

Capstone Project-2

Appliance Energy Prediction

Presented By:
Sandeep R

Finding Appliance Energy Consumption

- Exploring Dataset
- Finding out Dependent and Independent variable[labeled data]
- Exploratory Data analysis and Handling Null values
- Finding Correlation between Features
- Model building for predicting energy consumption by the Appliance
- Perform Model tuning
- Find the best Model

Brief Description of Dataset

The data set is at 10 min for about 4.5 months. The house temperature and humidity conditions were monitored with a ZigBee wireless sensor network. Each wireless node transmitted the temperature and humidity conditions around 3.3 min. Then, the wireless data was averaged for 10 minutes periods. The energy data was logged every 10 minutes with m-bus energy meters. Weather from the nearest airport weather station (Chievres Airport, Belgium) was downloaded from a public data set from Reliable Prognosis (rp5.ru) and merged together with the experimental data sets using the date and time column.



Independent Variables

- T1 to T9 are variables which indicates temperature of different areas in home.
- T_out is the Temperature outside (from Chievres weather station)
- RH1 to RH9 are variables which indicates the humidity in different areas of home.
- RHout, is the Humidity outside (from Chievres weather station)
- Wind speed : Wind Speed (from Chievres weather station), in m/s
- Visibility : Visibility (from Chievres weather station), in km
- Tdewpoint: Tdewpoint (from Chievres weather station), $^{\circ}\text{C}$

Dependent variables

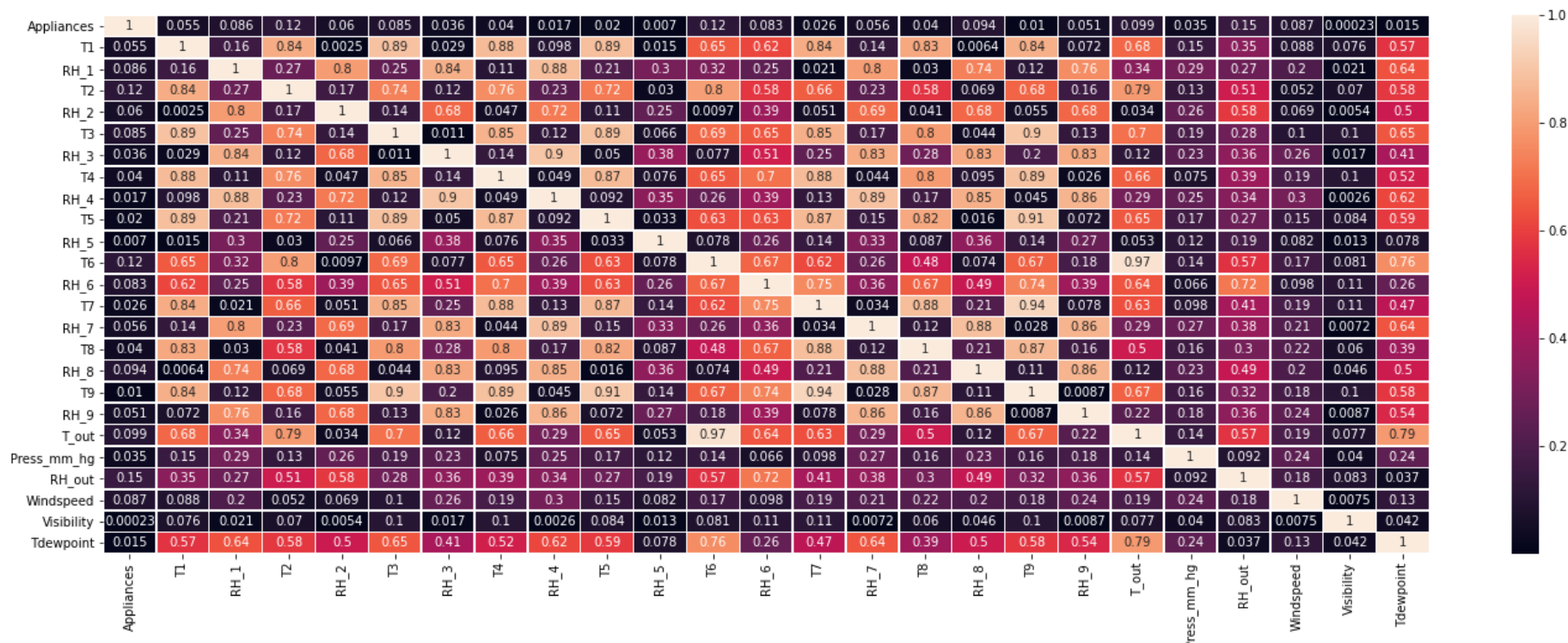
- Appliances: Is the dependent variable which indicates the consumption of power in Kwh

Exploratory Data Analysis

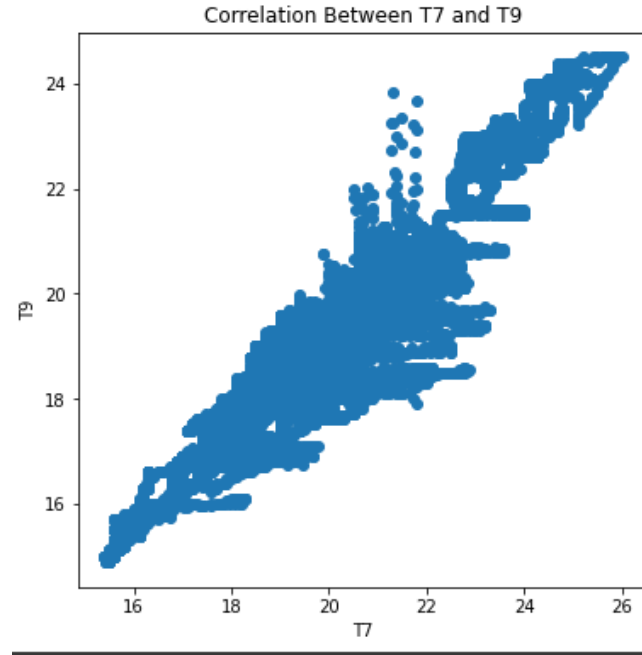
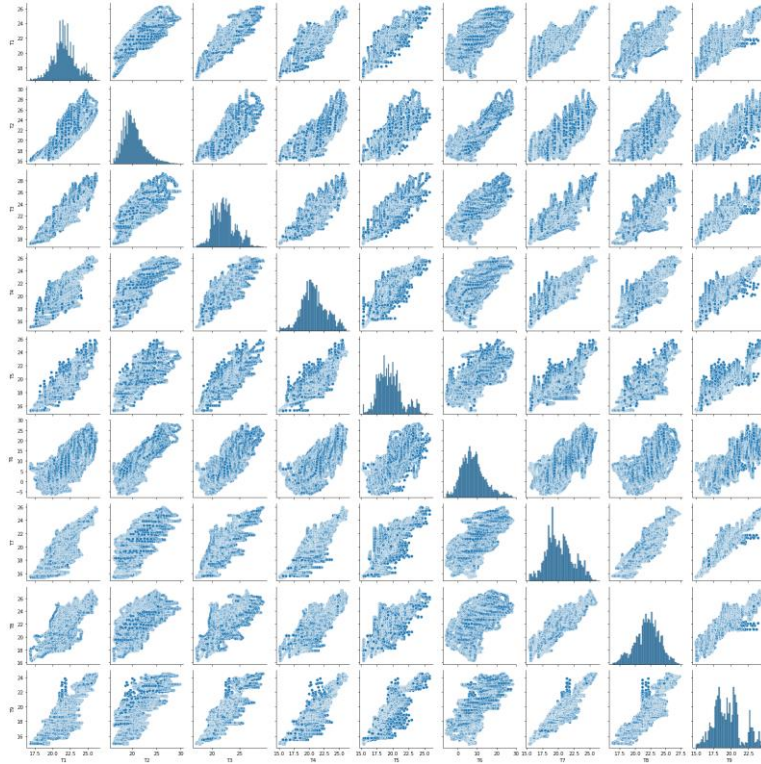
- Dataset Contains 19735 Examples and 25 Variables out of which 24 are Independent Variables and 1 of them is dependent variable.
- Dataset doesn't contain any null values
- Temperature ranges for all home sensors is between 14.89°C to 29.86°C except for T6 for which it is -6.06°C to 28.29°C. The reason for such low readings is that the sensor is kept outside.
- Similarly, humidity ranges for all home sensors is between 20.60% to 63.36%. Except for RH_5 which is Bathroom humidity and RH_6 which is outside humidity, whose ranges are 29.82% to 96.32% and 1% to 99.9% respectively.
- 75% of the appliance consumption is between 10wh and 100wh



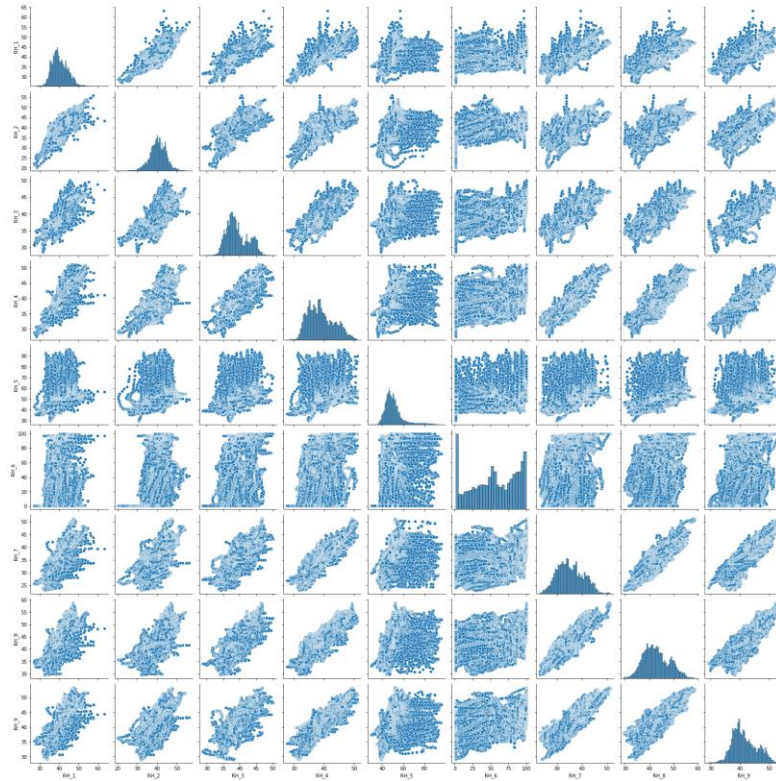
Correlation Between Variables



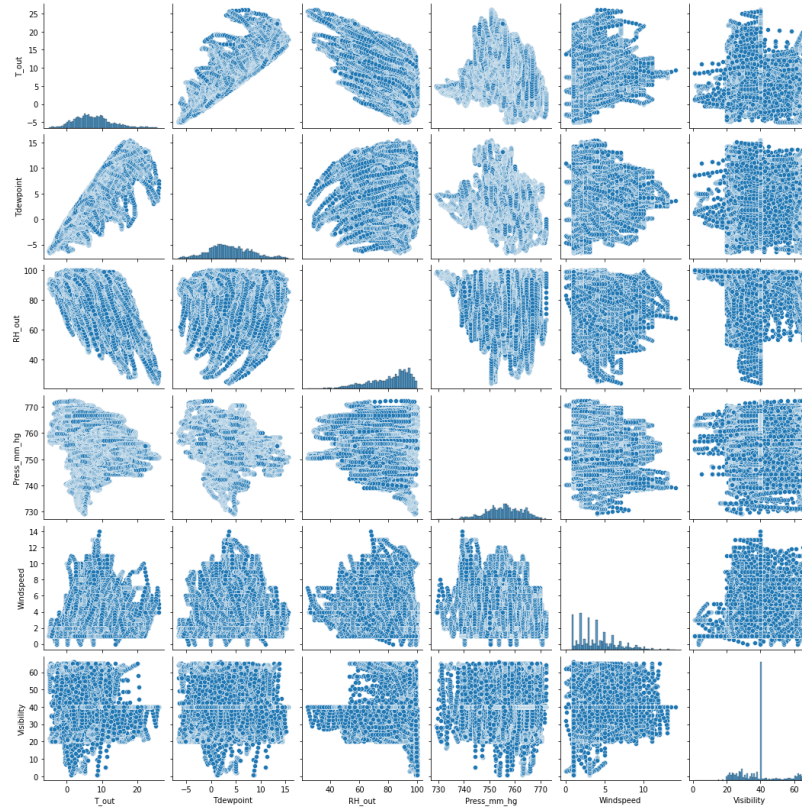
Correlation between temperature columns



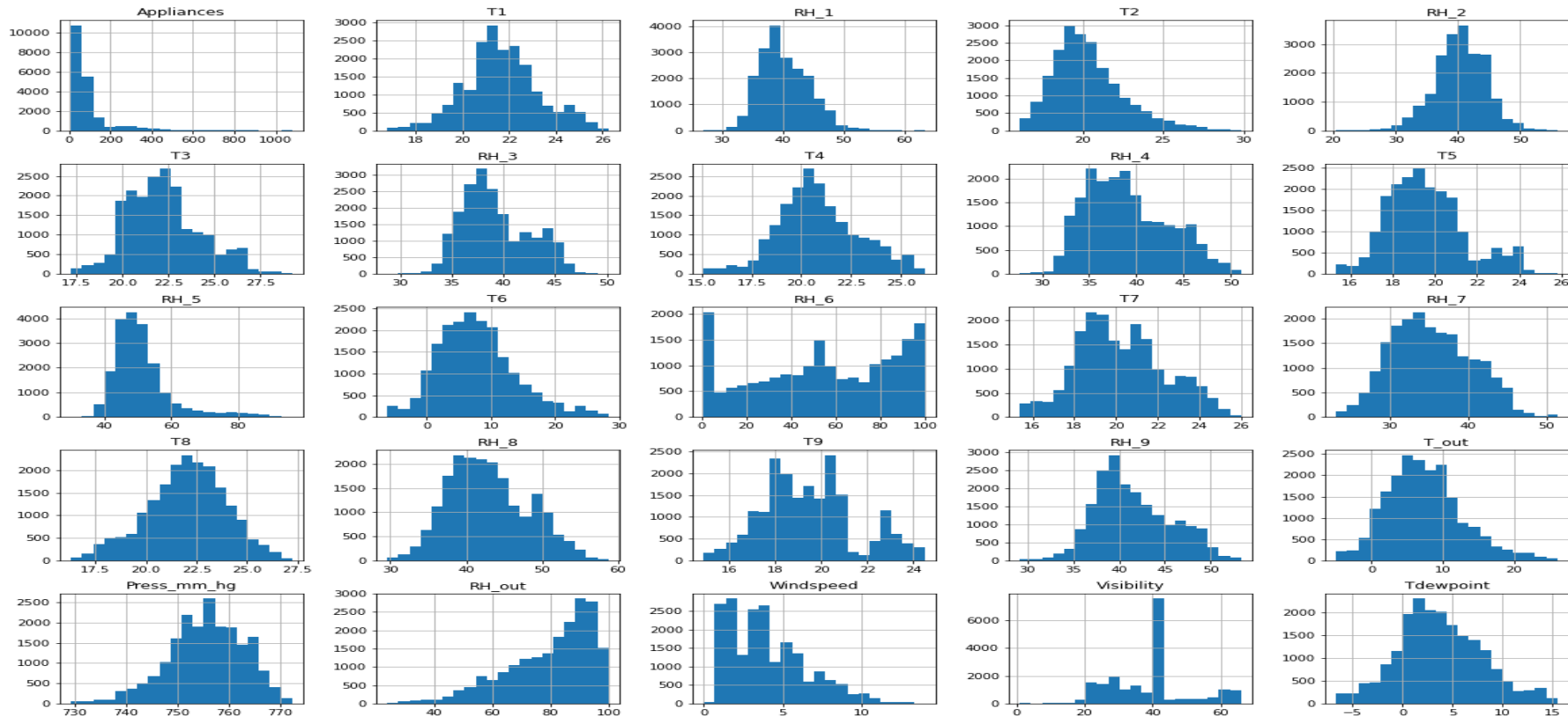
Correlation between Humidity columns



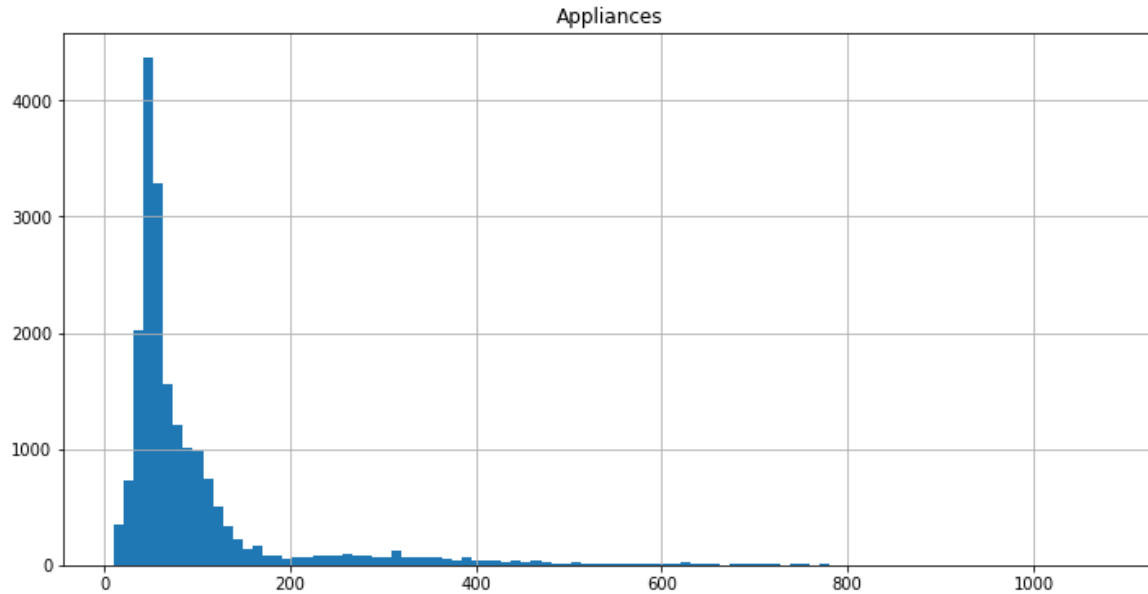
Correlation between Weather columns



Distribution of Variables using Histogram



Dependent Variable[Target Variable]



Model Selection

	Train_score	Test_score
RandomForestRegressor	0.058062	0.491609
SVR	0.367933	0.573519
DecisionTreeRegressor	0.228514	0.796679
Lasso	0.833212	0.936716
Ridge	0.833257	0.936739
LinearRegression	0.833198	0.936739

Predicted values of SVR

```
[ 1.51721334 -0.43446307  1.95512742 -0.54208325 -0.63895303 -0.51270026  
 -0.60010549 -0.25652649 -0.42319908 -0.40043354]
```

```
15563    1.875739
```

```
12564   -0.465215
```

```
10649    1.583120
```

```
16554   -0.465215
```

```
8130    -0.660295
```

```
16981   -0.465215
```

```
8164    -0.757835
```

```
14583   -0.270136
```

```
18716   -0.660295
```

```
18643   -0.465215
```

```
Name: Appliances, dtype: float64
```

Predicted values of Linear Regression

```
[ 1.05914576 -0.10511699  0.45254555 -0.12213543 -0.42374968  0.64648278  
-0.04005006 -0.31081389  0.04295414 -0.14801521]
```

```
15563    1.875739
```

```
12564   -0.465215
```

```
10649    1.583120
```

```
16554   -0.465215
```

```
8130    -0.660295
```

```
16981   -0.465215
```

```
8164    -0.757835
```

```
14583   -0.270136
```

```
18716   -0.660295
```

```
18643   -0.465215
```

```
Name: Appliances, dtype: float64
```





Thank You