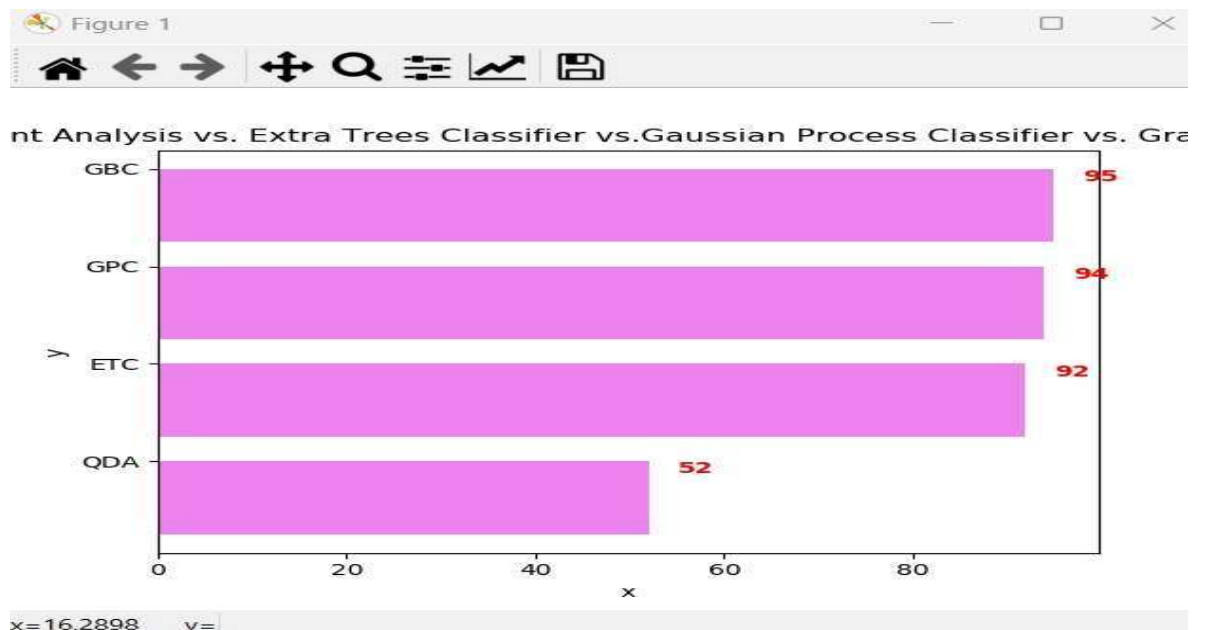
Screen 7.4: Run the Program

```

(base) C:\7001maj>python bldgelec1.py
The accuracy of QDA Classifier on testing data is: 52.32558139534884
QDA prediction on the first test set is: [1]
QDA prediction on the second test set is: [1]
The accuracy of GP Classifier on testing data is: 94.18604651162791
GPC prediction on the first test set is: [1]
GPC prediction on the second test set is: [0]
The accuracy of Extra Trees Classifier on testing data is: 93.4108527131783
ETC prediction on the first test set is: [1]
ETC prediction on the second test set is: [0]
The accuracy of GB Classifier on testing data is: 95.34883720930233
GBC prediction on the first test set is: [1]
GBC prediction on the second test set is: [0]

```

Screen 7.6: Testing of Data Accuracies And Output Of Each Classification



Screen 7.7: Comparison Plot Between the Different Classifications Done

## 8. RESULTS AND DISCUSSIONS

The results of the classification models were evaluated and compared as shown earlier. The proposed model achieved an accuracy of 95% when Gaussian Process classifier was used, indicating excellent performance among the other classifiers.

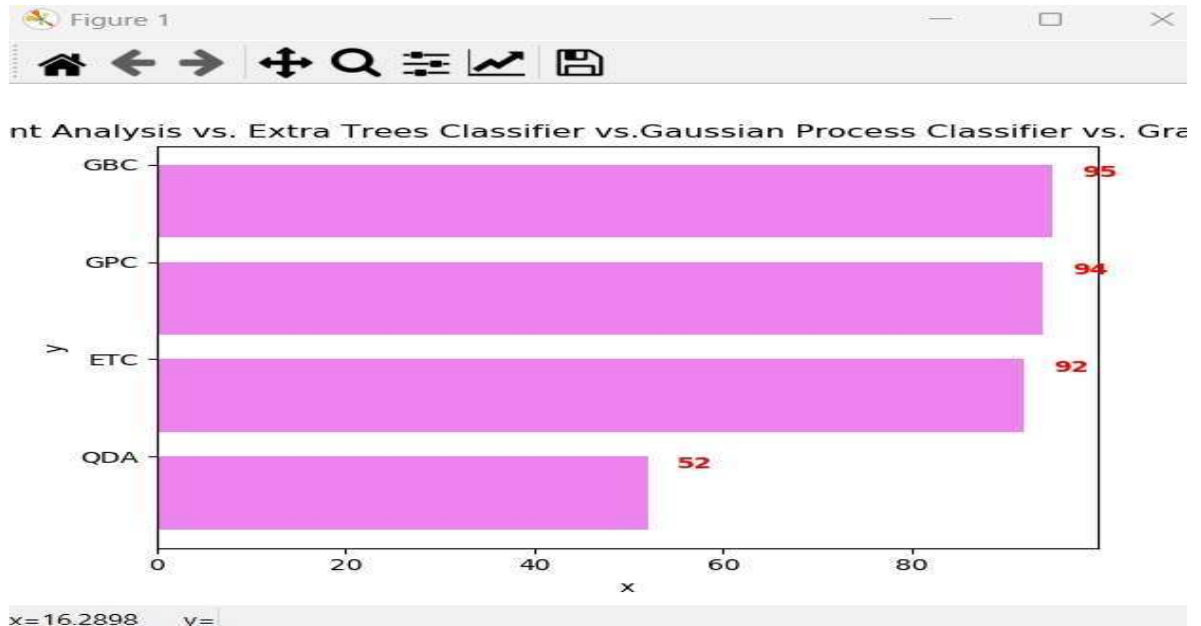


Figure 8.1: Comparison Plot Between the Different Classifications Done

These results demonstrate that the proposed model based on GPC classification model is effective in identifying whether the building energy management system is optimized or not.

```
(base) C:\7001maj>python bldgelec1.py
The accuracy of QDA Classifier on testing data is: 52.32558139534884
QDA prediction on the first test set is: [1]
QDA prediction on the second test set is: [1]
The accuracy of GP Classifier on testing data is: 94.18604651162791
GPC prediction on the first test set is: [1]
GPC prediction on the second test set is: [0]
The accuracy of Extra Trees Classifier on testing data is: 93.4108527131783
ETC prediction on the first test set is: [1]
ETC prediction on the second test set is: [0]
The accuracy of GB Classifier on testing data is: 95.34883720930233
GBC prediction on the first test set is: [1]
GBC prediction on the second test set is: [0]
```

Figure 8.2: Testing of Data Accuracies And Output Of Each Classification

By analyzing the energy usage data and identifying patterns and trends, GPC can provide accurate predictions of the building's energy usage and identify the optimal settings for the BEMS. This can help reduce energy consumption, minimize energy costs, and achieve sustainability. GPC is a flexible and adaptable model that can handle different types of data and adapt to new situations, making it an ideal tool for BEMS optimization.