

IMPORTING LIBRARIES

```
import pandas as pd
import pandas_profiling
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

READING .CSV FILE

```
data = pd.read_csv('dataset.csv')
```

```
data
```

	Relative Compactness	Surface Area	Wall Area	Roof Area	Overall
Height \					
0	0.98	514.5	294.0	110.25	
7.0					
1	0.98	514.5	294.0	110.25	
7.0					
2	0.98	514.5	294.0	110.25	
7.0					
3	0.98	514.5	294.0	110.25	
7.0					
4	0.90	563.5	318.5	122.50	
7.0					
..	
...					
763	0.64	784.0	343.0	220.50	
3.5					
764	0.62	808.5	367.5	220.50	
3.5					
765	0.62	808.5	367.5	220.50	
3.5					
766	0.62	808.5	367.5	220.50	
3.5					
767	0.62	808.5	367.5	220.50	
3.5					

	Orientation	Glazing Area	Glazing Area Distribution	Heating
Load \				
0	2	0.0		0
15.55				
1	3	0.0		0
15.55				
2	4	0.0		0
15.55				
3	5	0.0		0
15.55				

4	2	0.0	0	
20.84				
..
.				
763	5	0.4	5	
17.88				
764	2	0.4	5	
16.54				
765	3	0.4	5	
16.44				
766	4	0.4	5	
16.48				
767	5	0.4	5	
16.64				

	Cooling Load
0	21.33
1	21.33
2	21.33
3	21.33
4	28.28
..	...
763	21.40
764	16.88
765	17.11
766	16.61
767	16.03

[768 rows x 10 columns]

FIRST FIVE ROWS OF THE DATASET

data.head()

	Relative Compactness	Surface Area	Wall Area	Roof Area	Overall
Height \					
0	0.98	514.5	294.0	110.25	
7.0					
1	0.98	514.5	294.0	110.25	
7.0					
2	0.98	514.5	294.0	110.25	
7.0					
3	0.98	514.5	294.0	110.25	
7.0					
4	0.90	563.5	318.5	122.50	
7.0					

	Orientation	Glazing Area	Glazing Area Distribution	Heating Load
\				
0	2	0.0	0	15.55

1	3	0.0	0	15.55
2	4	0.0	0	15.55
3	5	0.0	0	15.55
4	2	0.0	0	20.84

Cooling Load	
0	21.33
1	21.33
2	21.33
3	21.33
4	28.28

LAST FIVE ROWS OF THE DATASET

data.tail()

Height \	Relative Compactness	Surface Area	Wall Area	Roof Area	Overall
763	0.64	784.0	343.0	220.5	
3.5					
764	0.62	808.5	367.5	220.5	
3.5					
765	0.62	808.5	367.5	220.5	
3.5					
766	0.62	808.5	367.5	220.5	
3.5					
767	0.62	808.5	367.5	220.5	
3.5					

Load \	Orientation	Glazing Area	Glazing Area Distribution	Heating
763	5	0.4		5
17.88				
764	2	0.4		5
16.54				
765	3	0.4		5
16.44				
766	4	0.4		5
16.48				
767	5	0.4		5
16.64				

Cooling Load	
763	21.40
764	16.88

```

765         17.11
766         16.61
767         16.03

```

ANALYSING THE SHAPE OF THE DATASET

```

print("shape of the dataset :", data.shape)
print("Number of rows      :", data.shape[0])
print("Number of columns   :", data.shape[1])

```

```

shape of the dataset : (768, 10)
Number of rows      : 768
Number of columns   : 10

```

The `data.info()` function provides information about a dataset, including the data types and number of non-null values for each column.

```
data.info()
```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 10 columns):
 #   Column                                  Non-Null Count  Dtype
---  -
 0   Relative Compactness                   768 non-null    float64
 1   Surface Area                           768 non-null    float64
 2   Wall Area                              768 non-null    float64
 3   Roof Area                              768 non-null    float64
 4   Overall Height                         768 non-null    float64
 5   Orientation                            768 non-null    int64
 6   Glazing Area                           768 non-null    float64
 7   Glazing Area Distribution              768 non-null    int64
 8   Heating Load                           768 non-null    float64
 9   Cooling Load                           768 non-null    float64
dtypes: float64(8), int64(2)
memory usage: 60.1 KB

```

The `data.describe()` function provides statistical information about a dataset, including measures of central tendency, dispersion, and distribution for numerical columns.

```
data.describe()
```

	Relative Compactness	Surface Area	Wall Area	Roof Area	\
count	768.000000	768.000000	768.000000	768.000000	
mean	0.764167	671.708333	318.500000	176.604167	
std	0.105777	88.086116	43.626481	45.165950	
min	0.620000	514.500000	245.000000	110.250000	
25%	0.682500	606.375000	294.000000	140.875000	
50%	0.750000	673.750000	318.500000	183.750000	
75%	0.830000	741.125000	343.000000	220.500000	
max	0.980000	808.500000	416.500000	220.500000	

	Overall Heigt	Orientation	Glazing Area	Glazing Area
Distribution \				
count	768.00000	768.000000	768.000000	
768.00000				
mean	5.25000	3.500000	0.234375	
2.81250				
std	1.75114	1.118763	0.133221	
1.55096				
min	3.50000	2.000000	0.000000	
0.00000				
25%	3.50000	2.750000	0.100000	
1.75000				
50%	5.25000	3.500000	0.250000	
3.00000				
75%	7.00000	4.250000	0.400000	
4.00000				
max	7.00000	5.000000	0.400000	
5.00000				

	Heating Load	Cooling Load
count	768.000000	768.000000
mean	22.307201	24.587760
std	10.090196	9.513306
min	6.010000	10.900000
25%	12.992500	15.620000
50%	18.950000	22.080000
75%	31.667500	33.132500
max	43.100000	48.030000

The data.isnull().sum() function returns the number of missing values (null values) in each column of a dataset

```
data.isnull().sum()
```

```
Relative Compactness      0
Surface Area              0
Wall Area                 0
Roof Area                 0
Overall Heigt             0
Orientation               0
Glazing Area              0
Glazing Area Distribution  0
Heating Load              0
Cooling Load              0
dtype: int64
```

Data Visualization

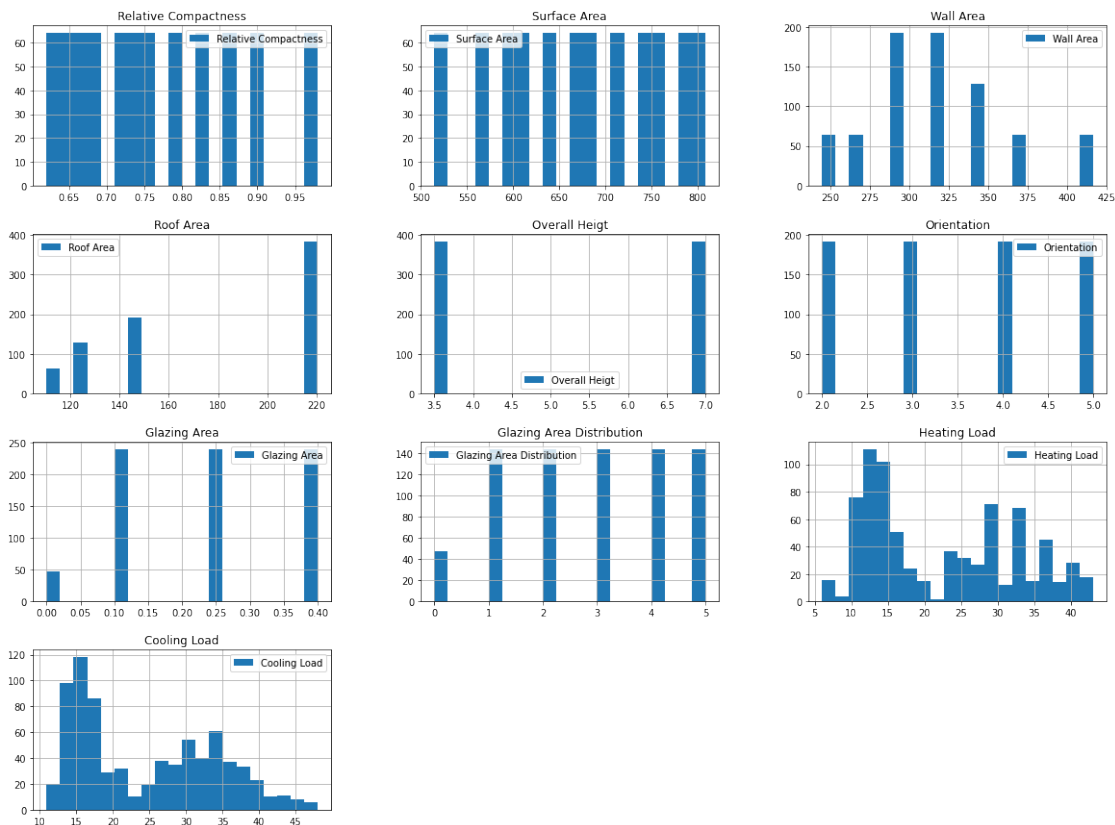
PLOTTING HISTOGRAM

```
data.hist(figsize = (20,15), bins=20, legend=True)
```

```

array([[<Axes: title={'center': 'Relative Compactness'}>,
       <Axes: title={'center': 'Surface Area'}>,
       <Axes: title={'center': 'Wall Area'}>],
      [<Axes: title={'center': 'Roof Area'}>,
       <Axes: title={'center': 'Overall Height'}>,
       <Axes: title={'center': 'Orientation'}>],
      [<Axes: title={'center': 'Glazing Area'}>,
       <Axes: title={'center': 'Glazing Area Distribution'}>,
       <Axes: title={'center': 'Heating Load'}>],
      [<Axes: title={'center': 'Cooling Load'}>, <Axes: >, <Axes:
>]],
      dtype=object)

```



BAR CHART

```

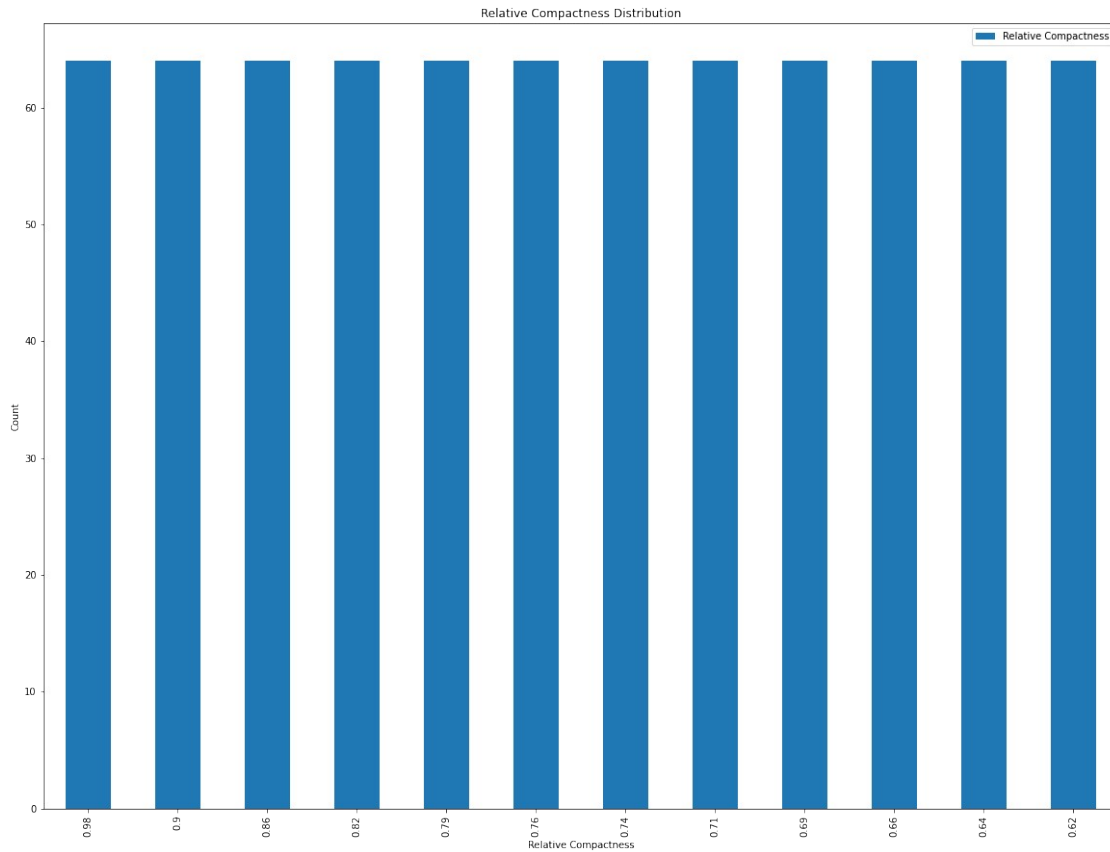
import pandas as pd
import matplotlib.pyplot as plt

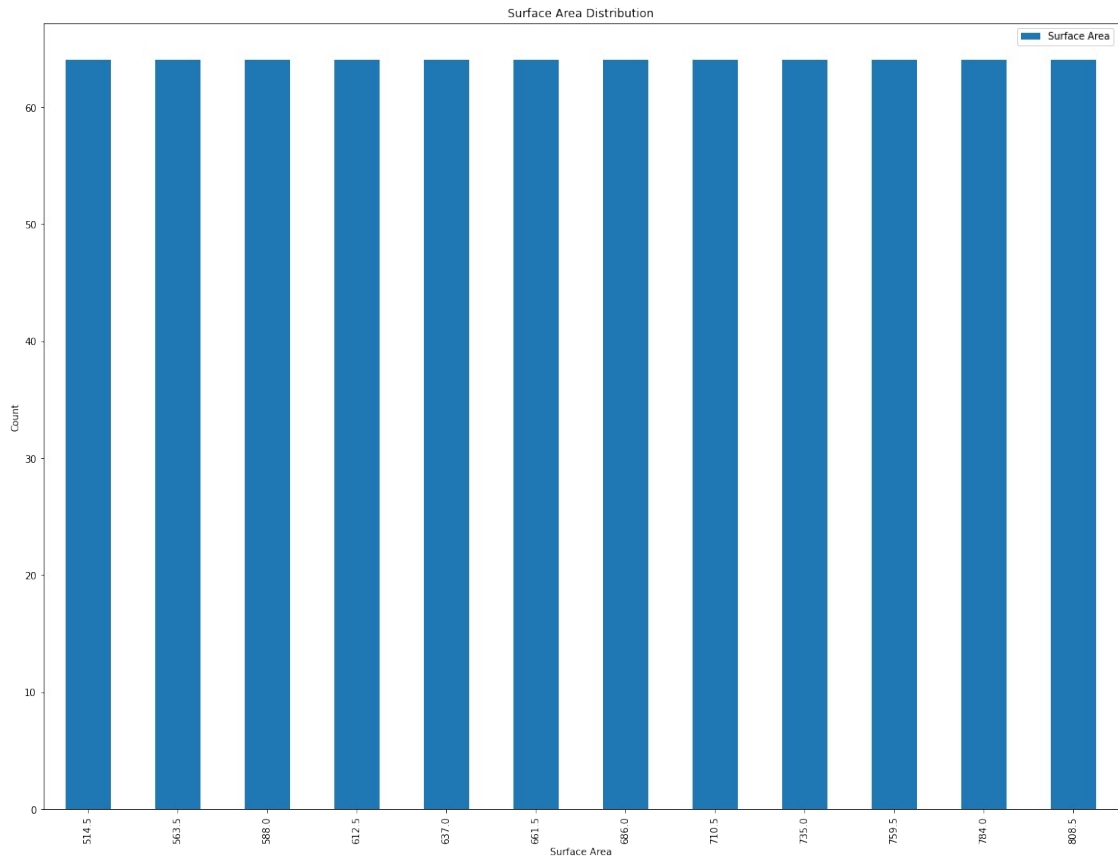
# read the data from CSV file into a pandas DataFrame
df = pd.read_csv('dataset.csv')

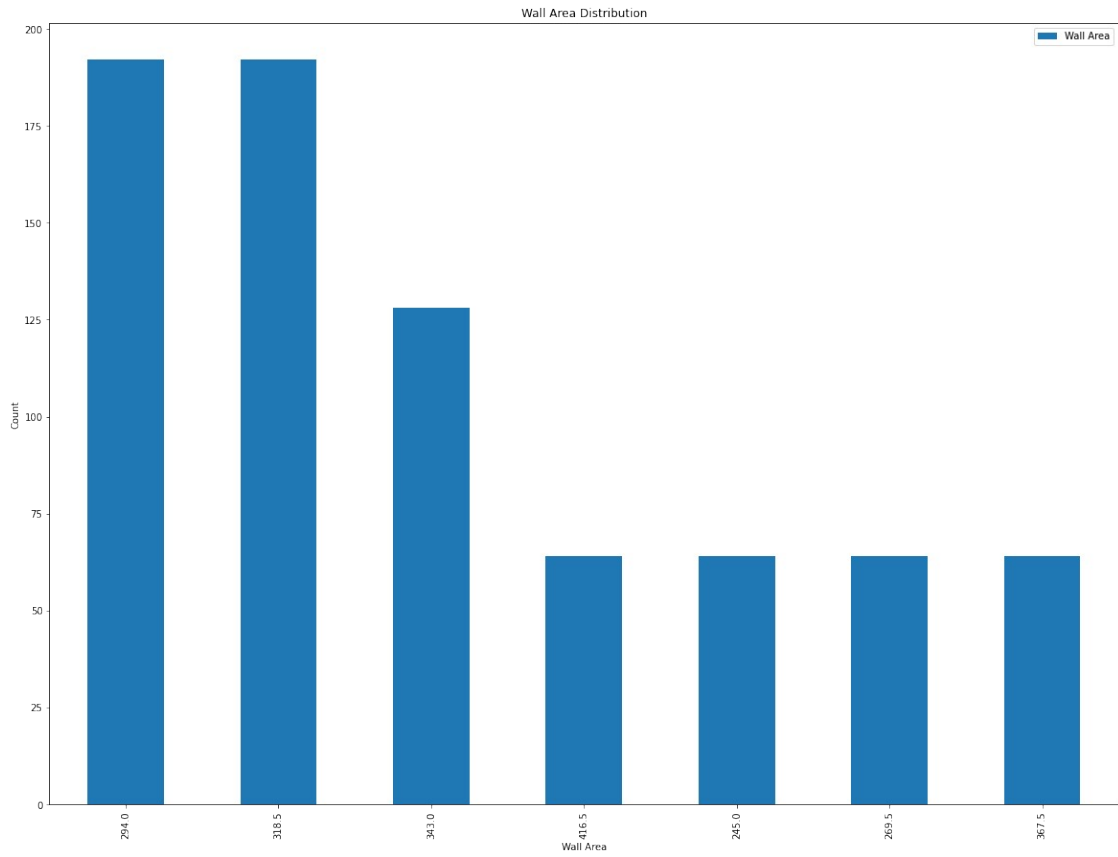
# iterate through the columns of the DataFrame and create a bar plot
# for each column
for col in df.columns:
    fig, ax = plt.subplots(figsize=(20, 15))

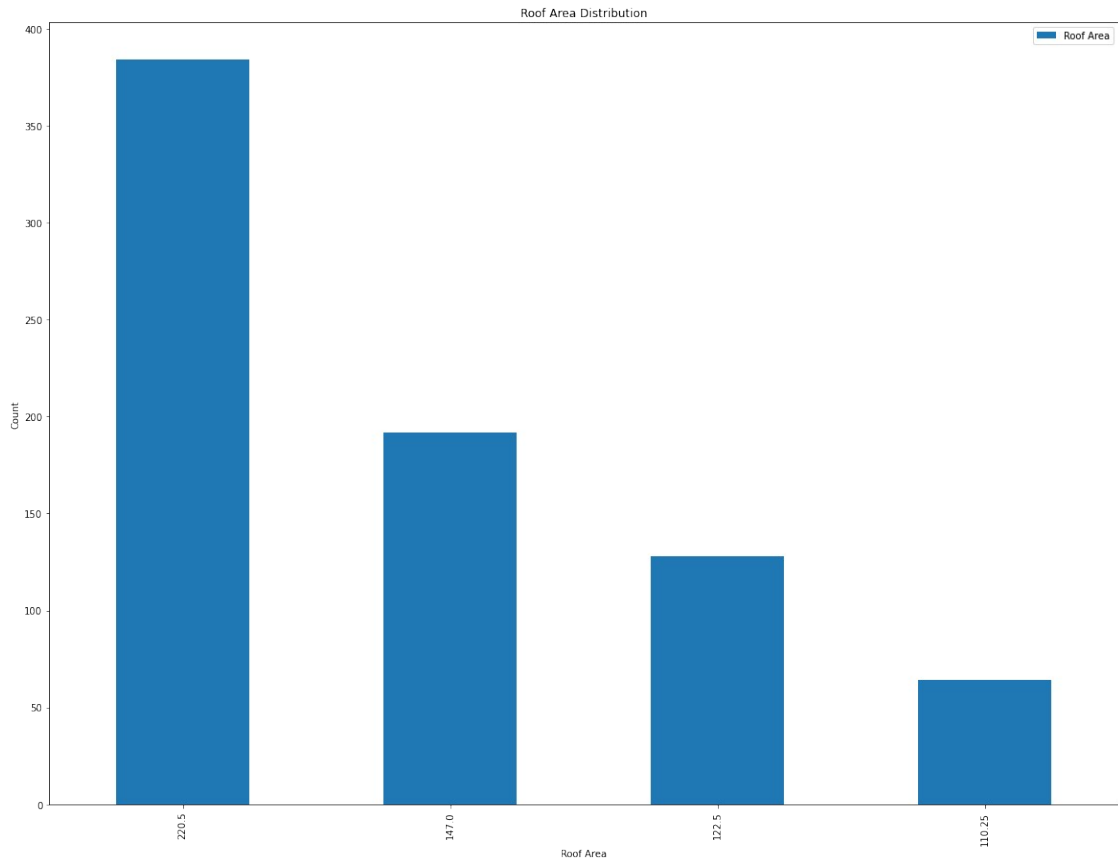
```

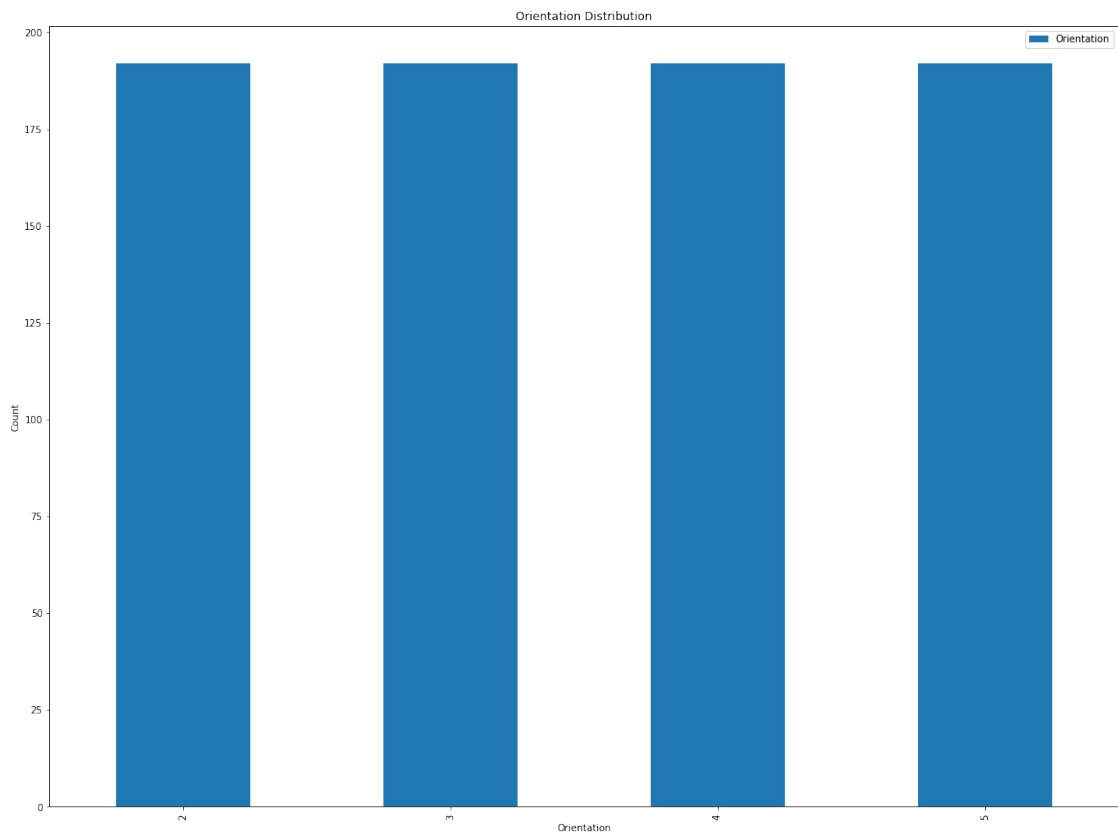
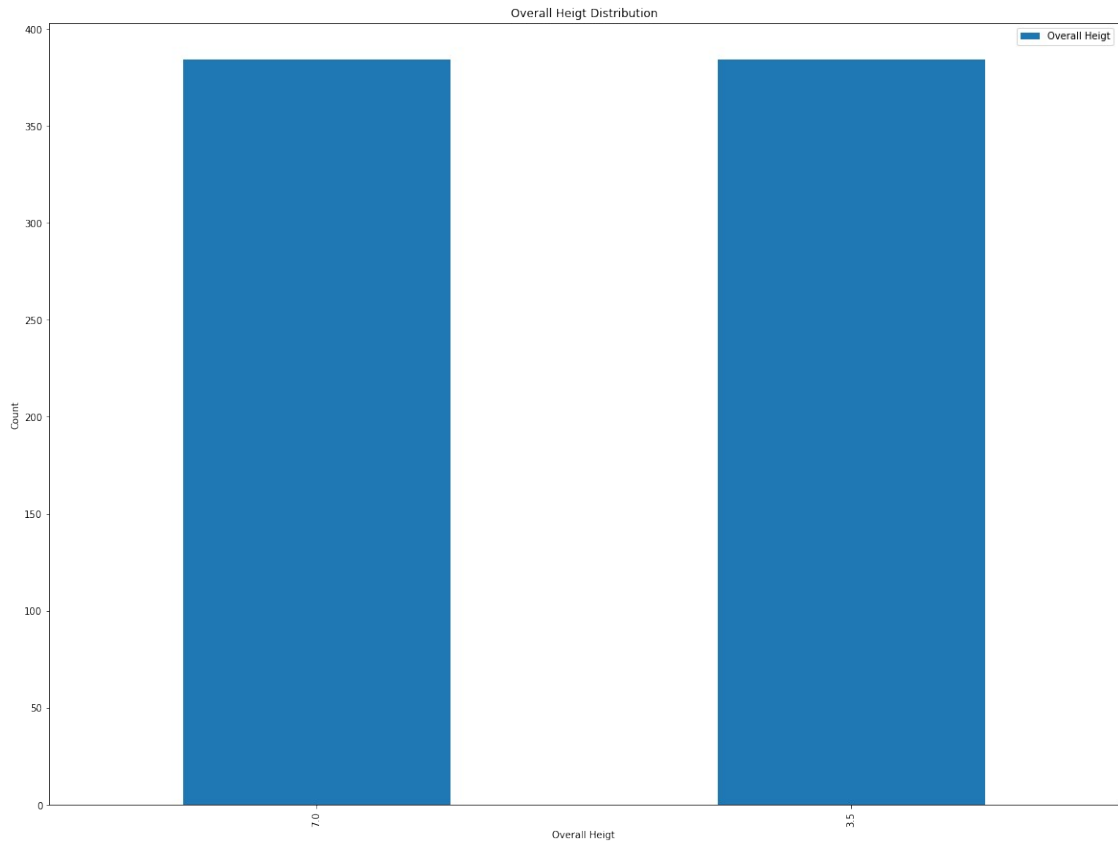
```
df[col].value_counts().plot(kind='bar', ax=ax)
ax.set_xlabel(col)
ax.set_ylabel('Count')
ax.set_title(f'{col} Distribution')
ax.legend()
plt.show()
```

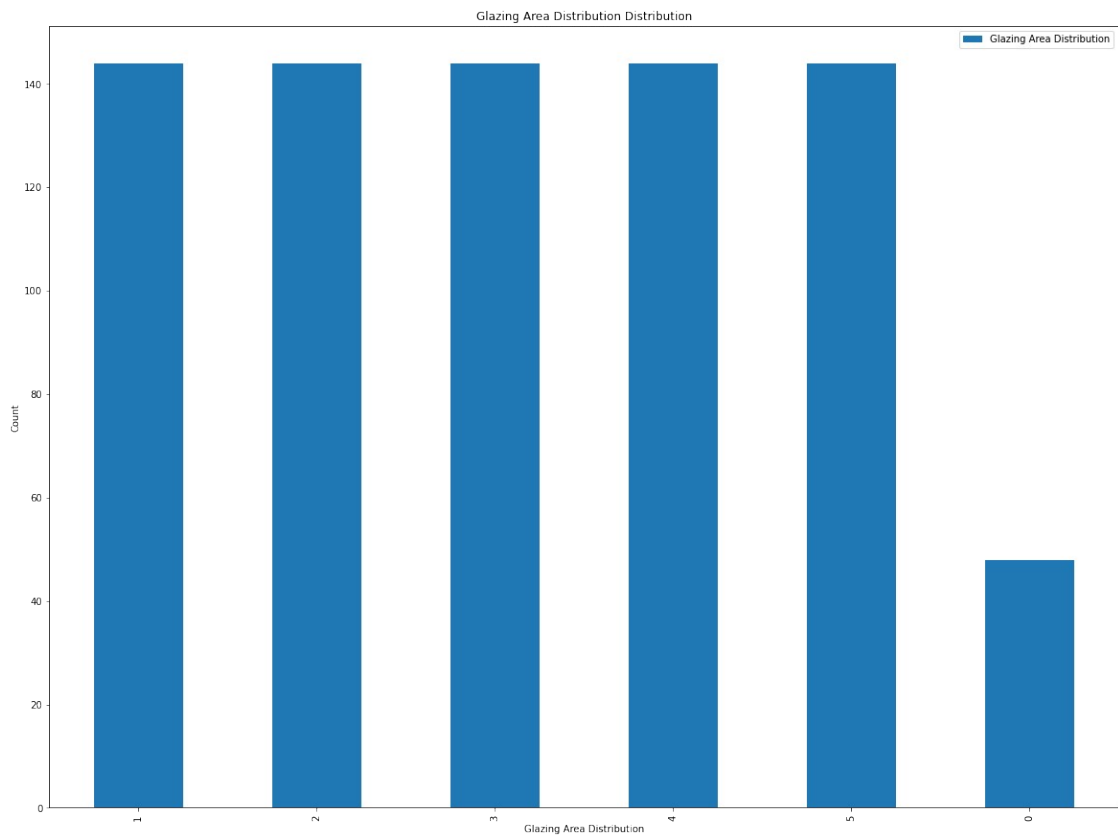
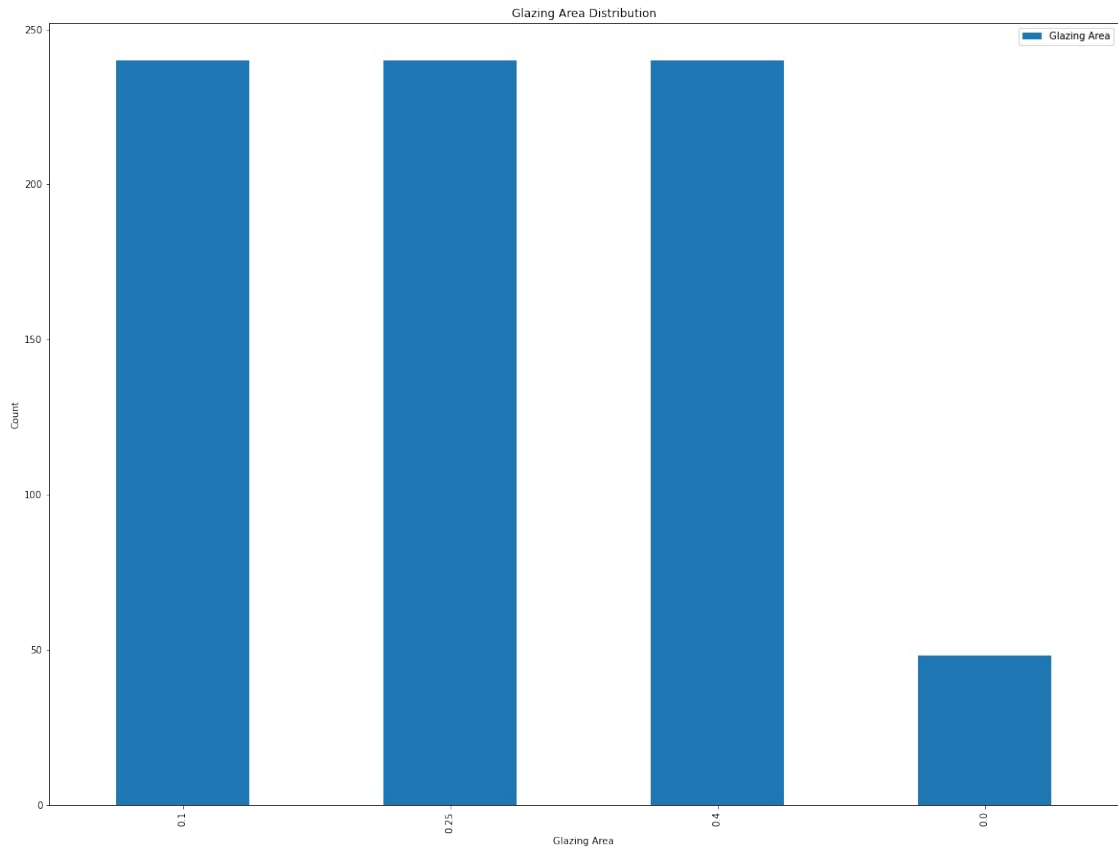


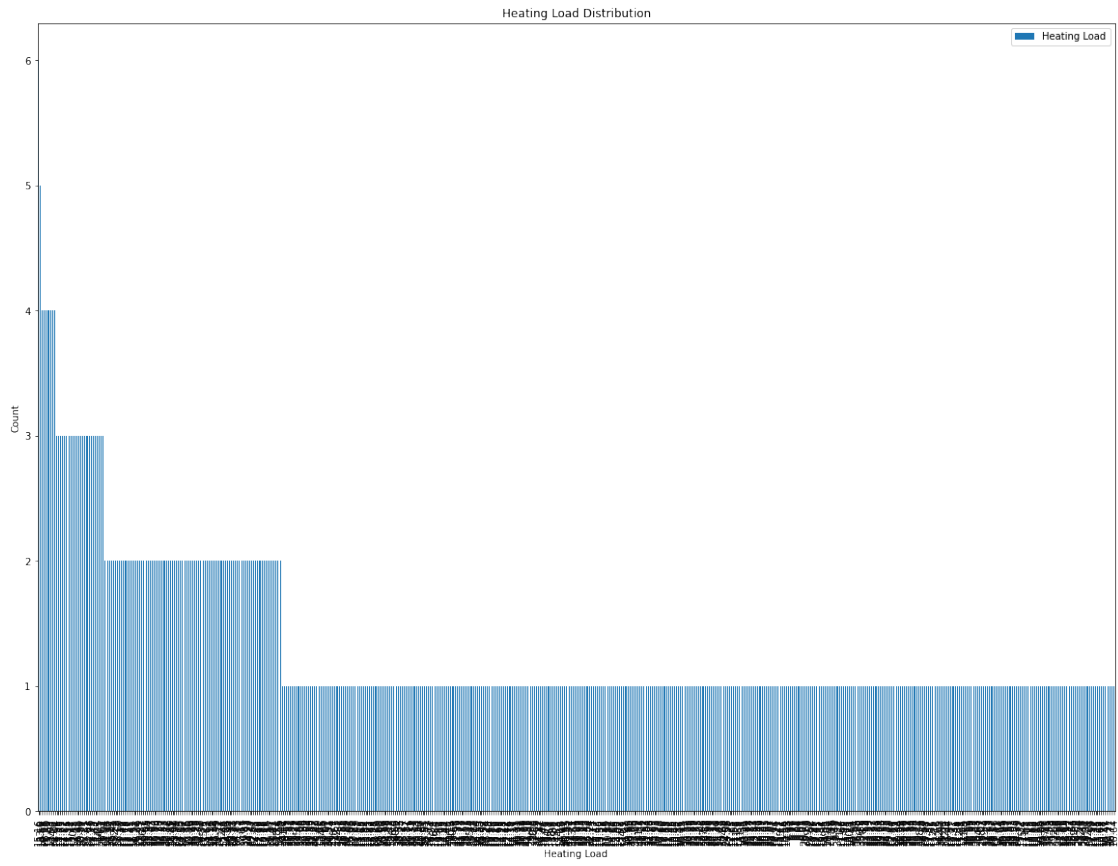


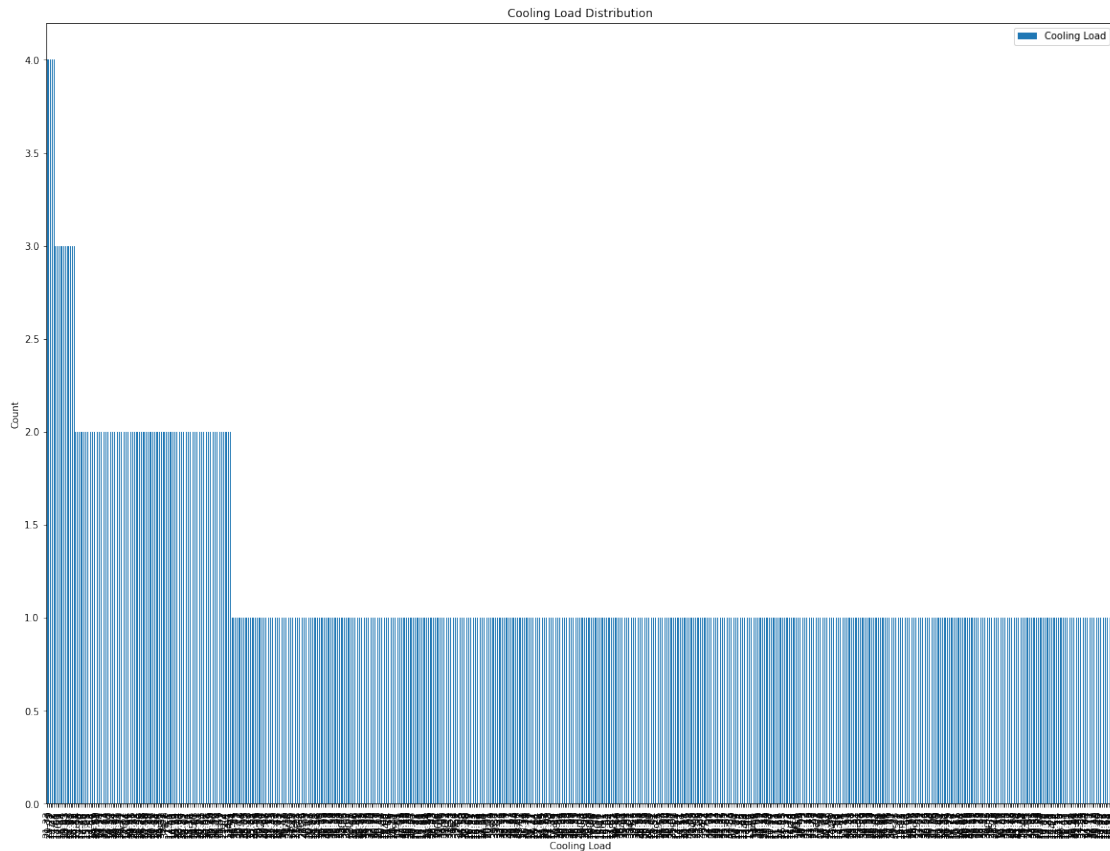












SCATTER PLOT

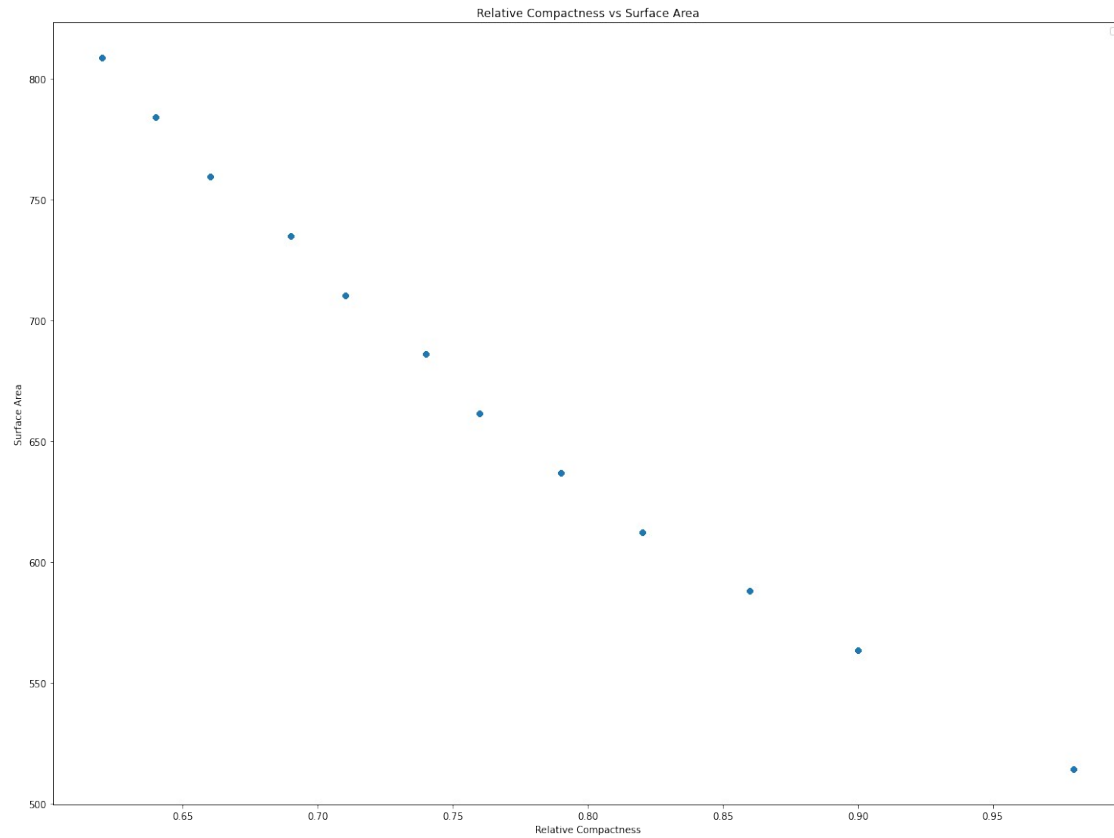
```
# read the data from CSV file into a pandas DataFrame
df = pd.read_csv('dataset.csv')
```

```
# iterate through pairs of columns in the DataFrame and create a
scatter plot for each pair
```

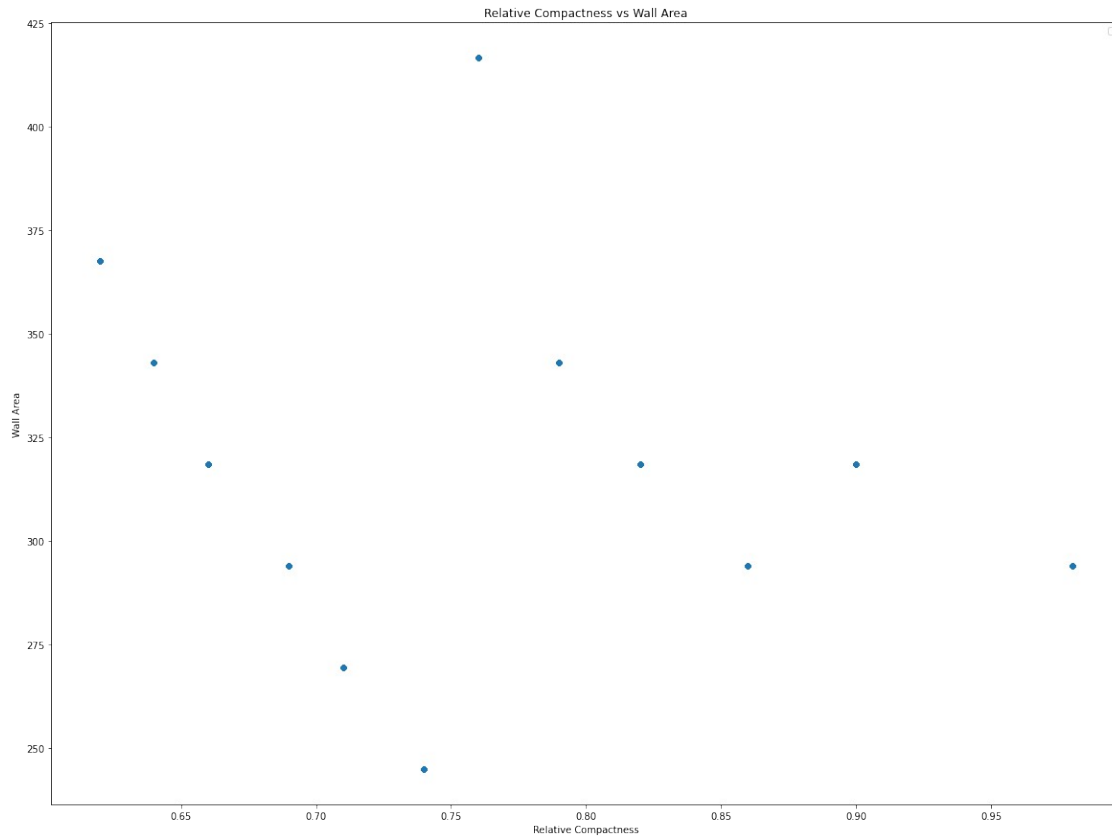
```
for i, col1 in enumerate(df.columns):
    for j, col2 in enumerate(df.columns):
        if i < j:
            fig, ax = plt.subplots(figsize=(20, 15))
            df.plot.scatter(x=col1, y=col2, ax=ax)
            ax.set_xlabel(col1)
            ax.set_ylabel(col2)
            ax.set_title(f'{col1} vs {col2}')
            ax.legend()
            plt.show()
```

```
/usr/local/lib/python3.9/dist-packages/pandas/plotting/_matplotlib/
core.py:1114: UserWarning: No data for colormapping provided via 'c'.
Parameters 'cmap' will be ignored
```

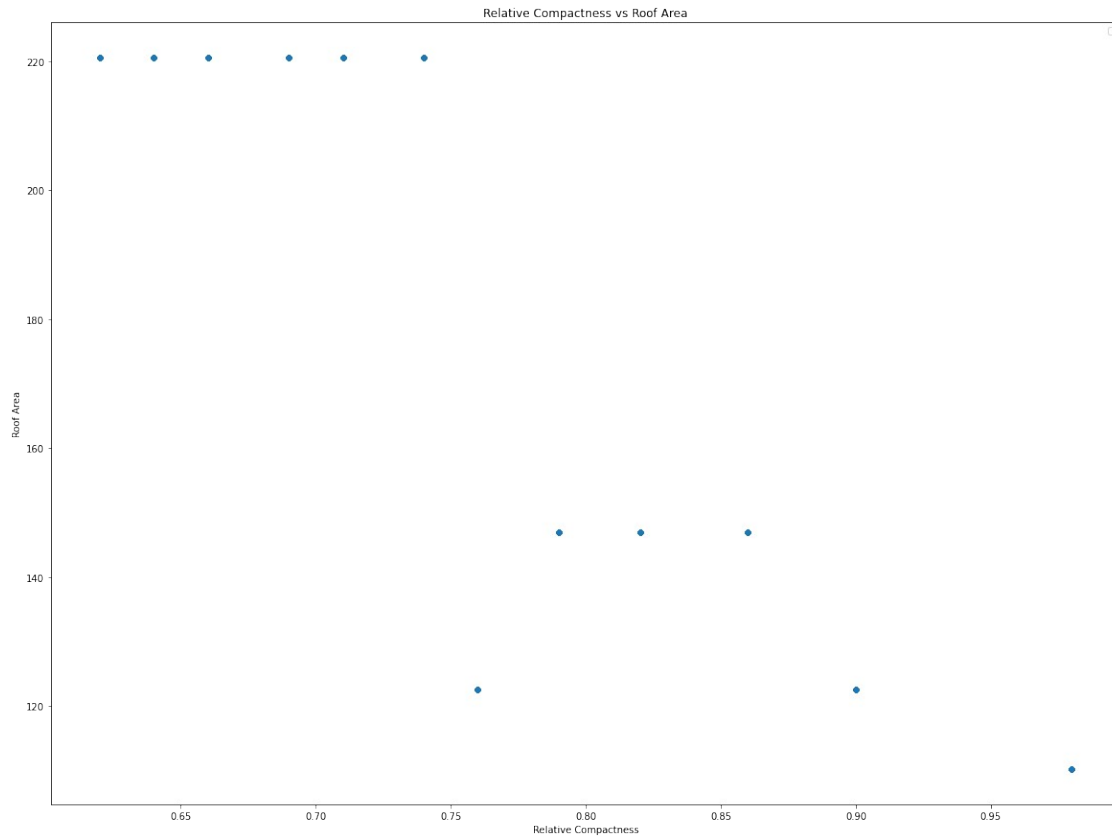
```
scatter = ax.scatter(
WARNING:matplotlib.legend:No artists with labels found to put in
legend. Note that artists whose label start with an underscore are
ignored when legend() is called with no argument.
```



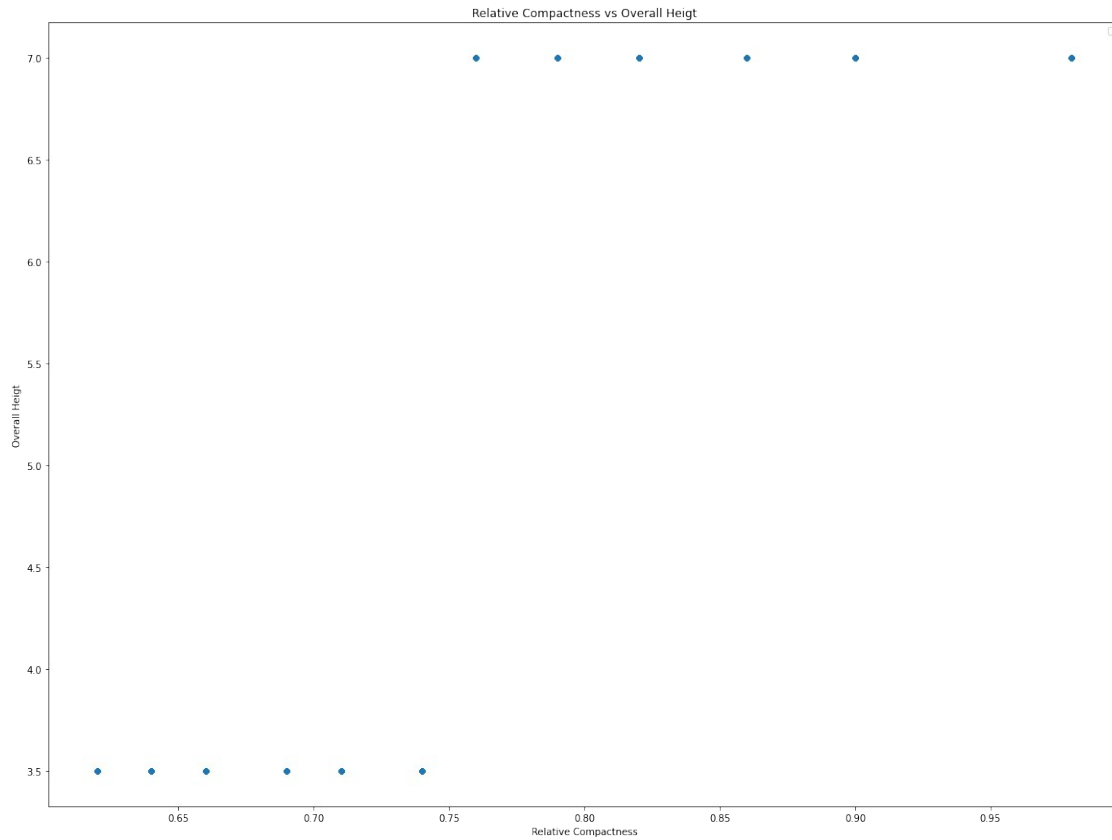
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



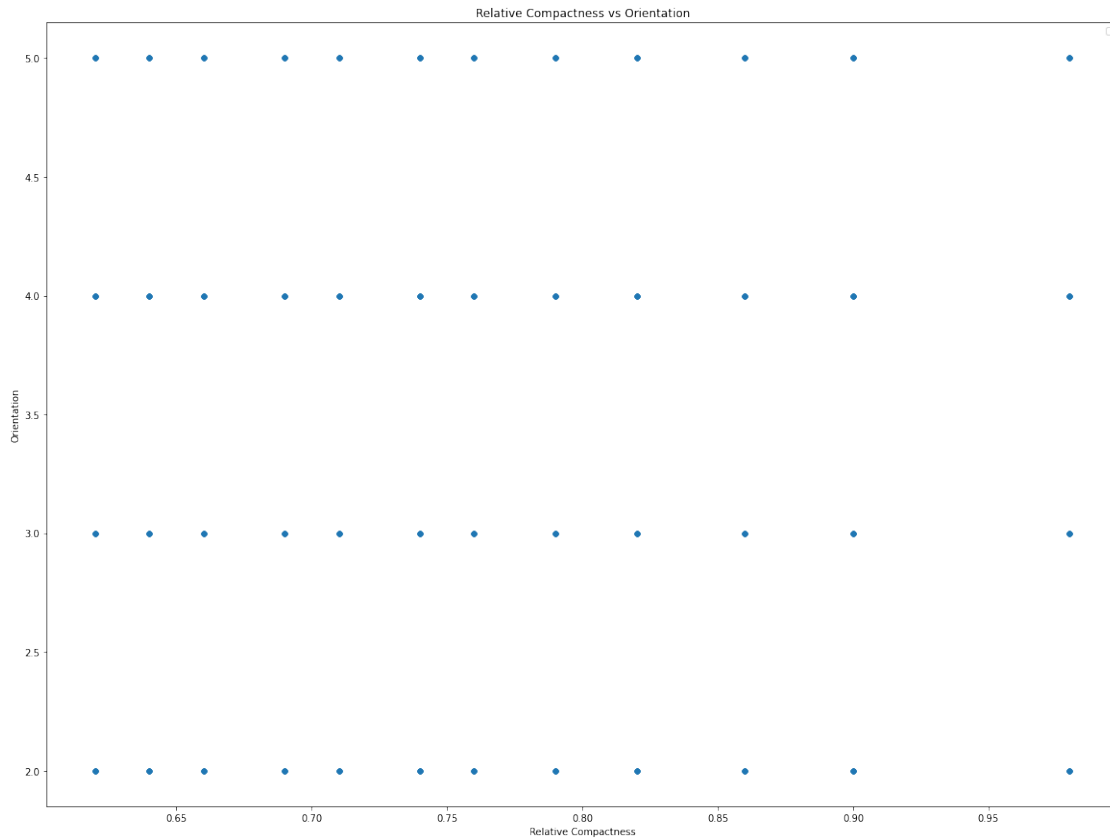
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



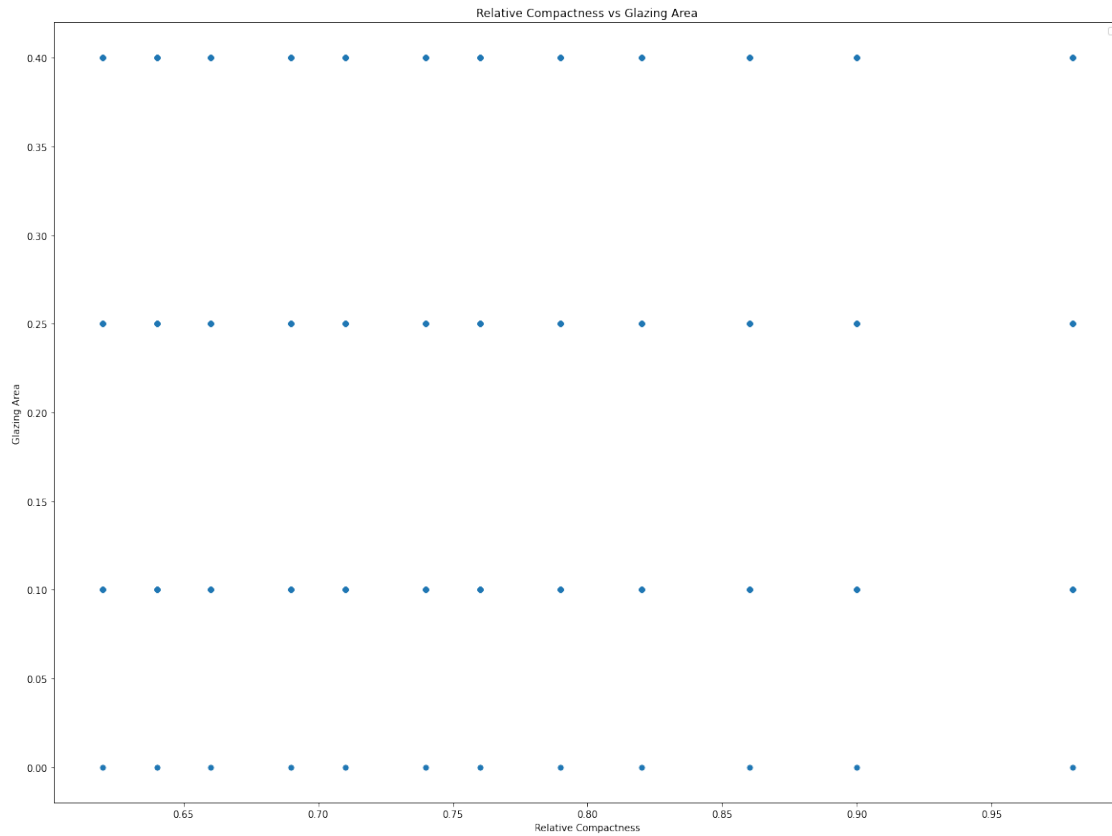
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



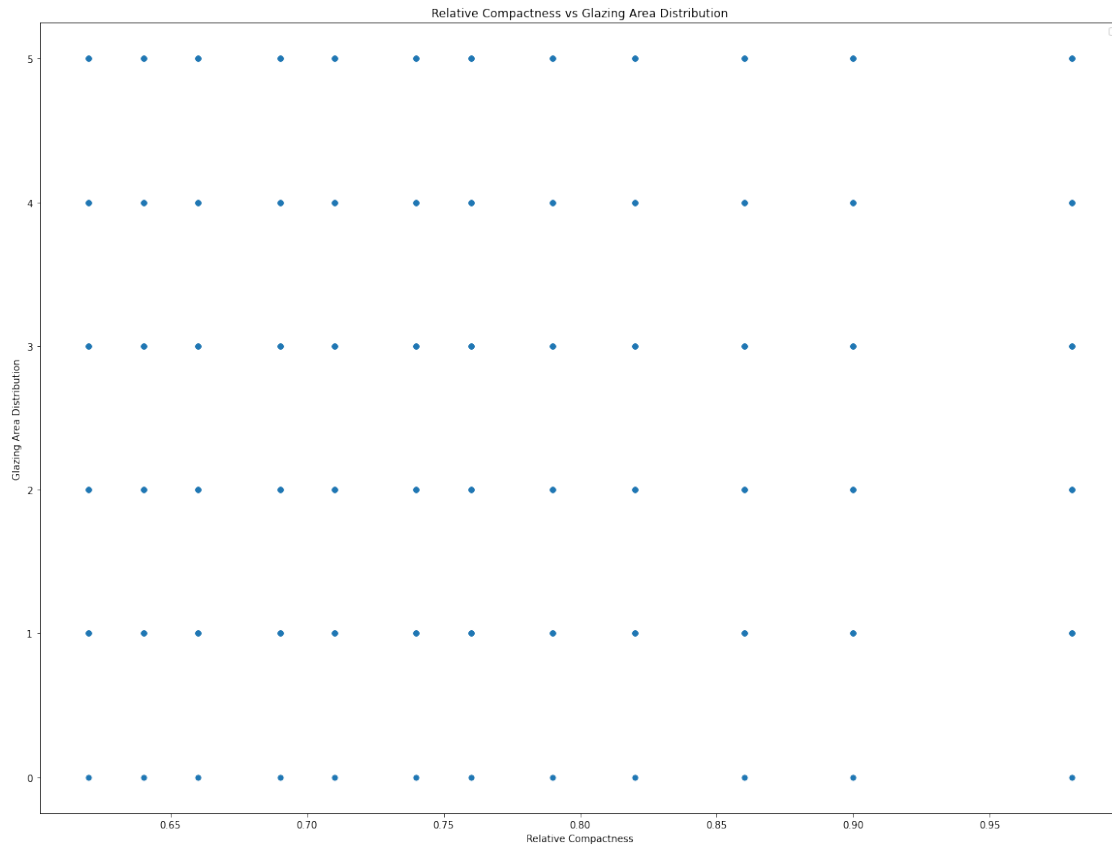
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



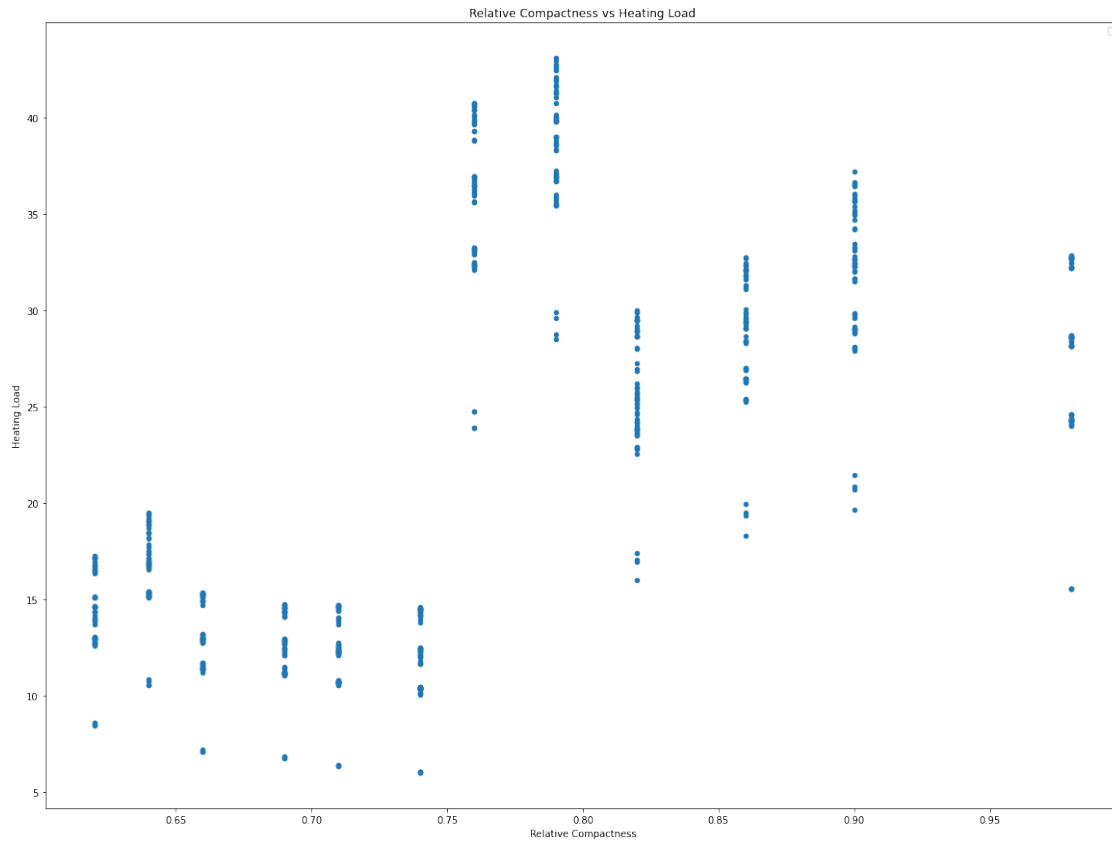
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



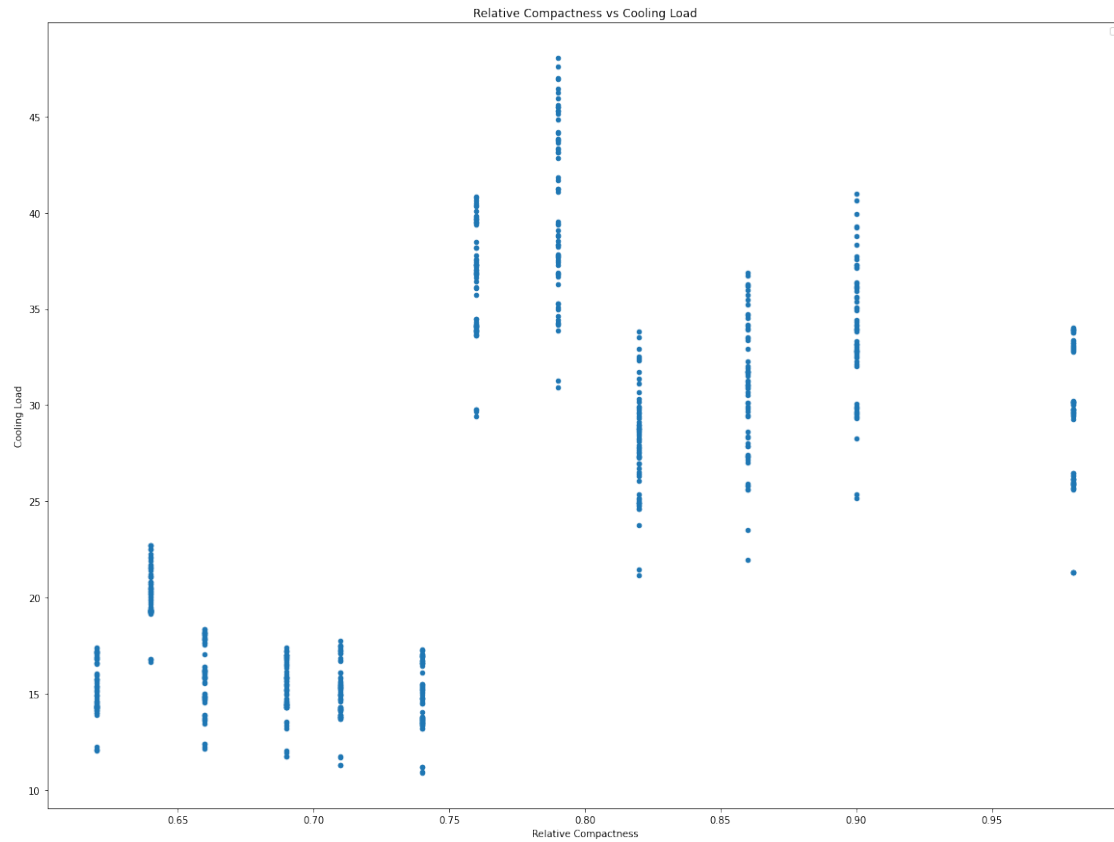
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



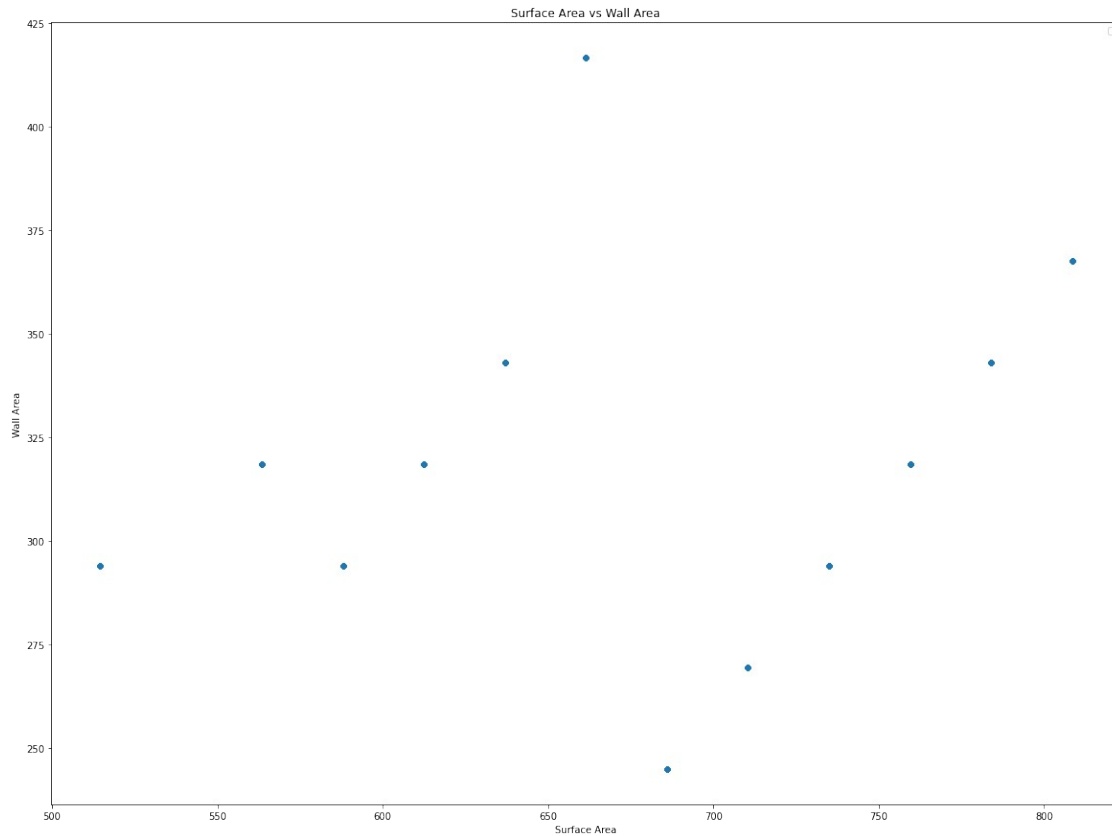
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



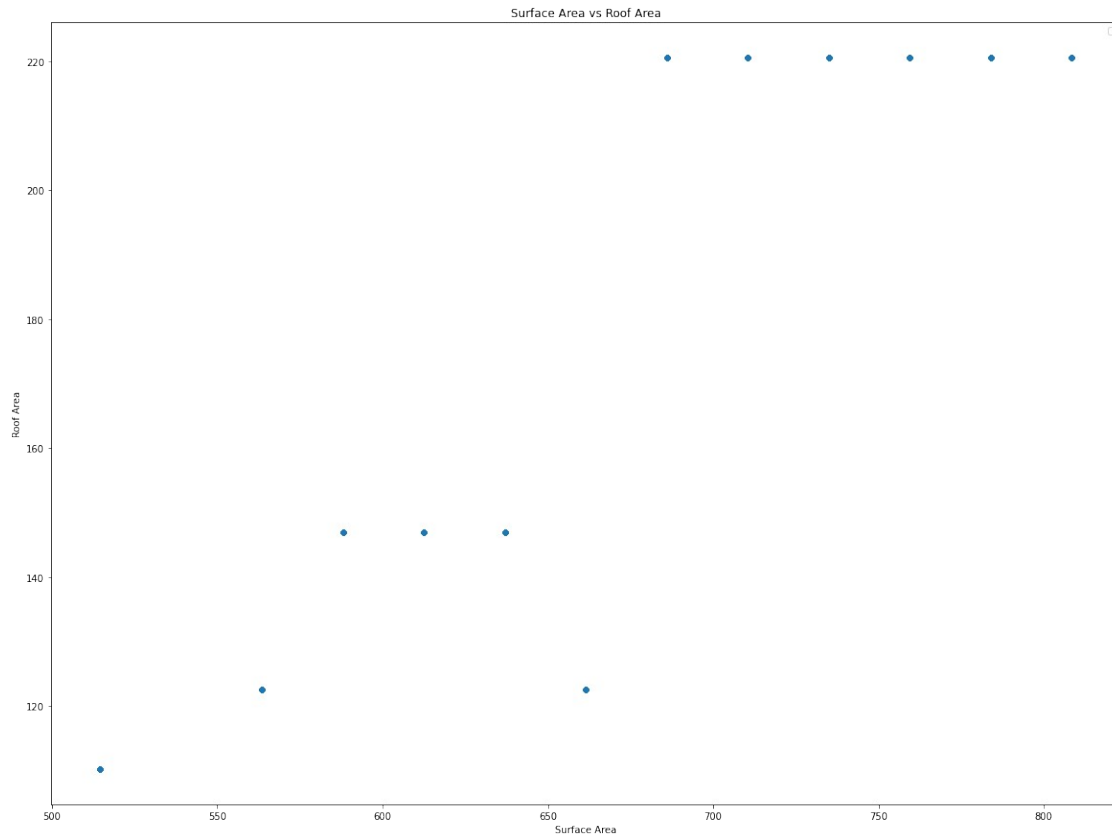
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



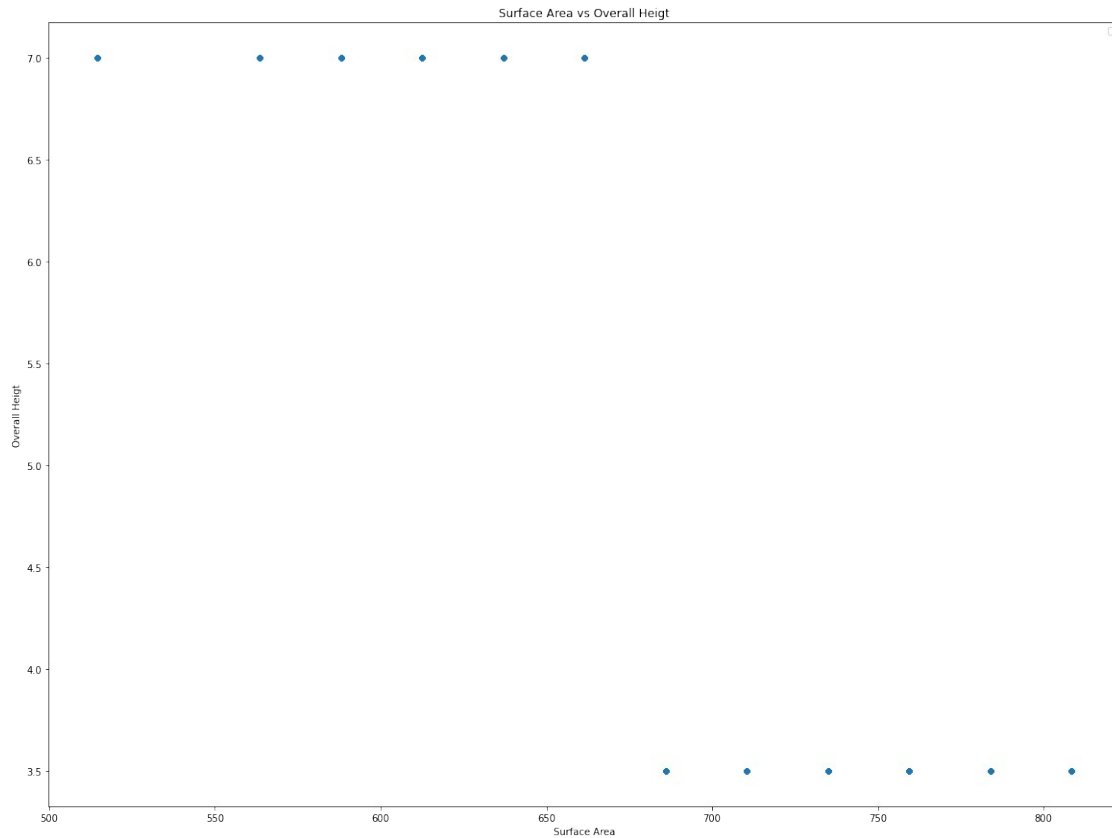
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



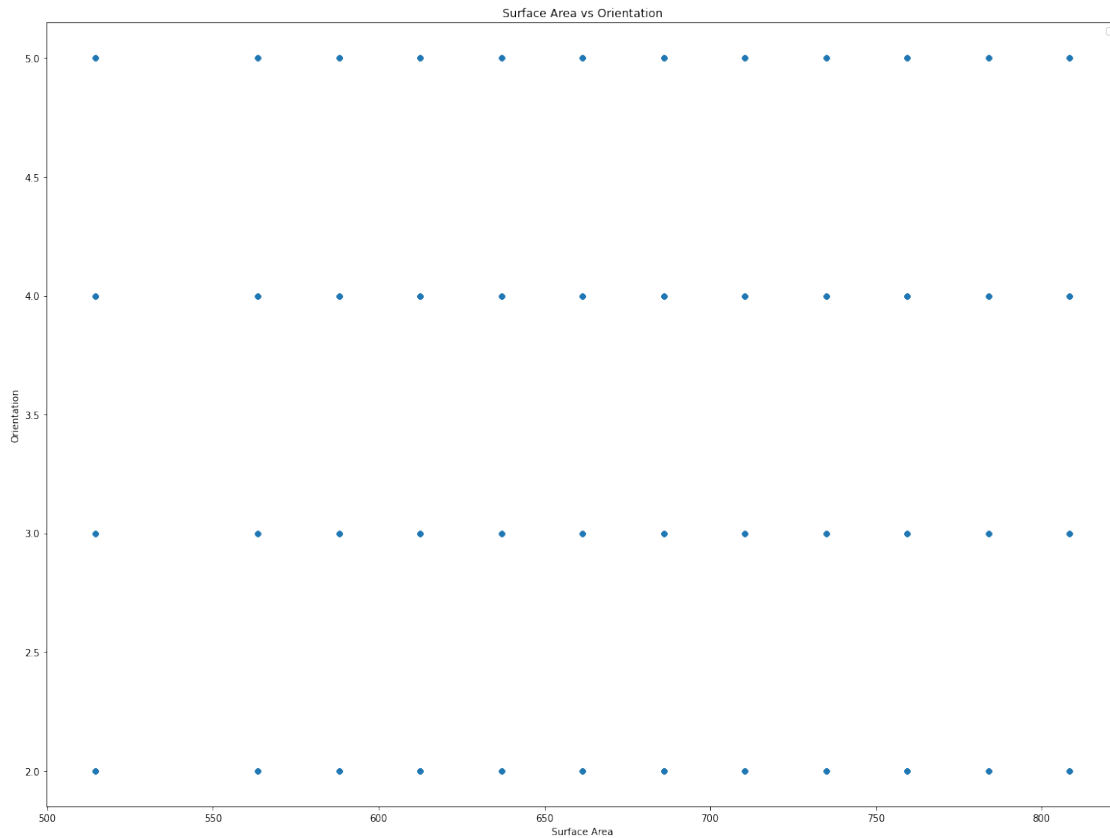
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



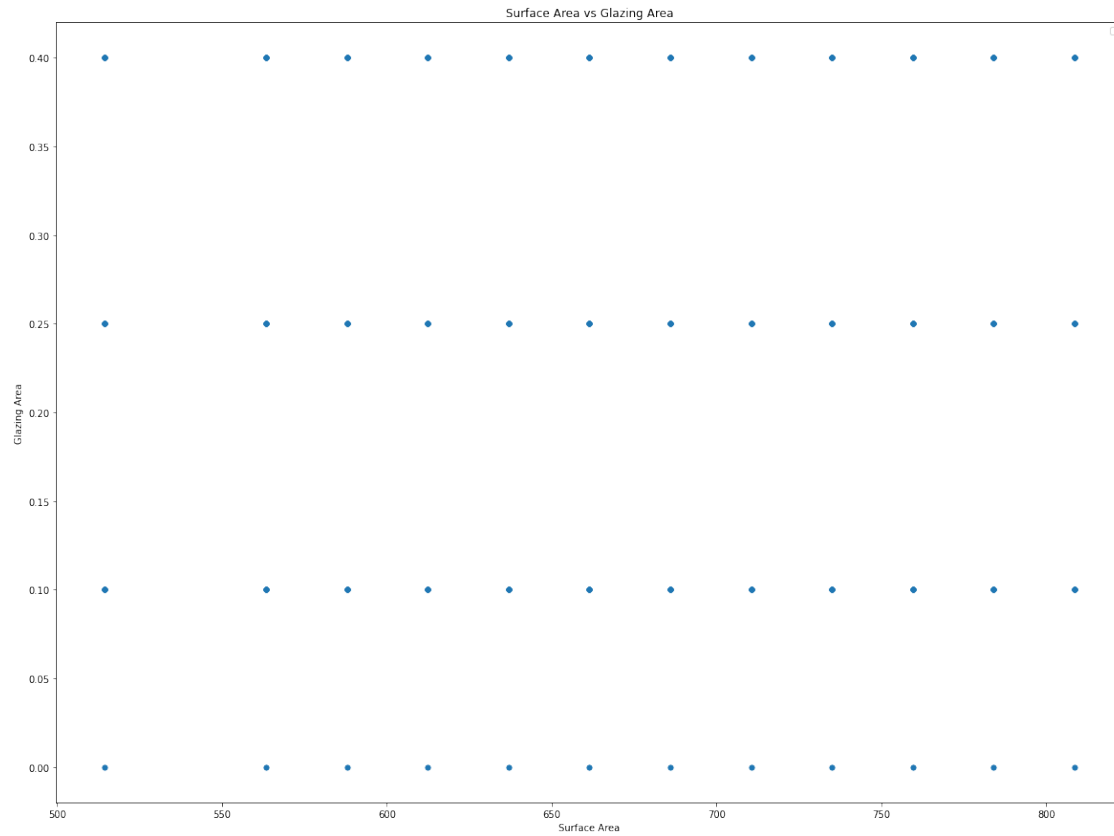
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



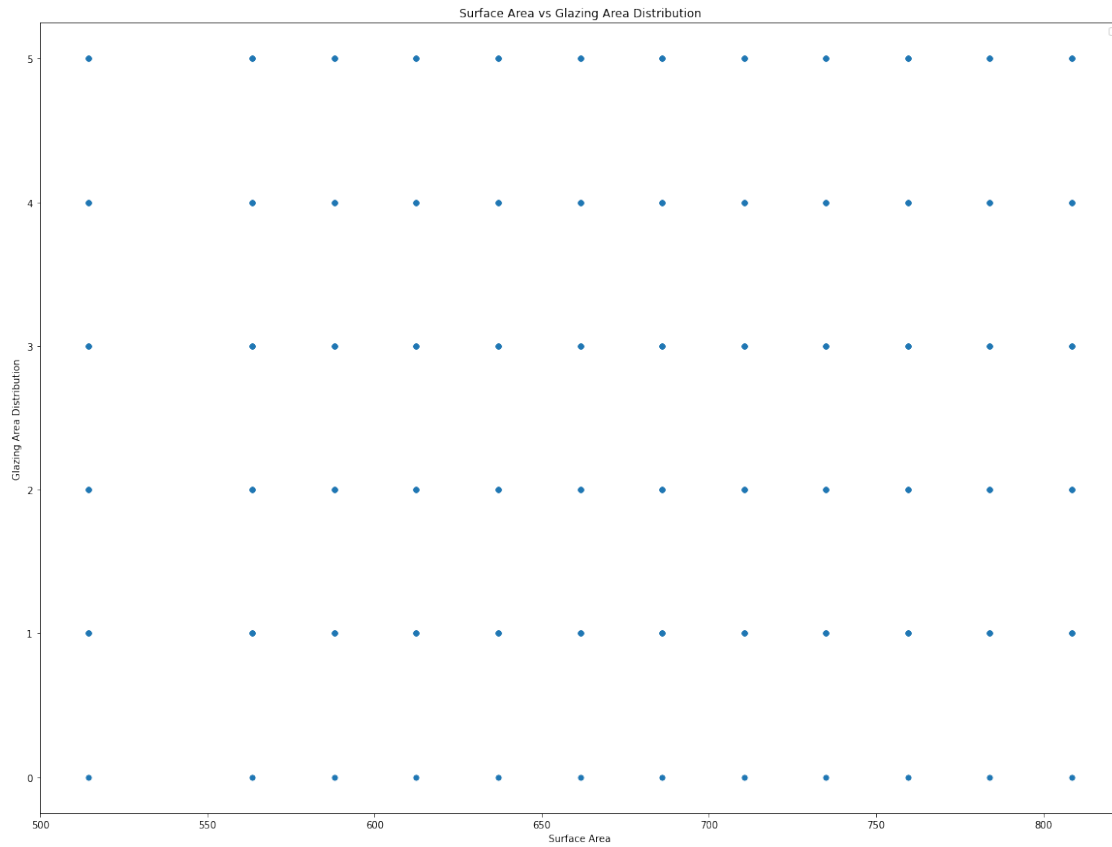
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



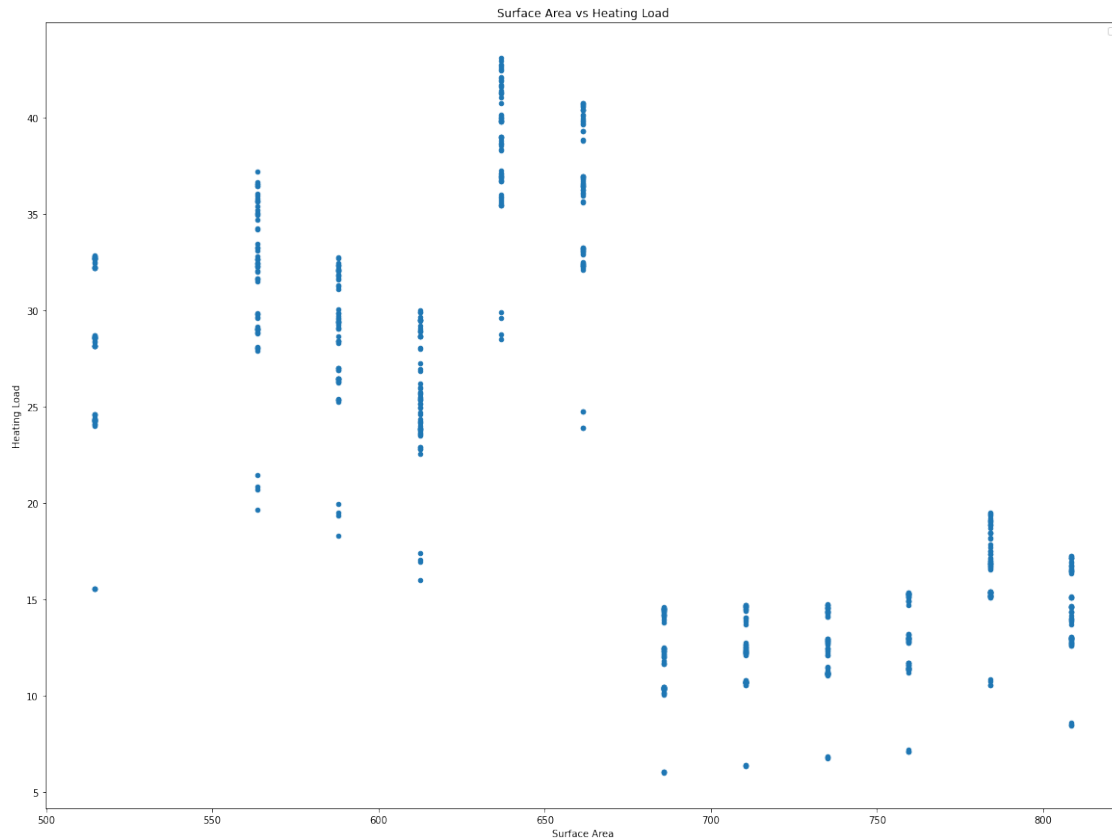
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



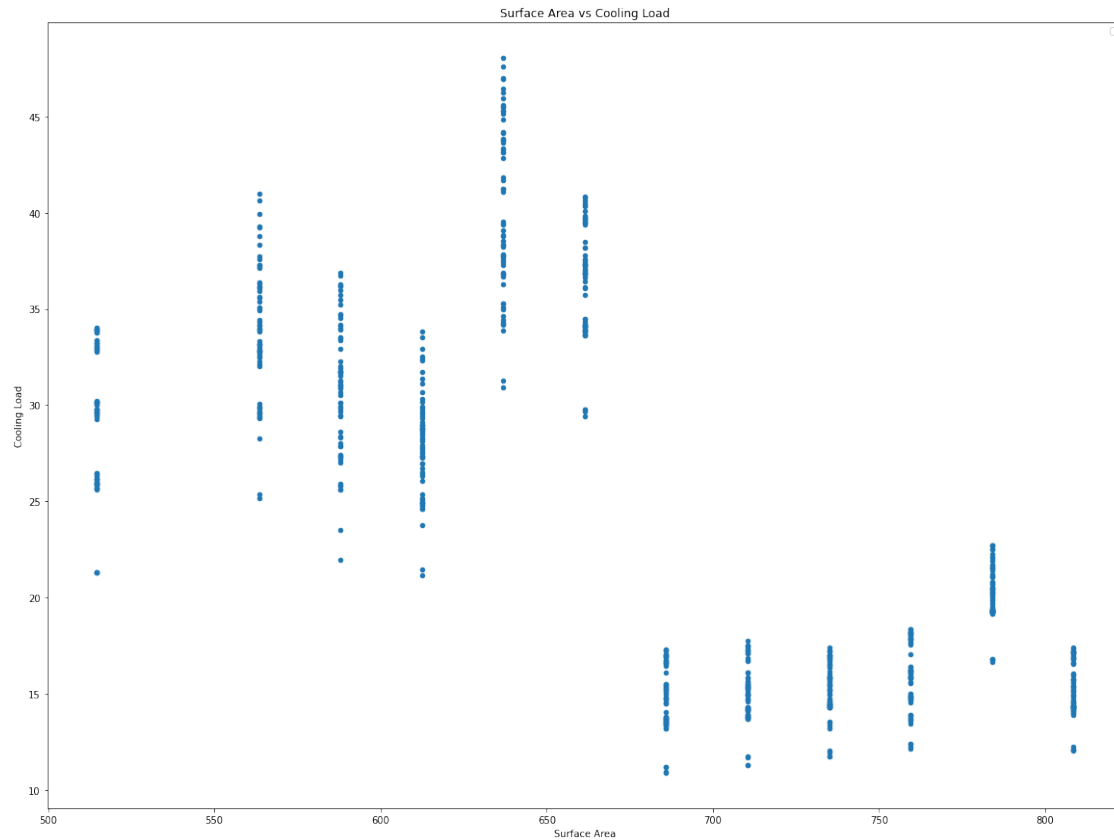
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



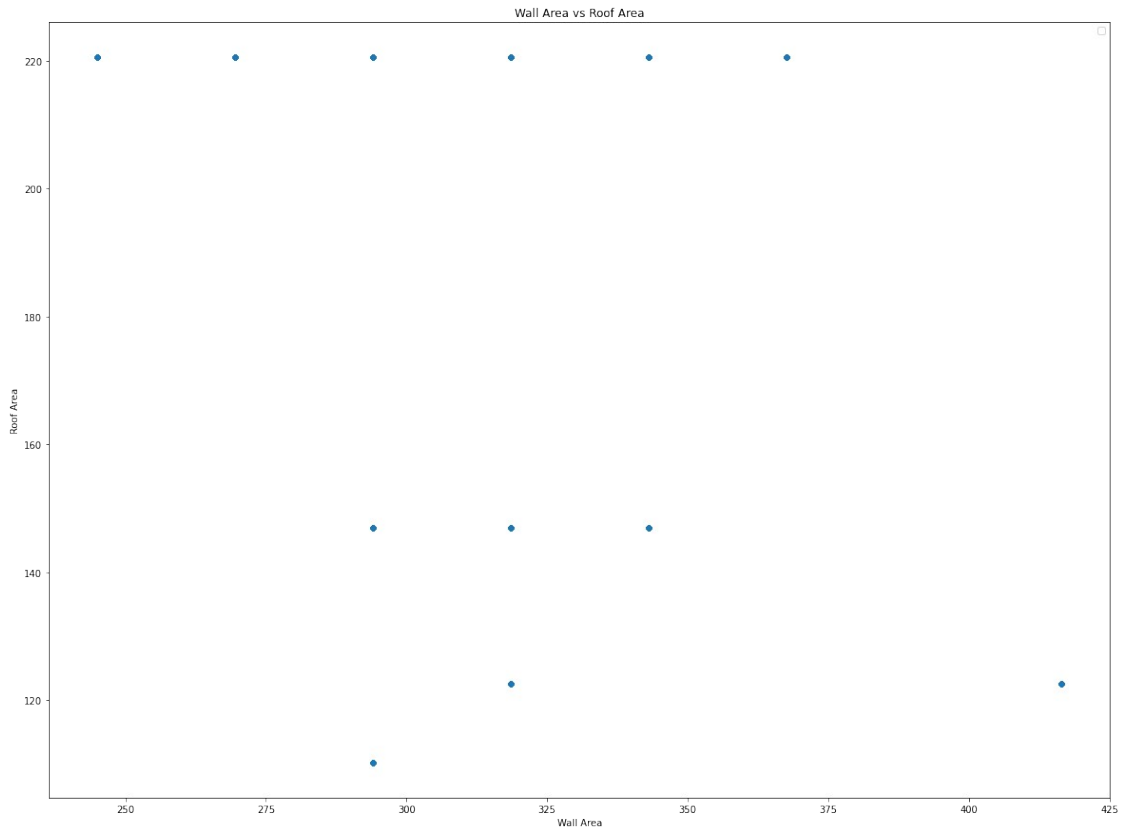
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



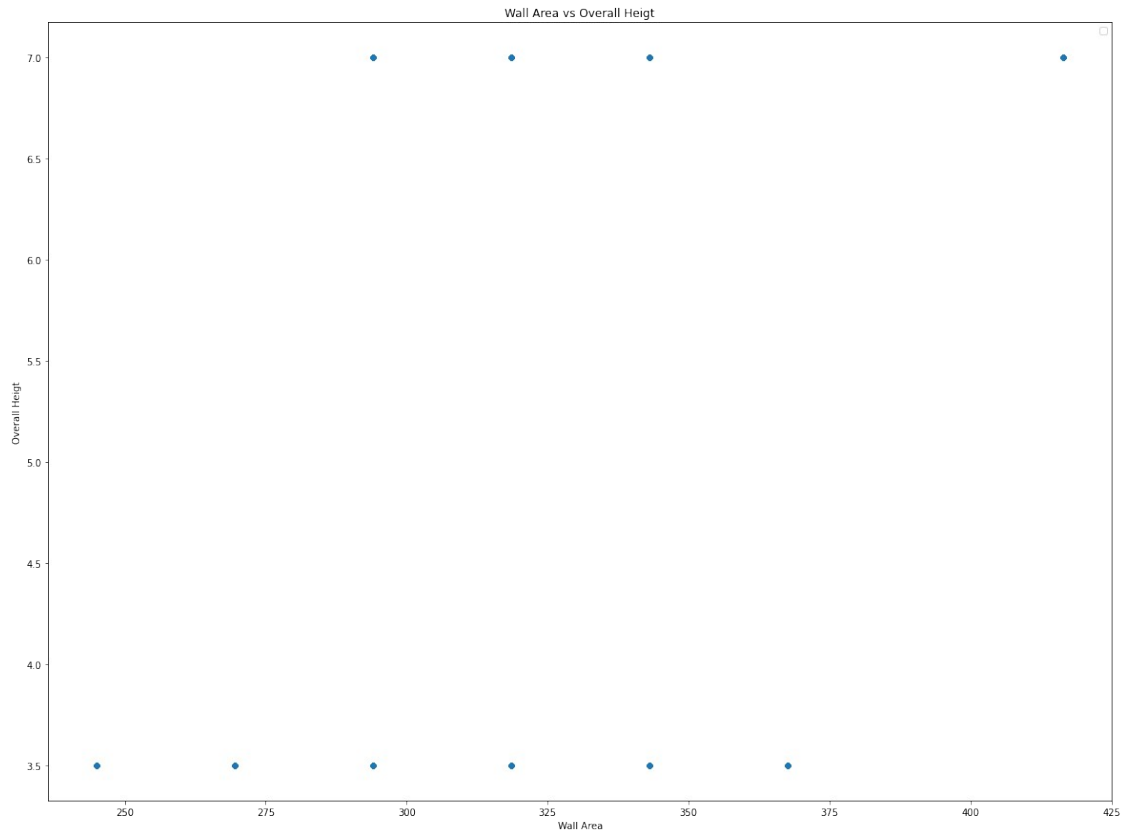
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



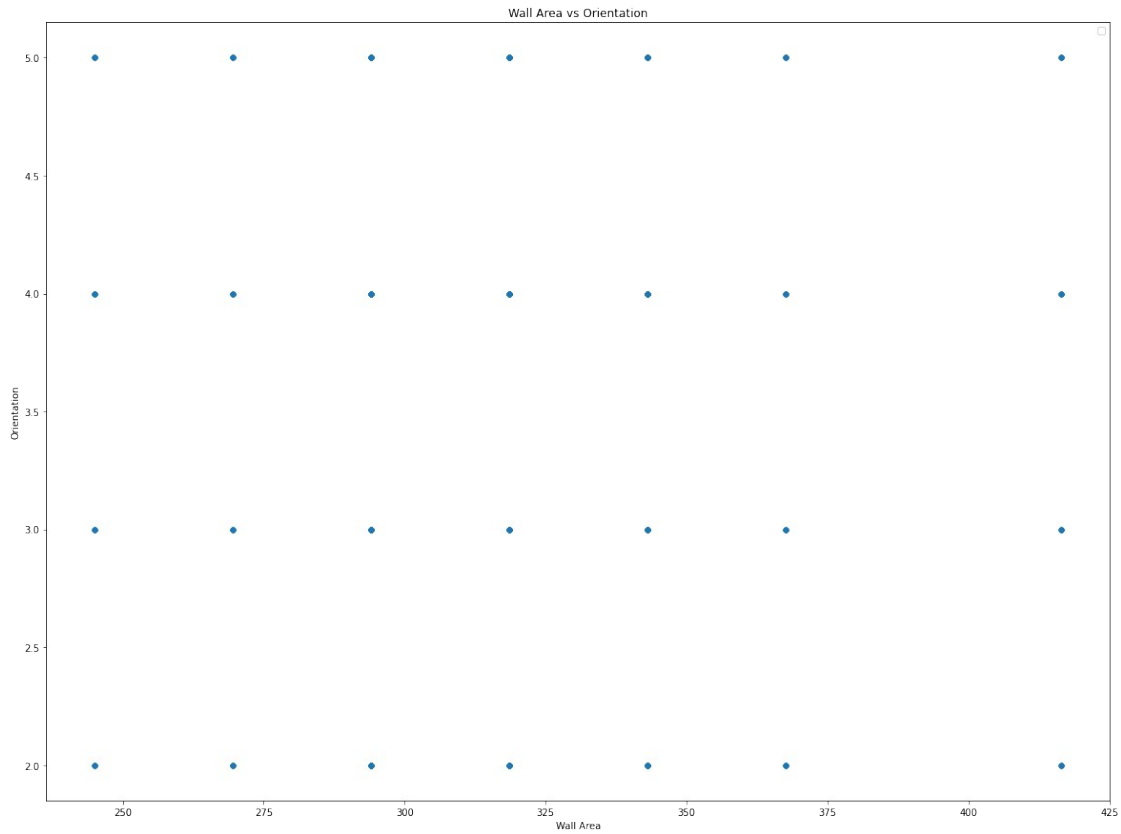
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



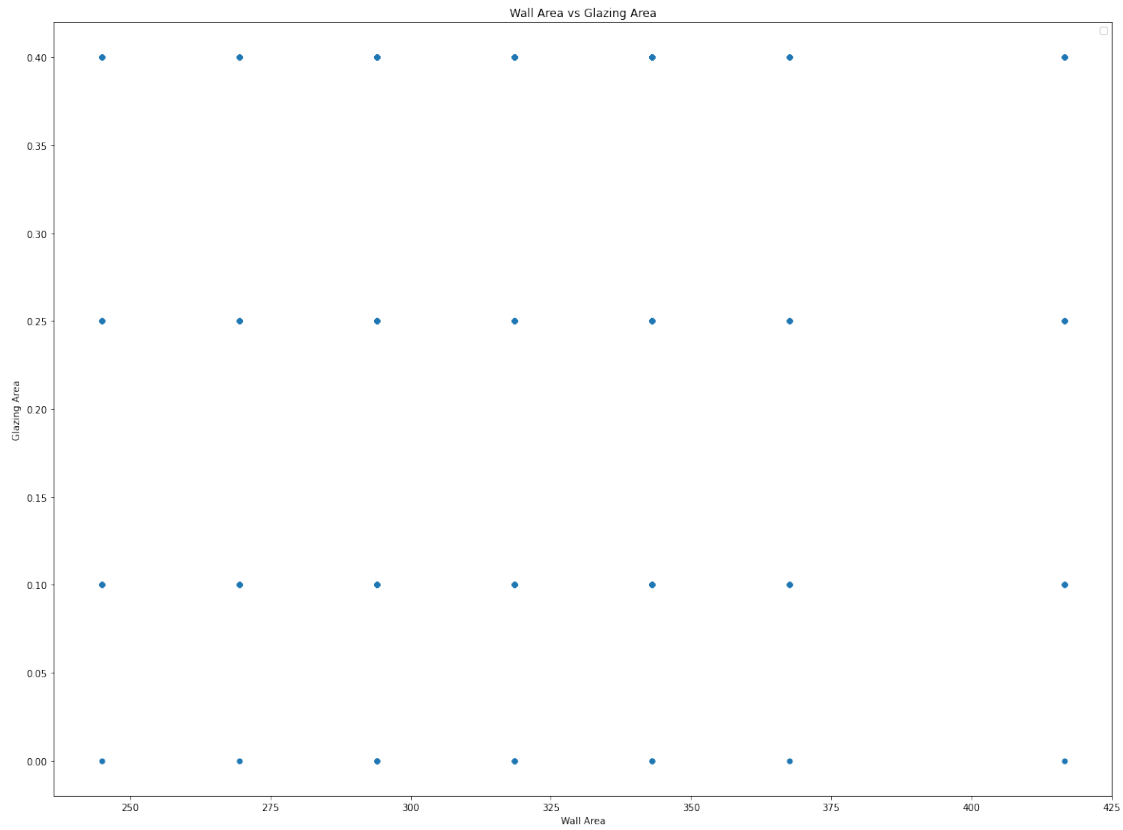
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



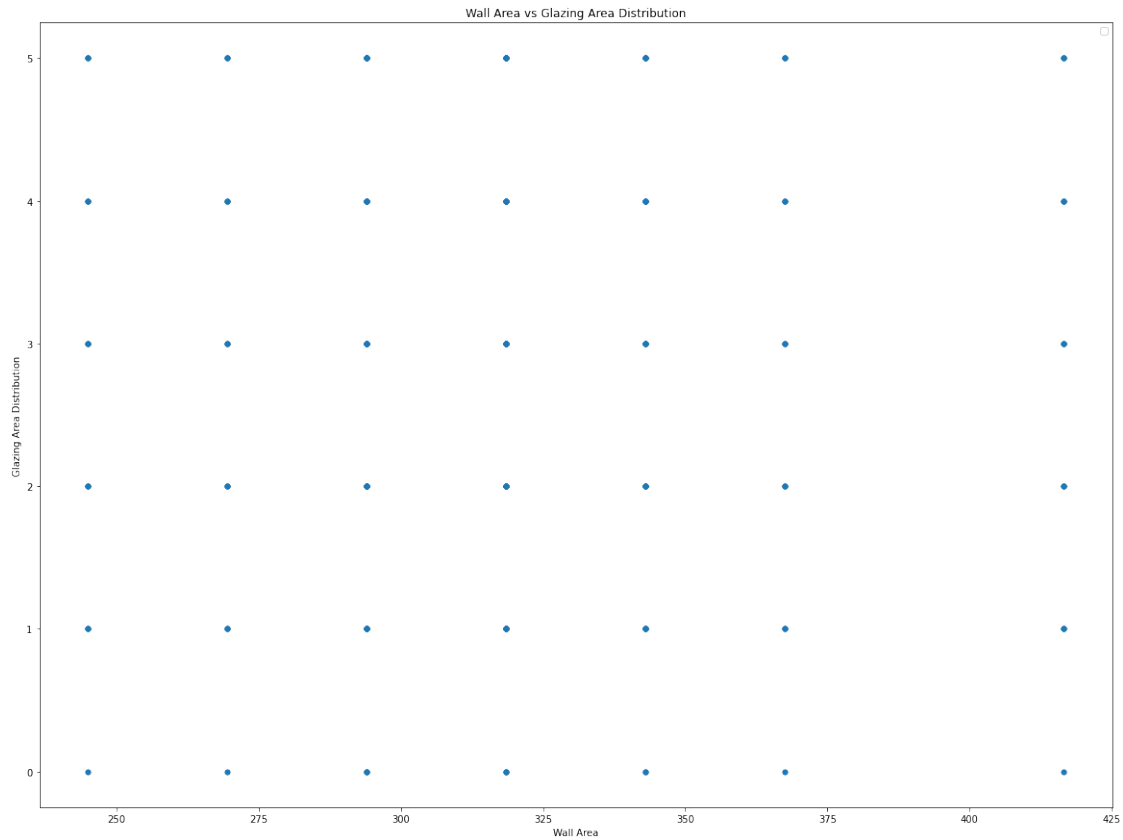
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



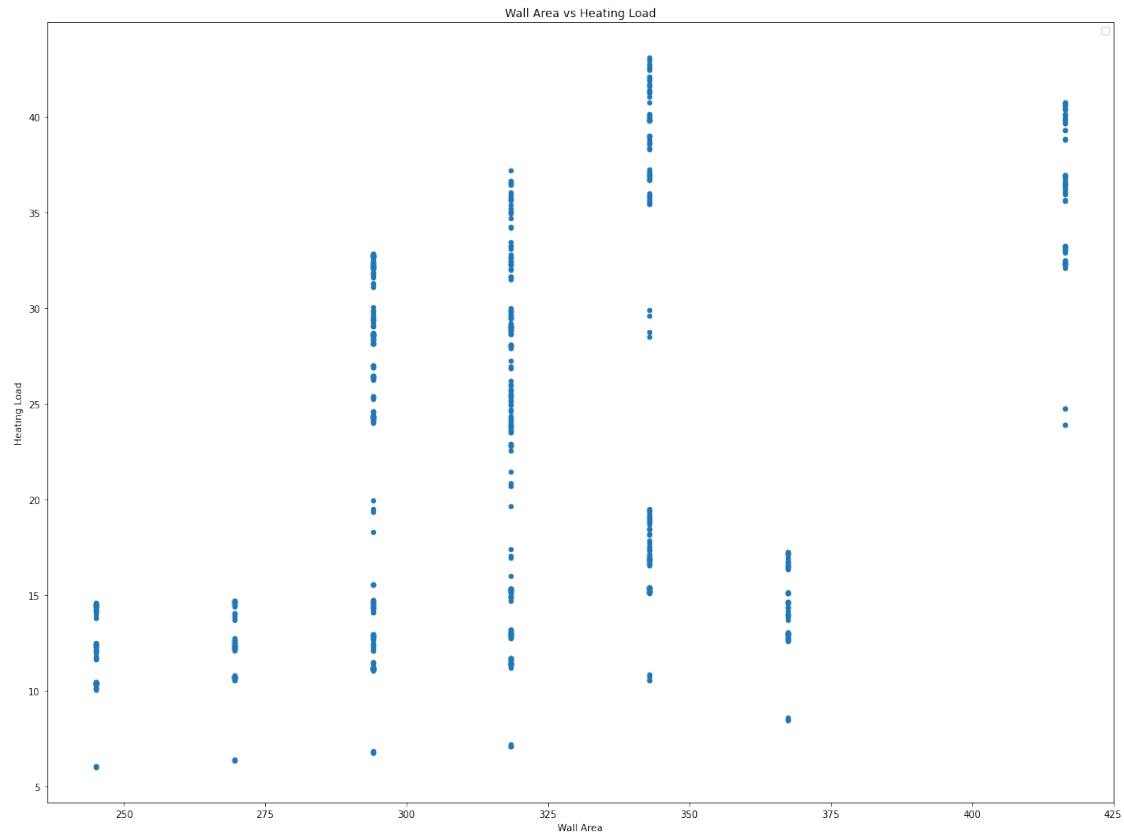
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



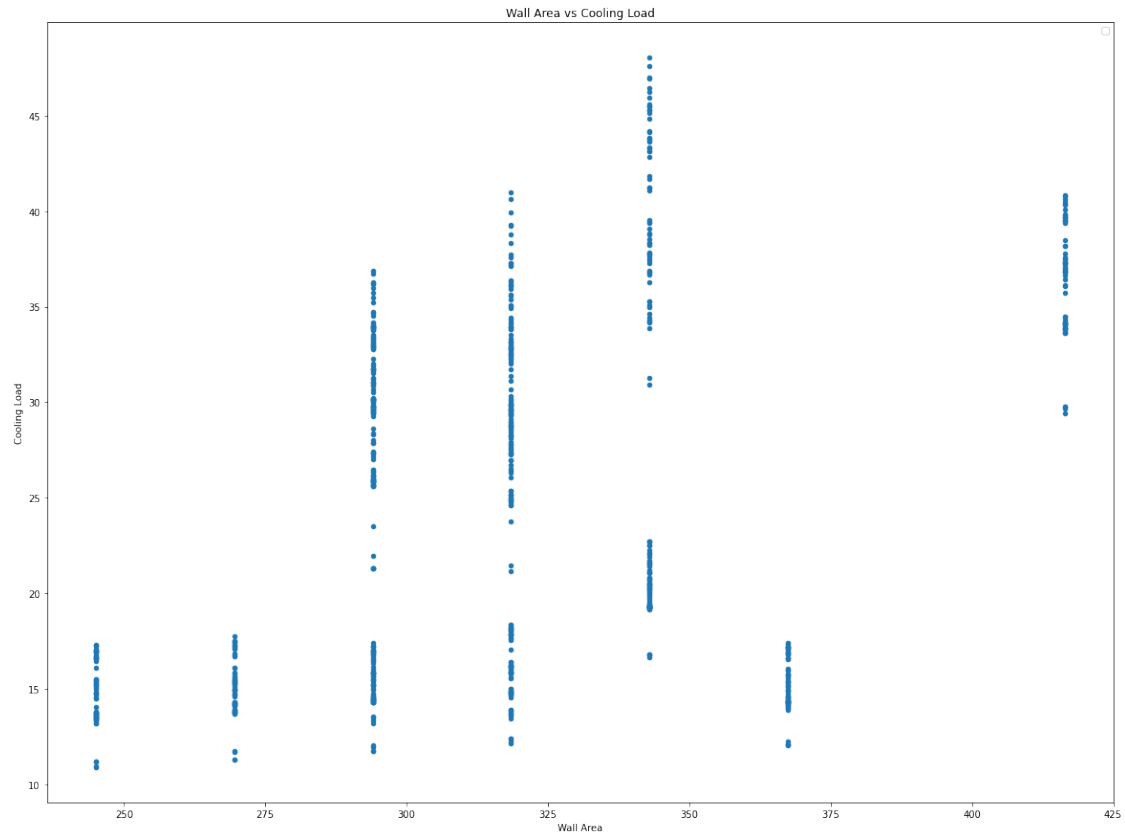
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



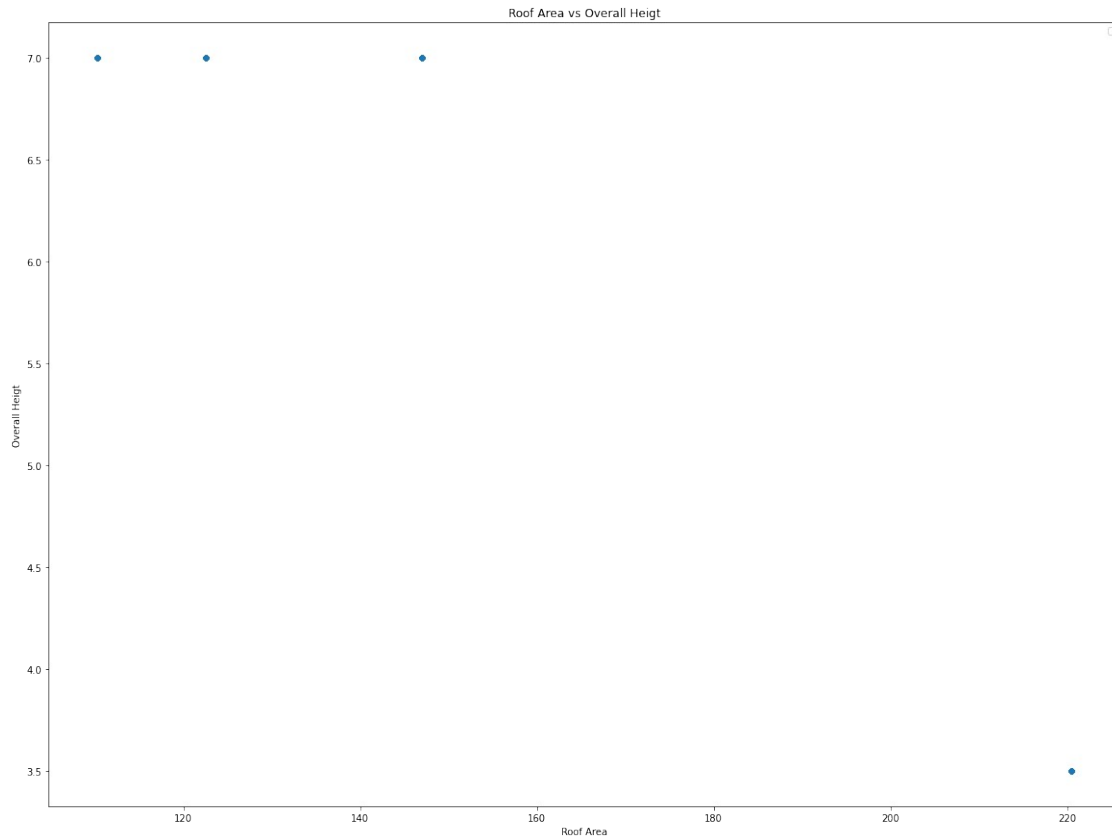
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



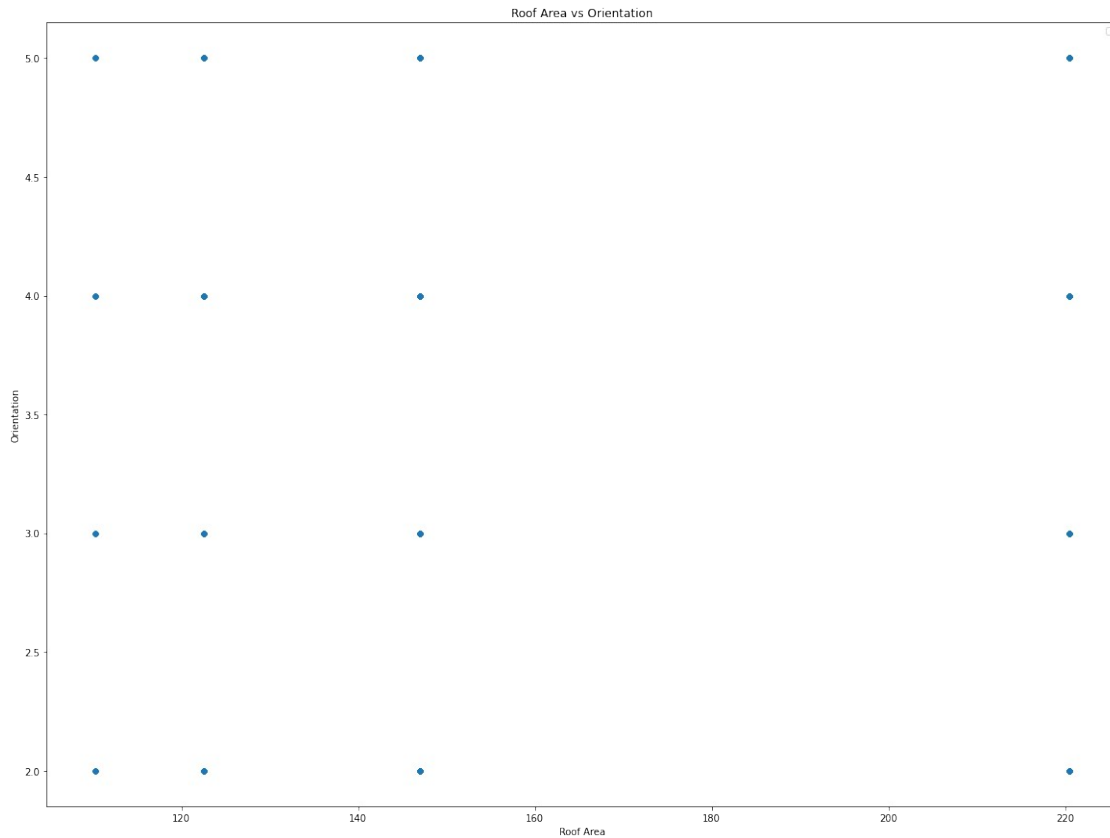
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



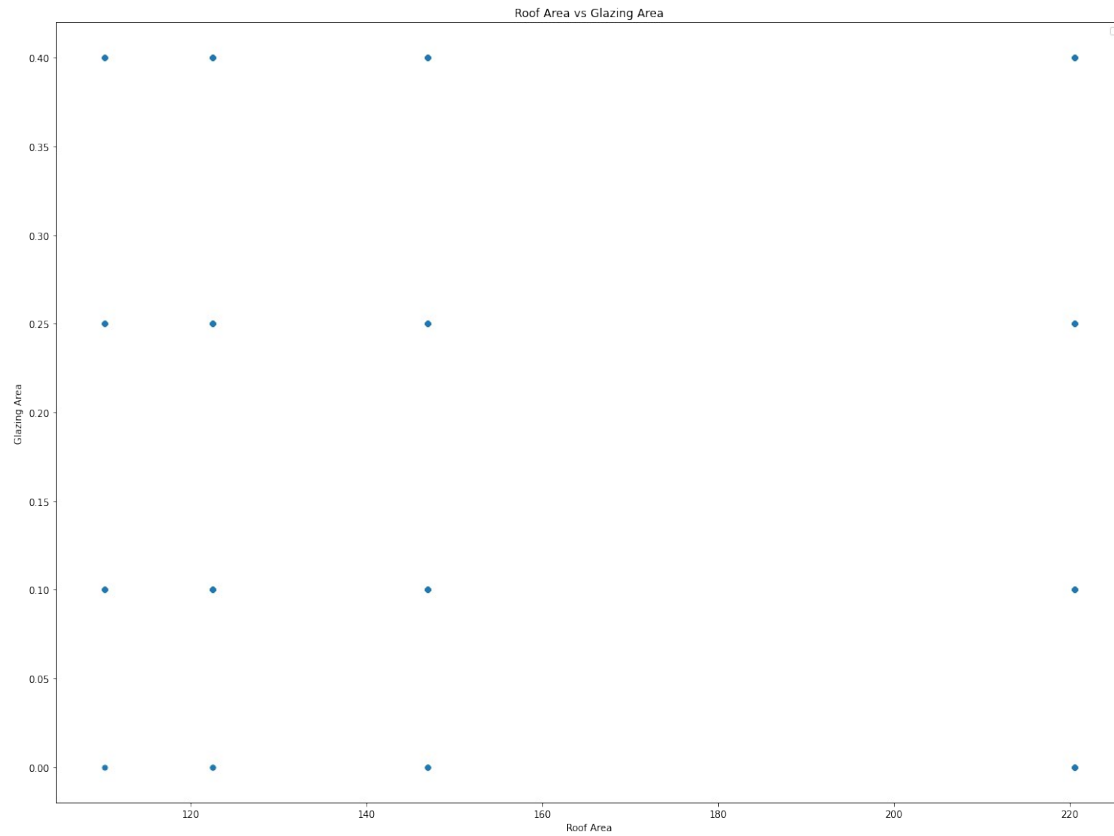
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



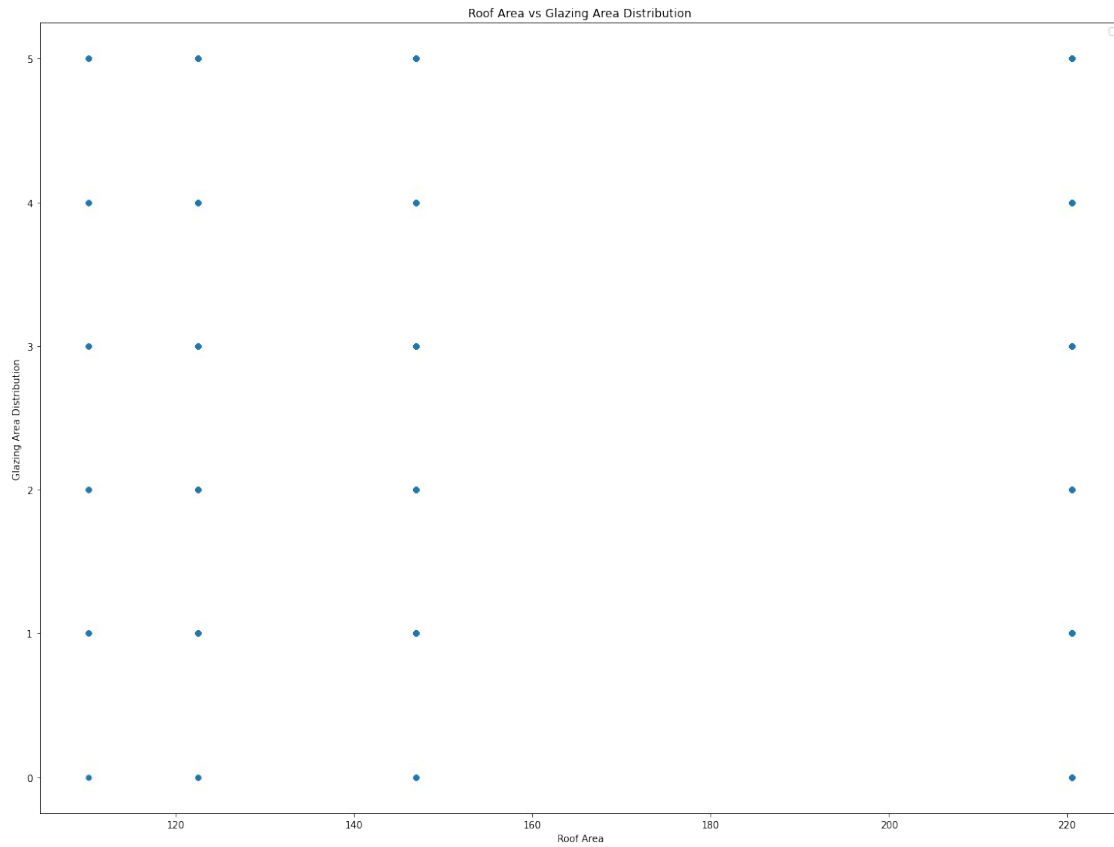
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



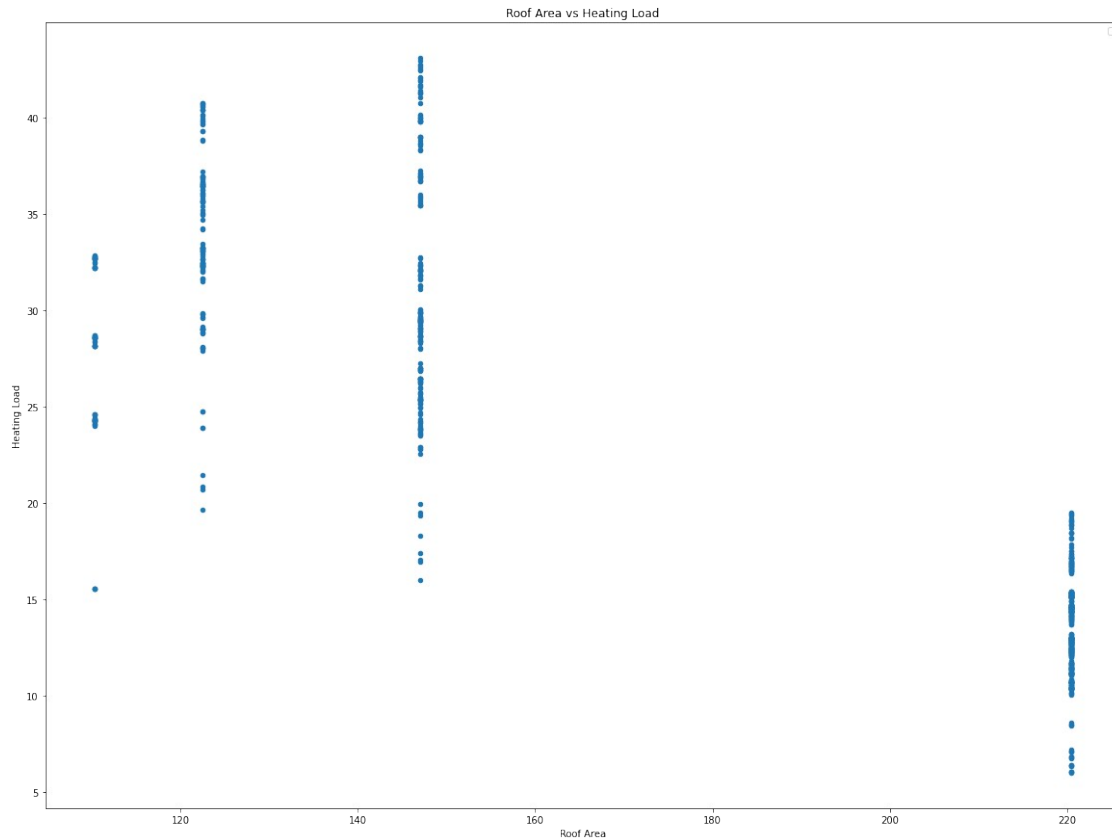
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



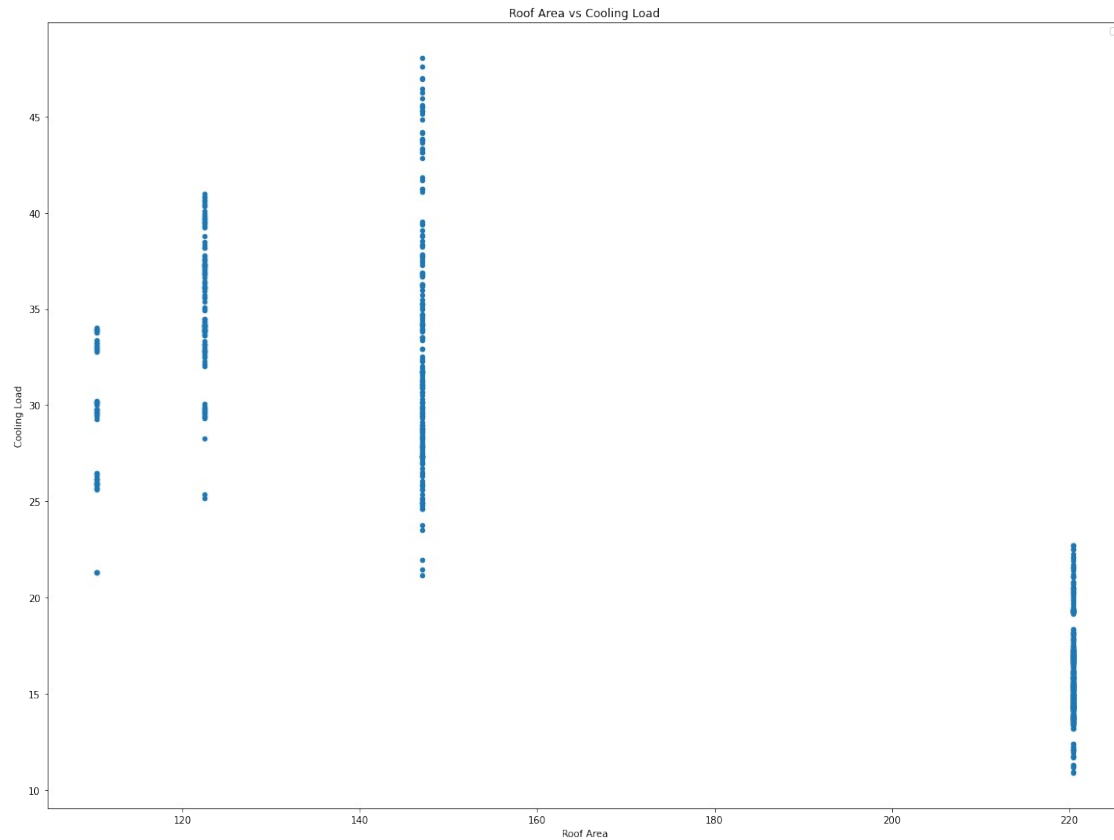
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



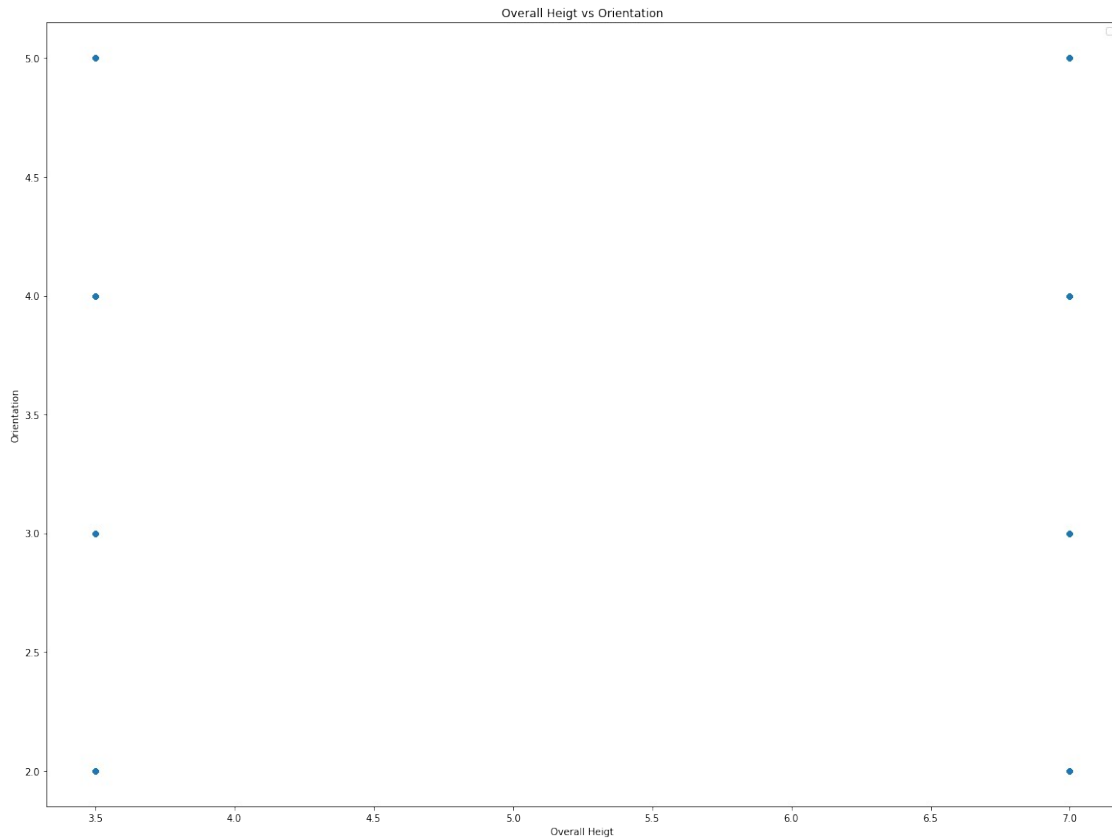
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



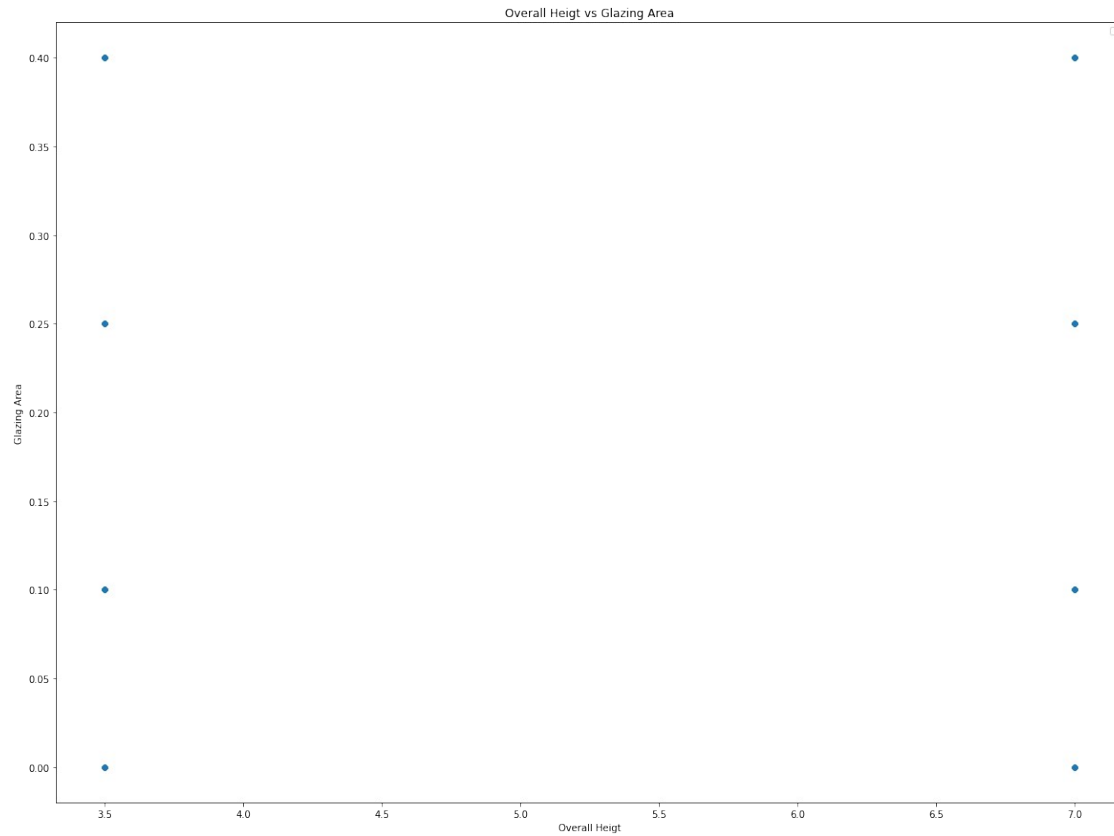
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



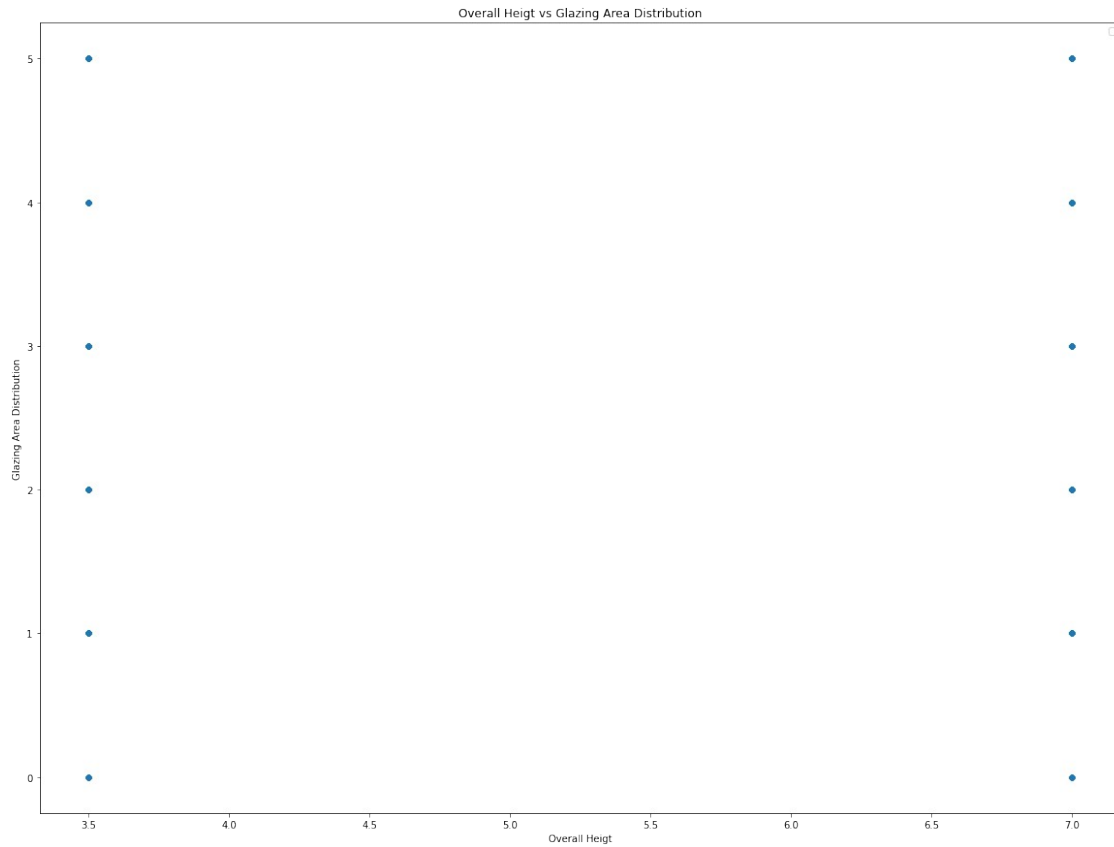
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



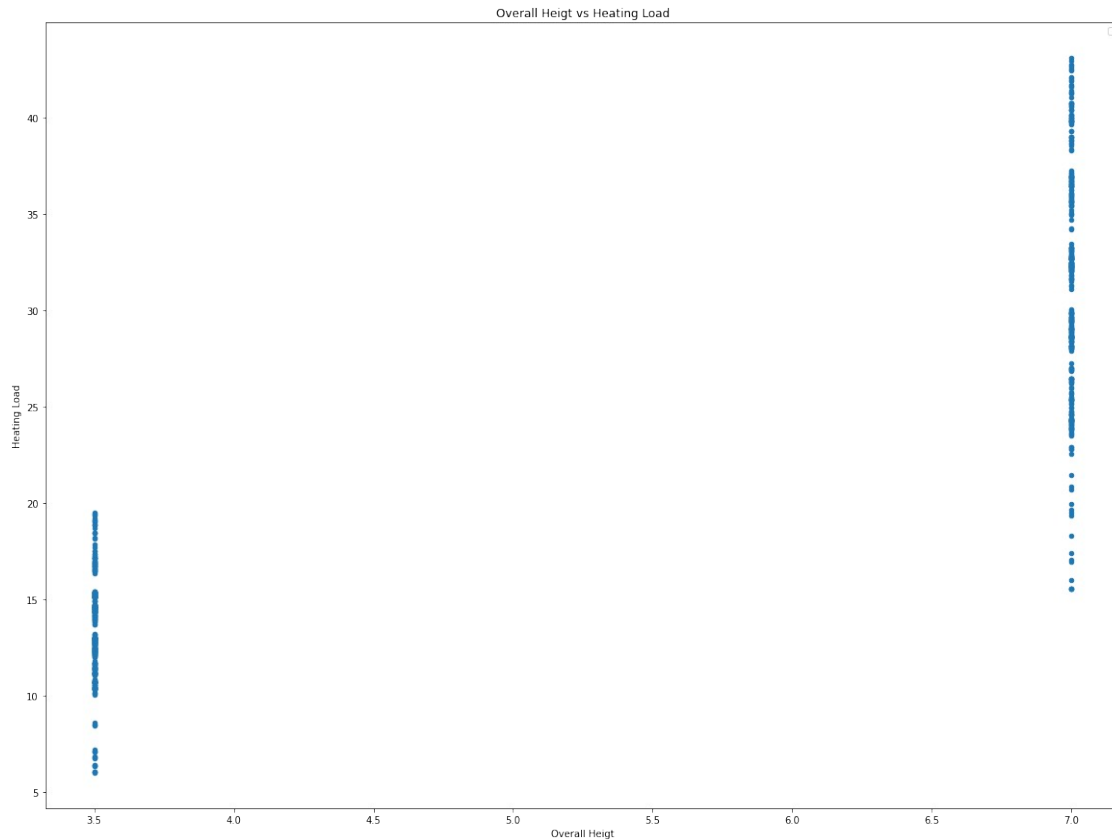
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



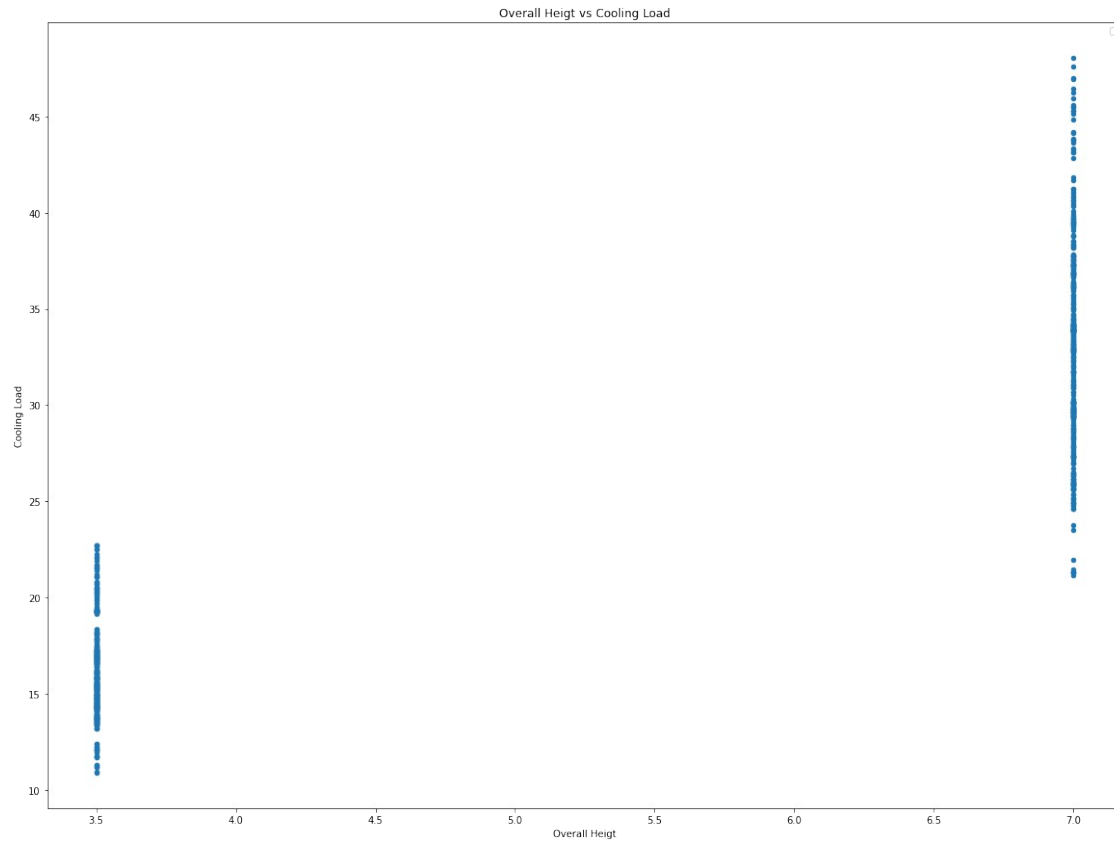
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



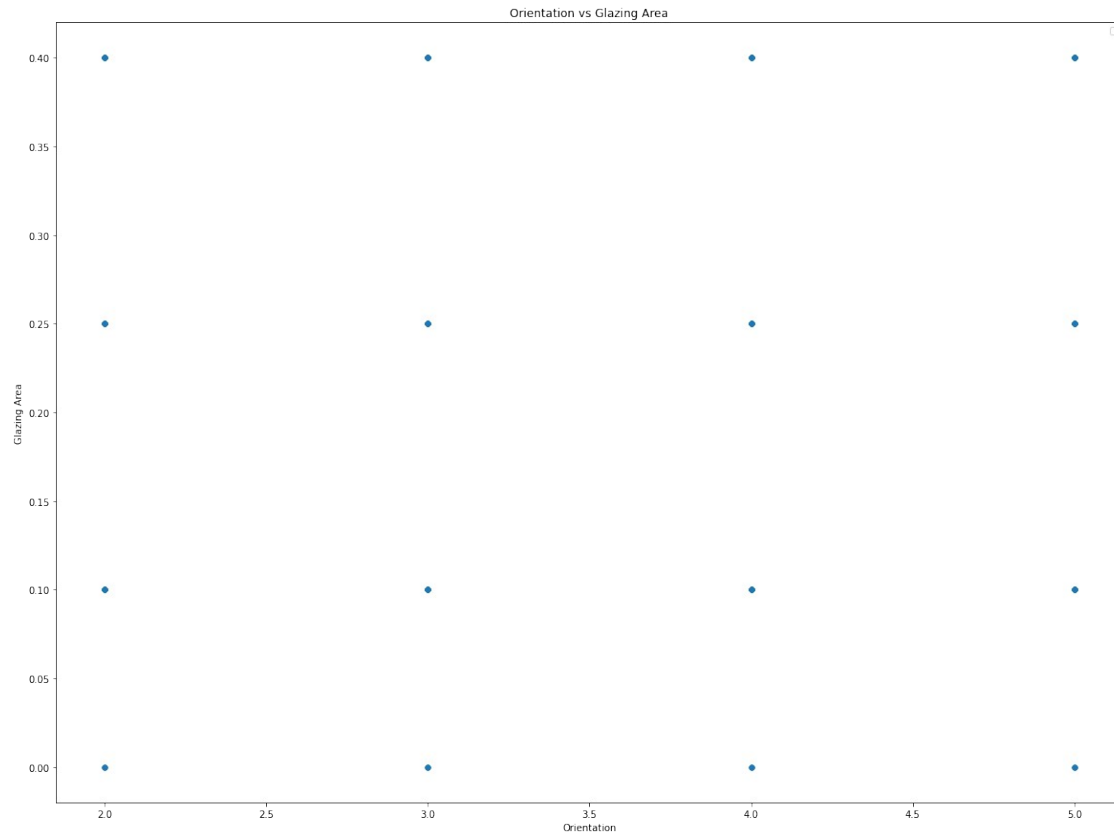
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



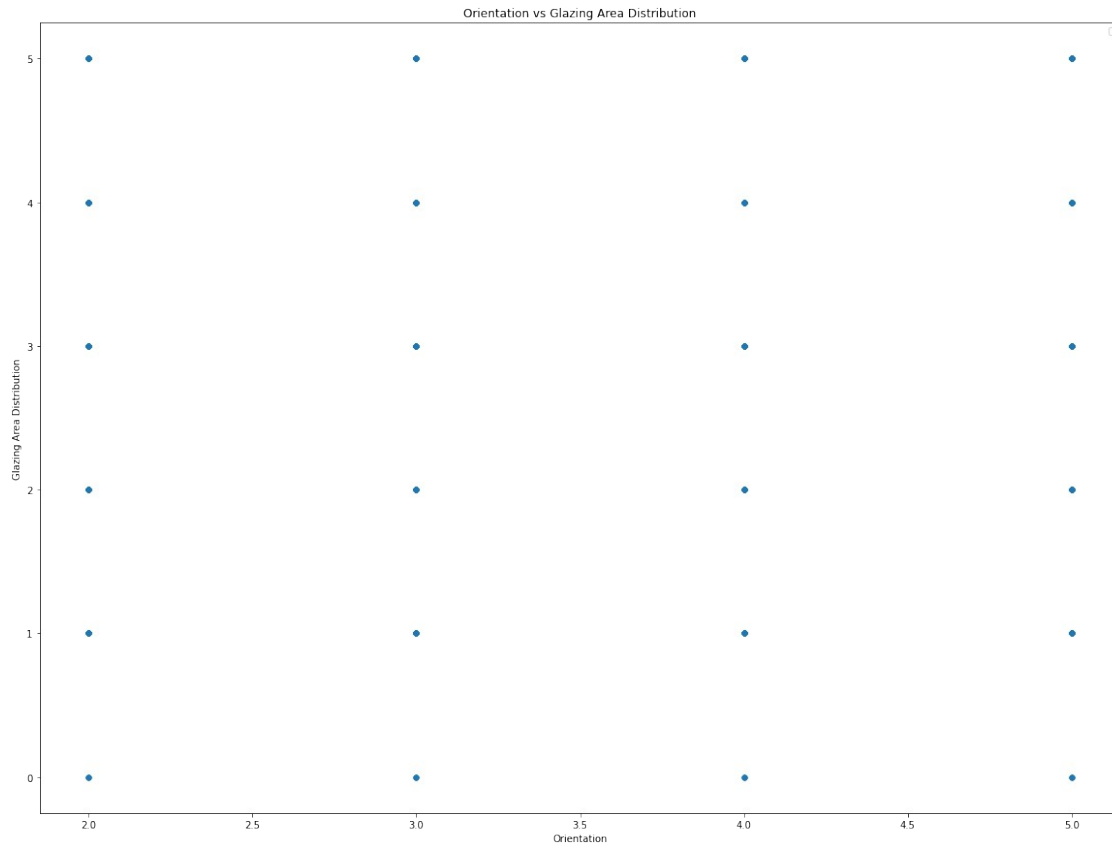
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



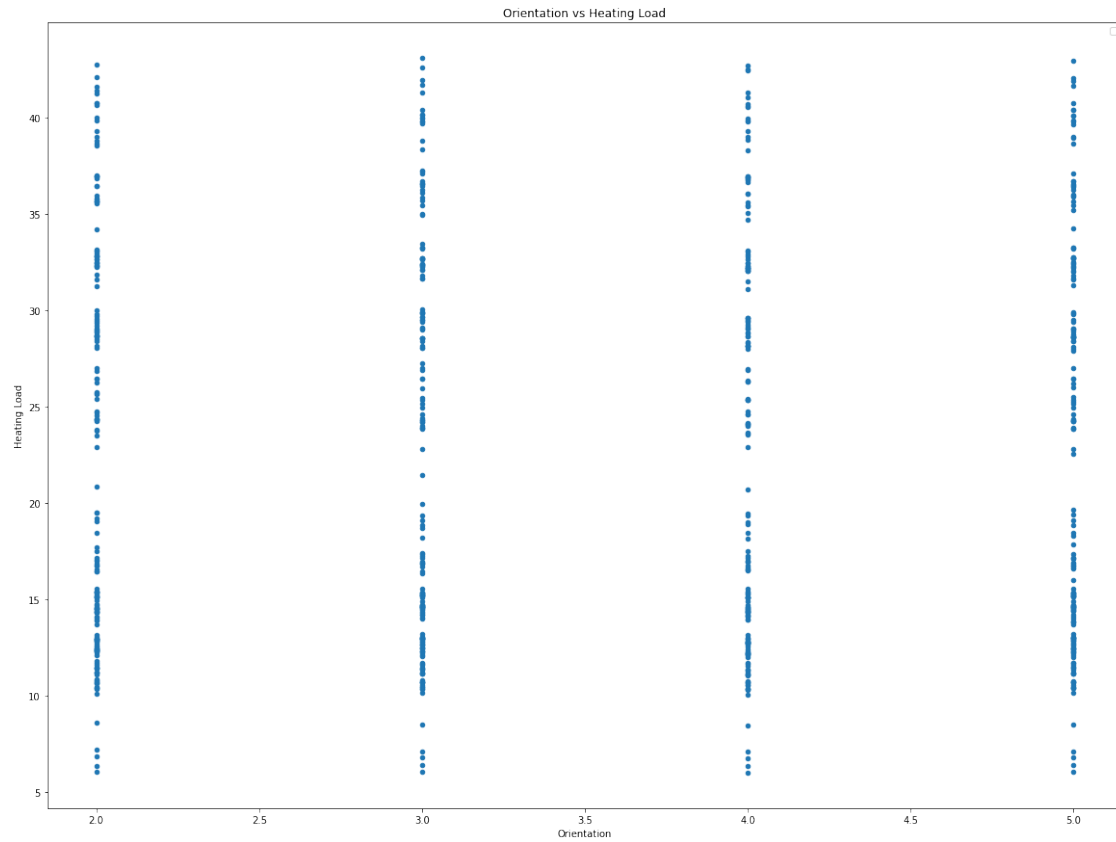
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



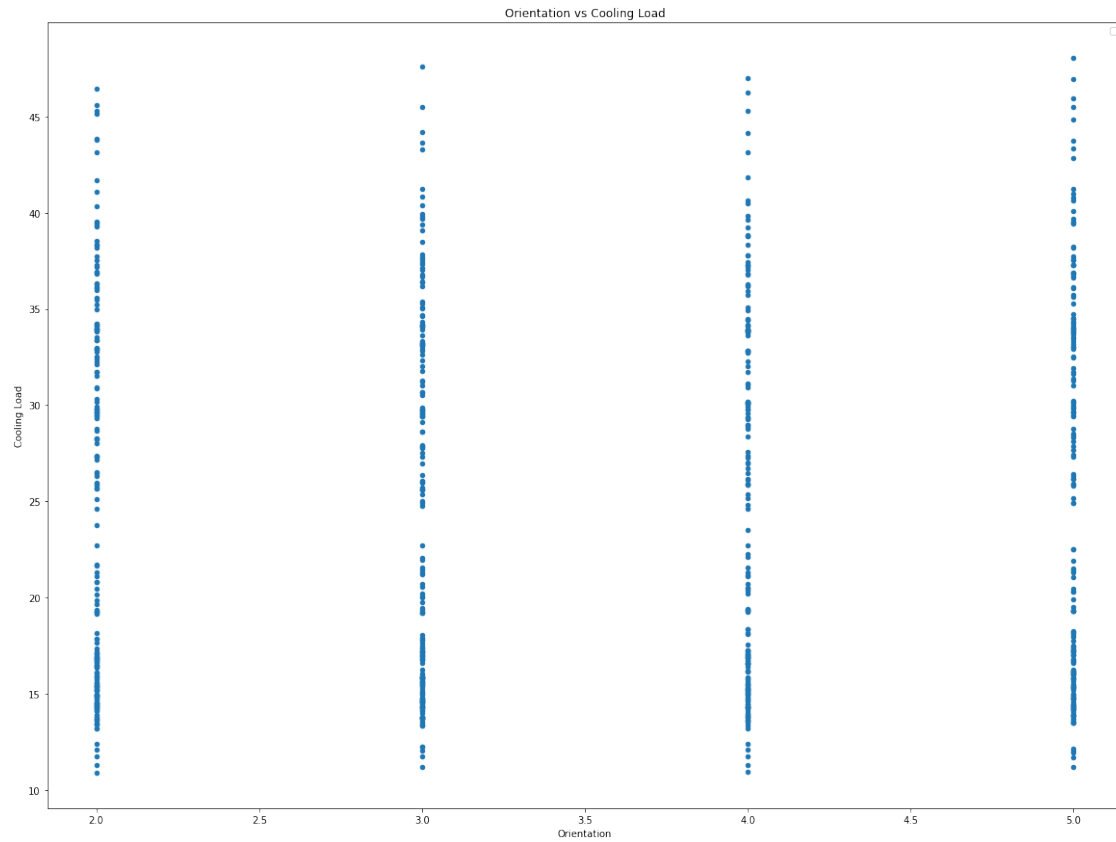
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



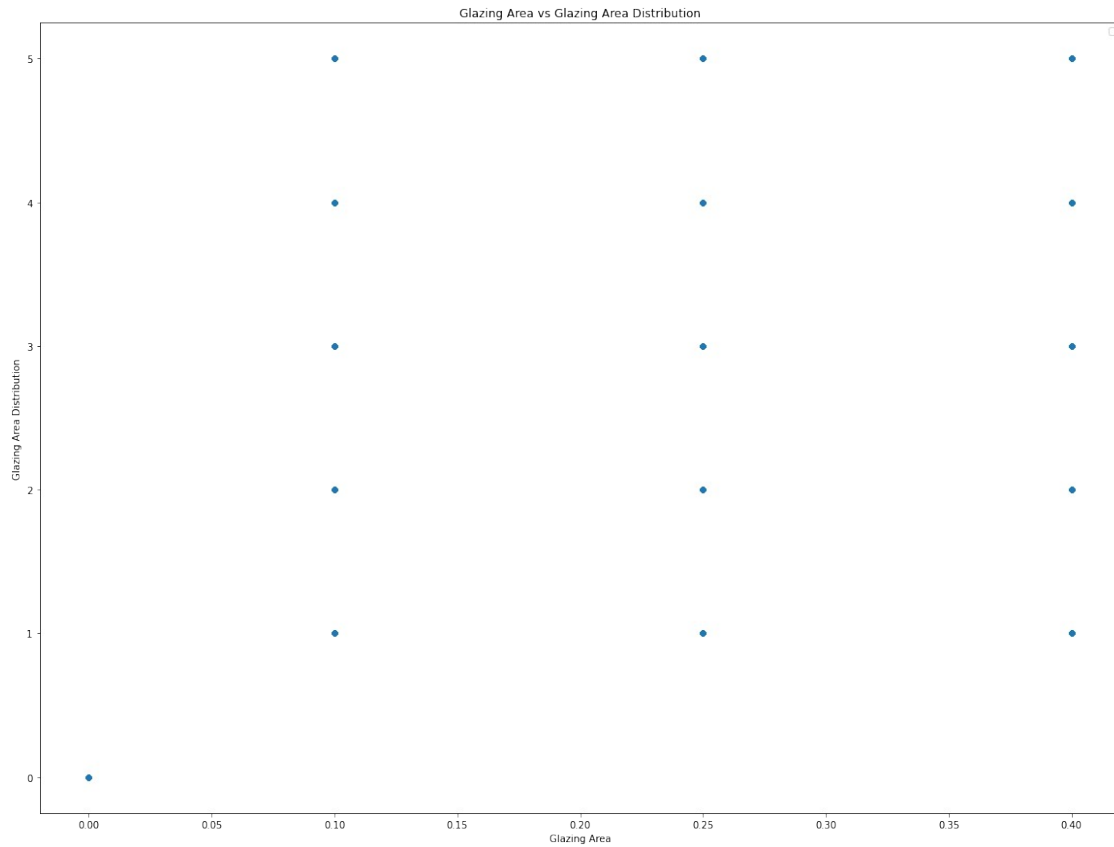
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



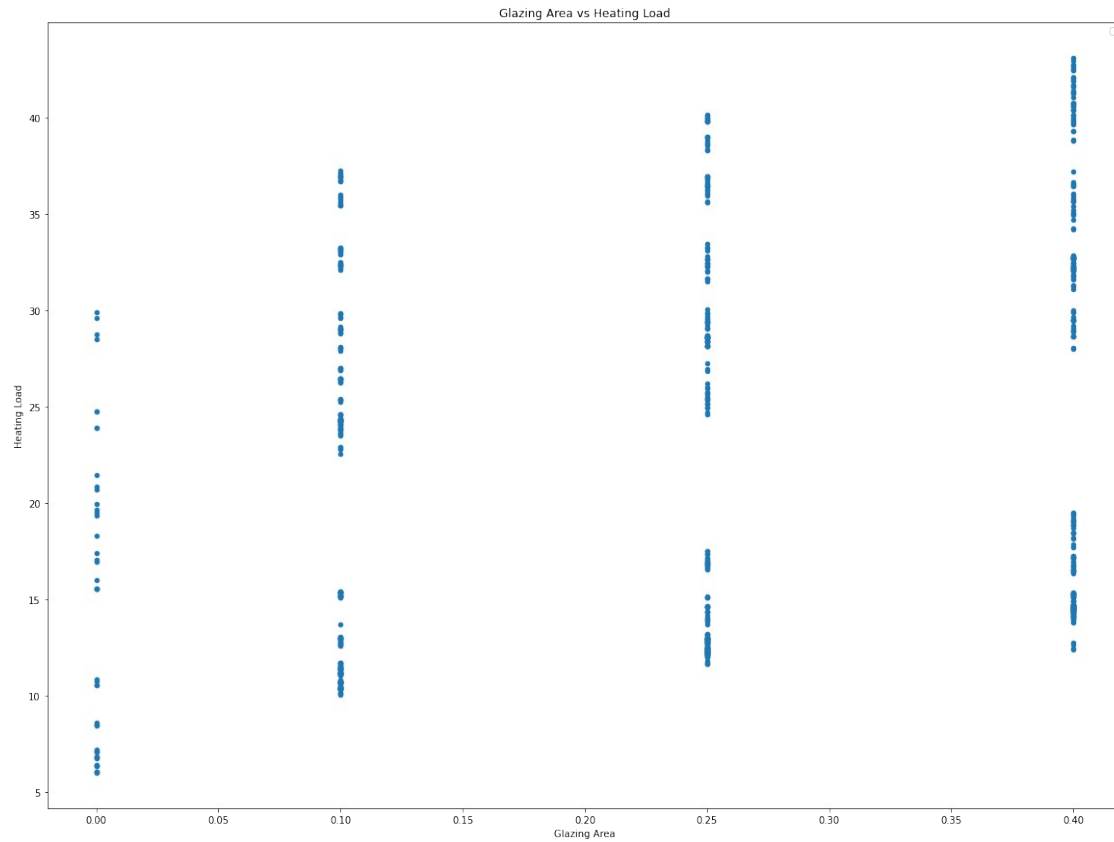
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



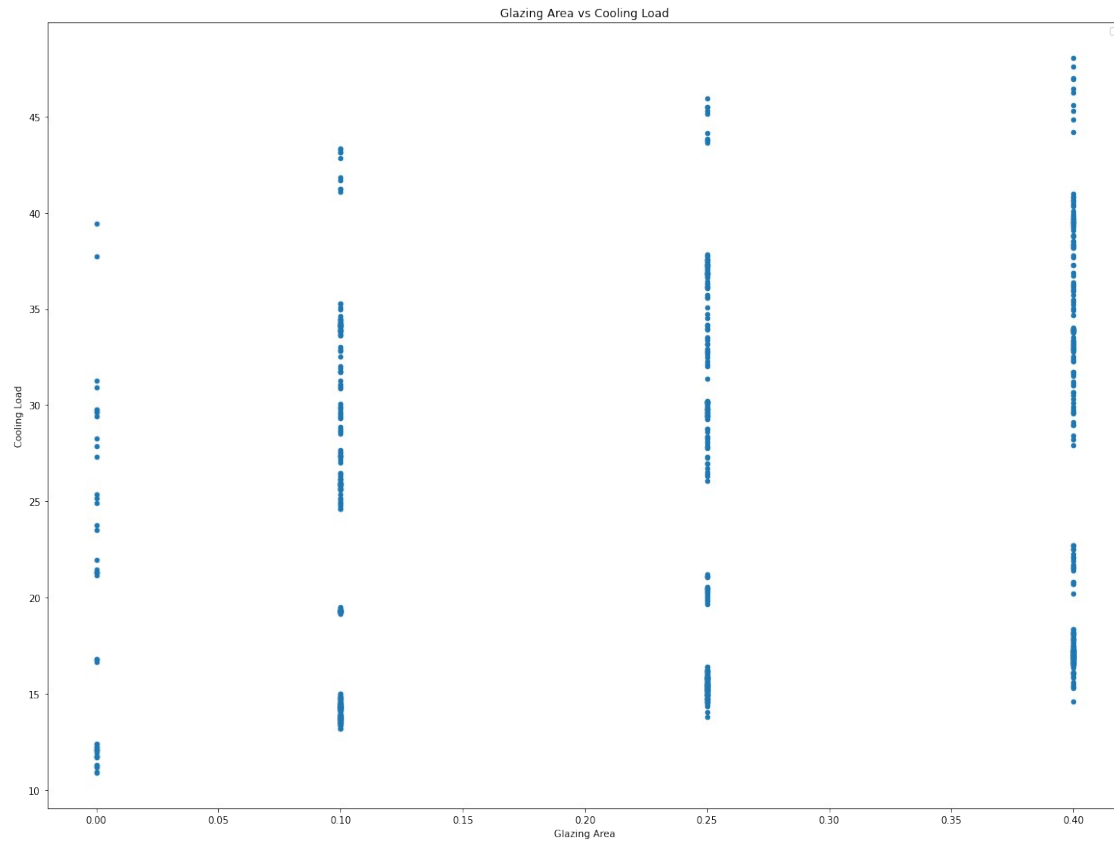
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



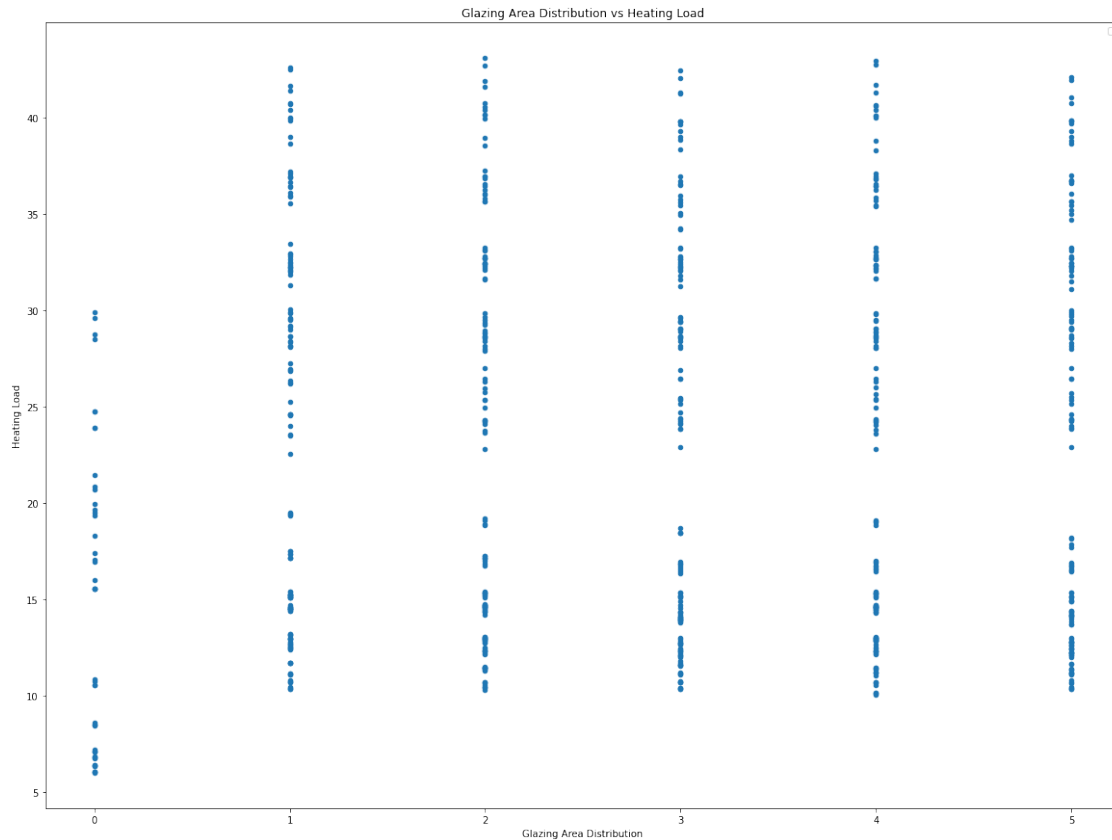
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



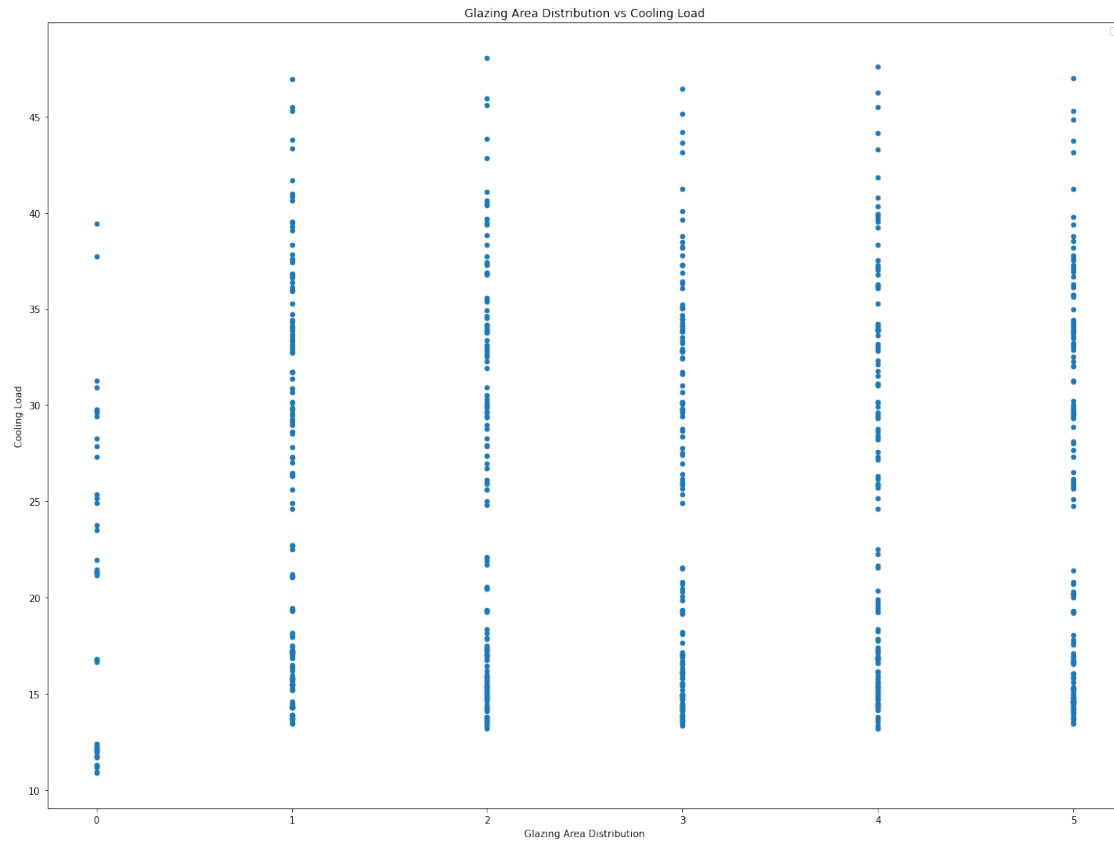
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



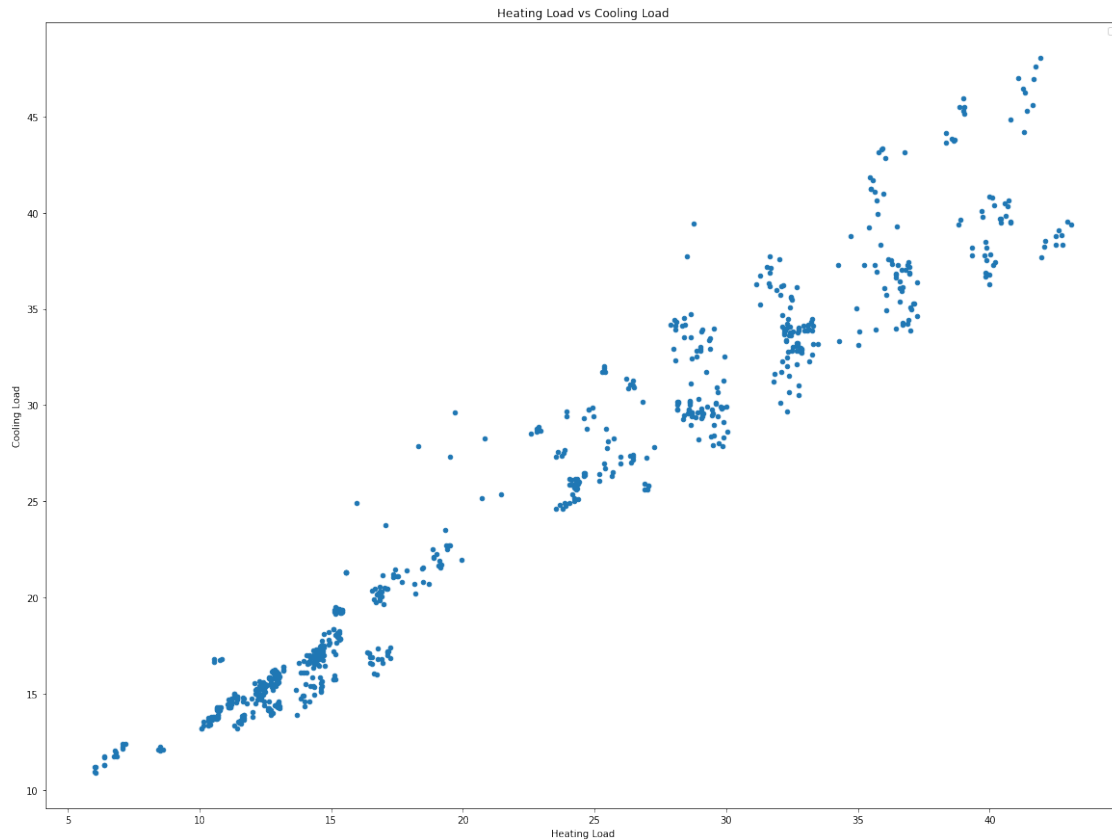
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.



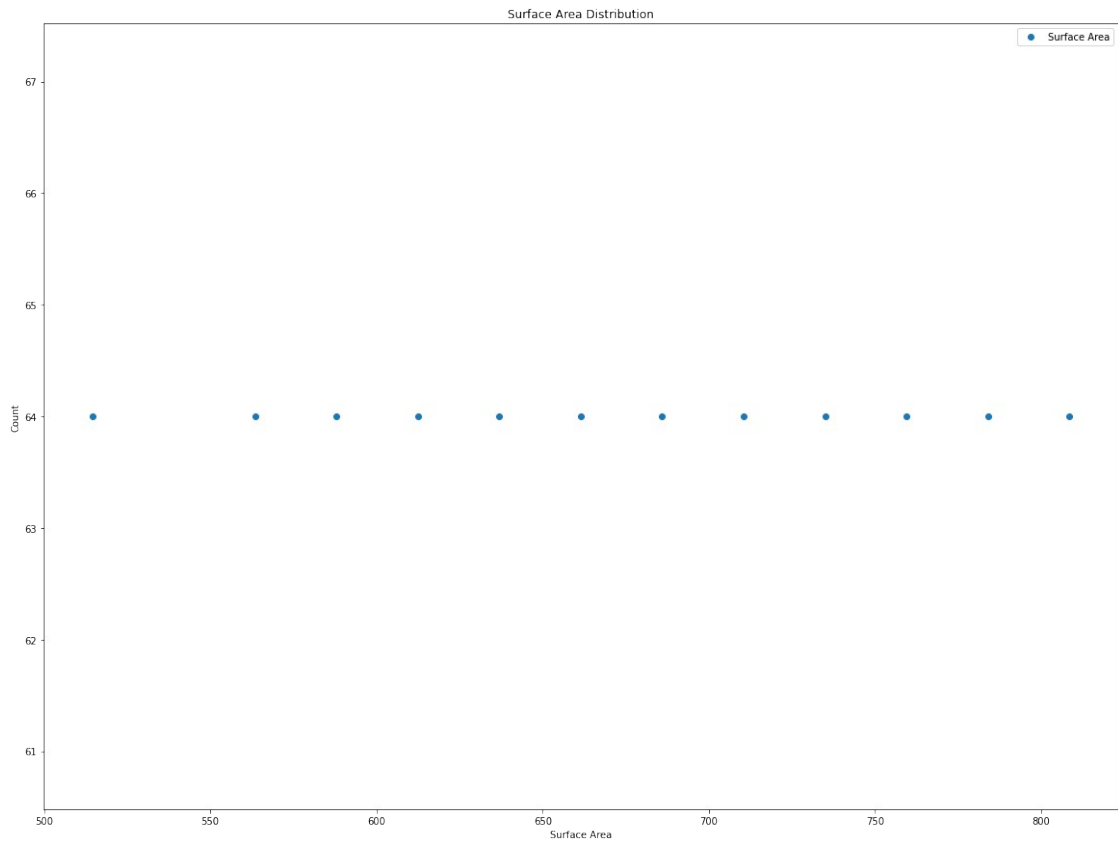
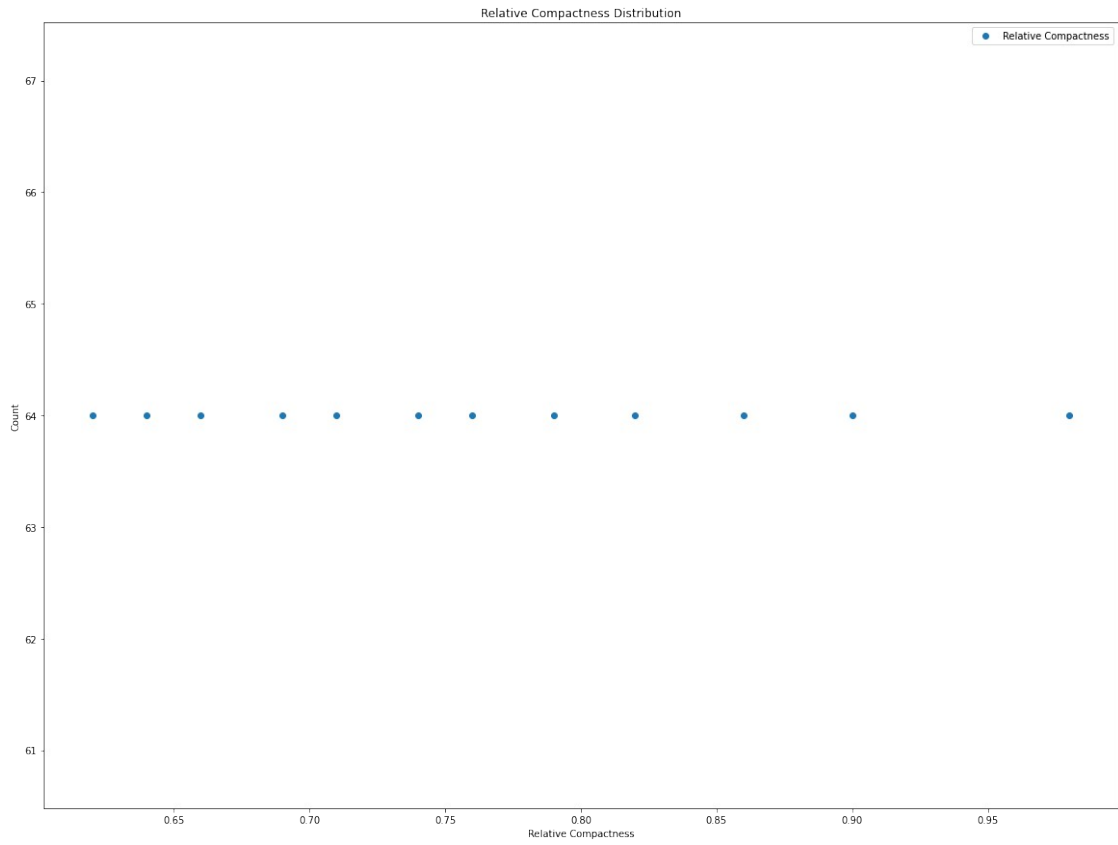
WARNING:matplotlib.legend:No artists with labels found to put in legend. Note that artists whose label start with an underscore are ignored when legend() is called with no argument.

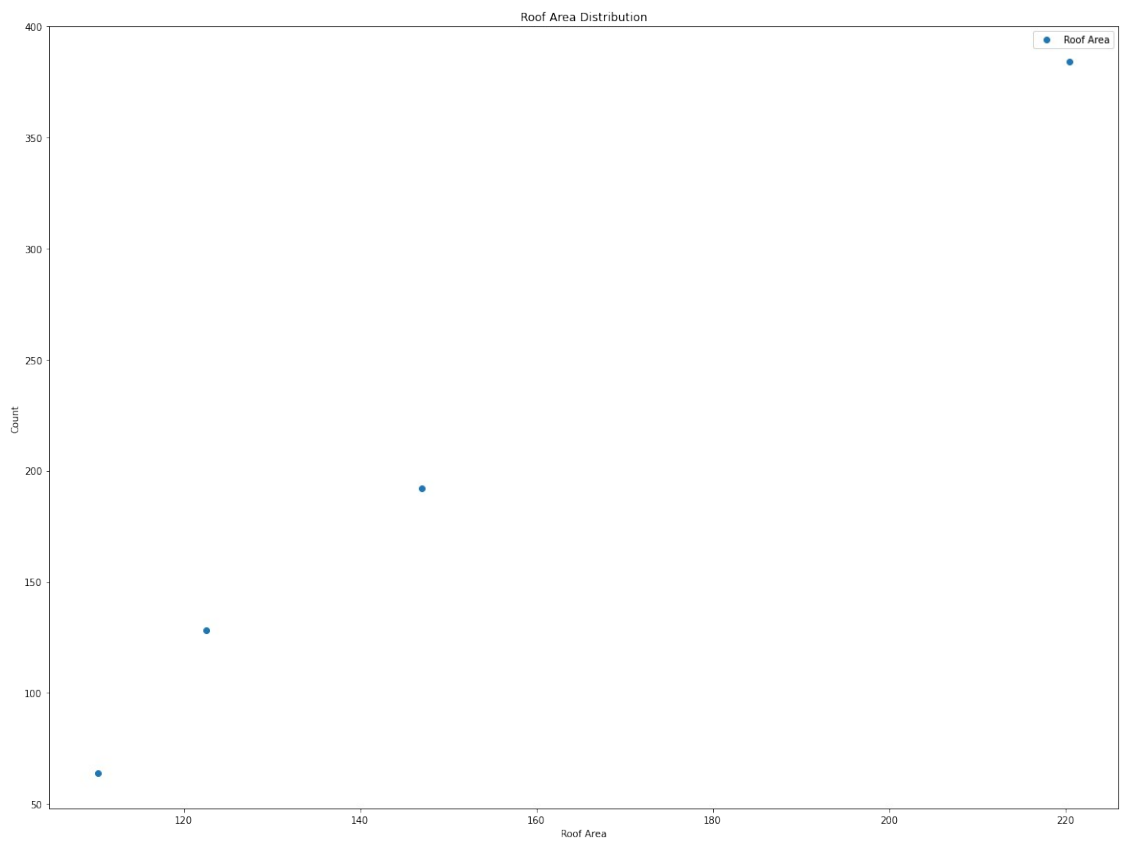
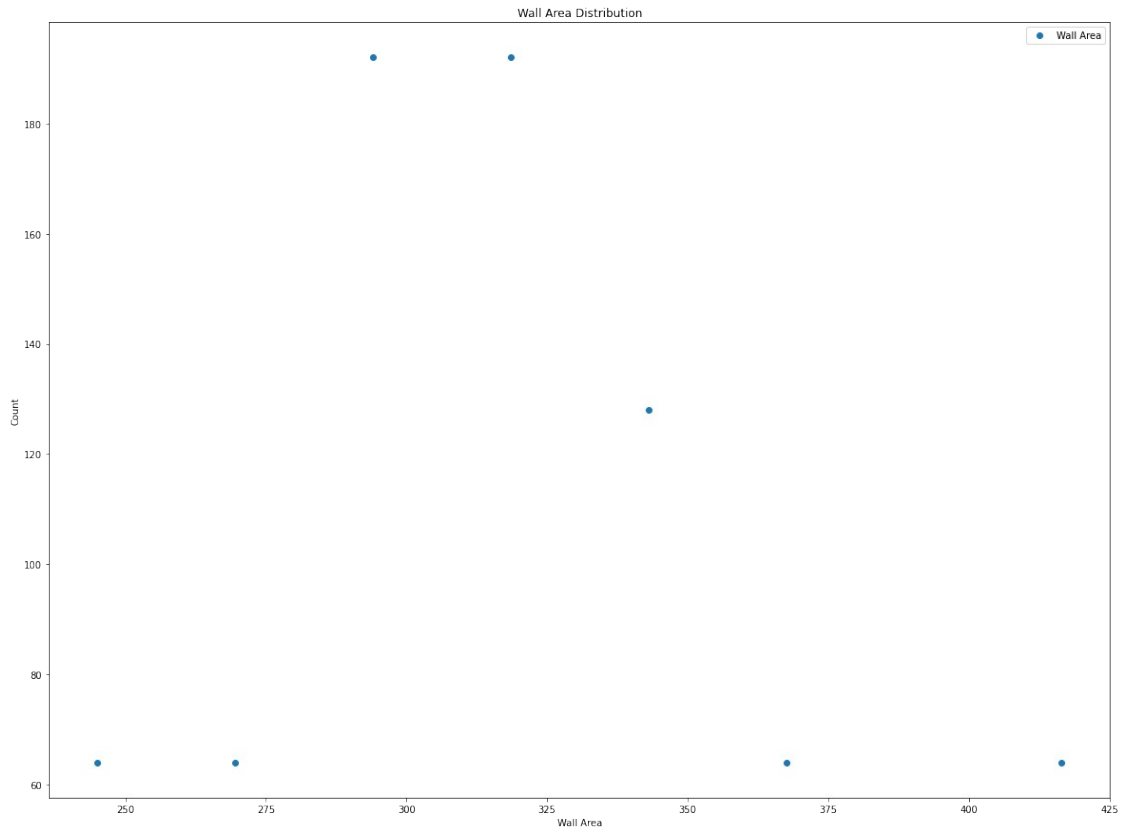


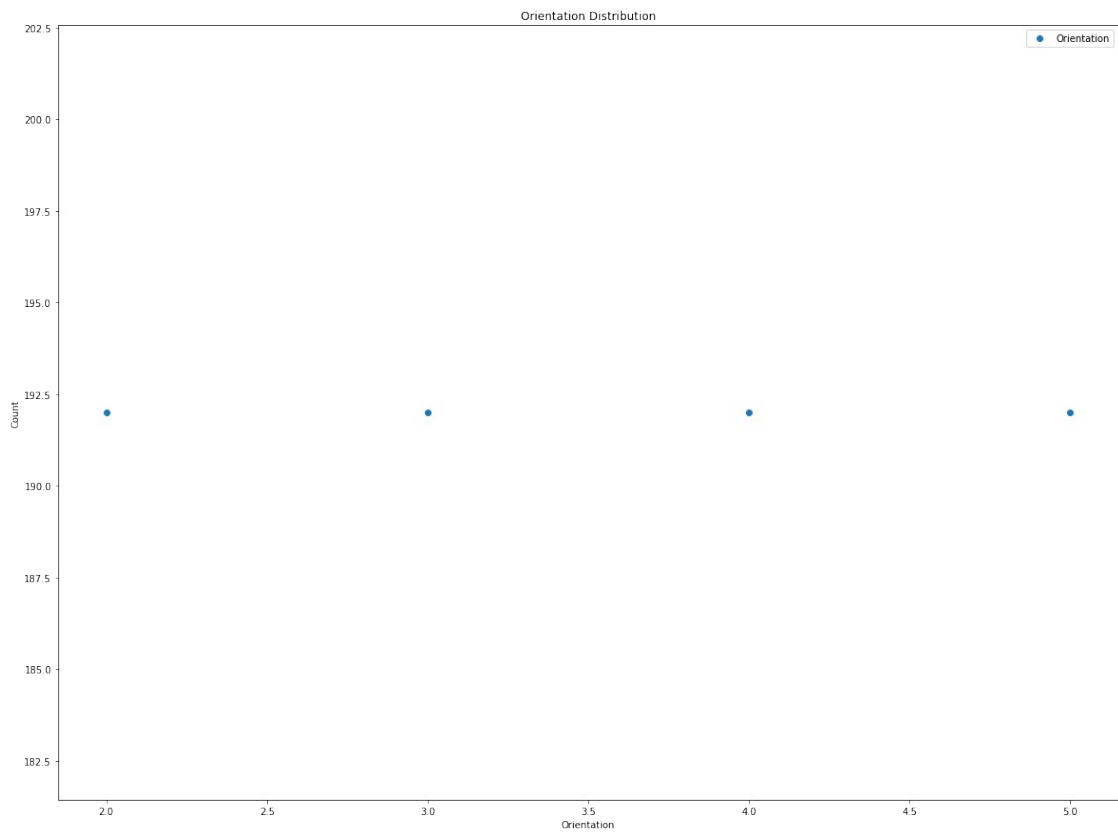
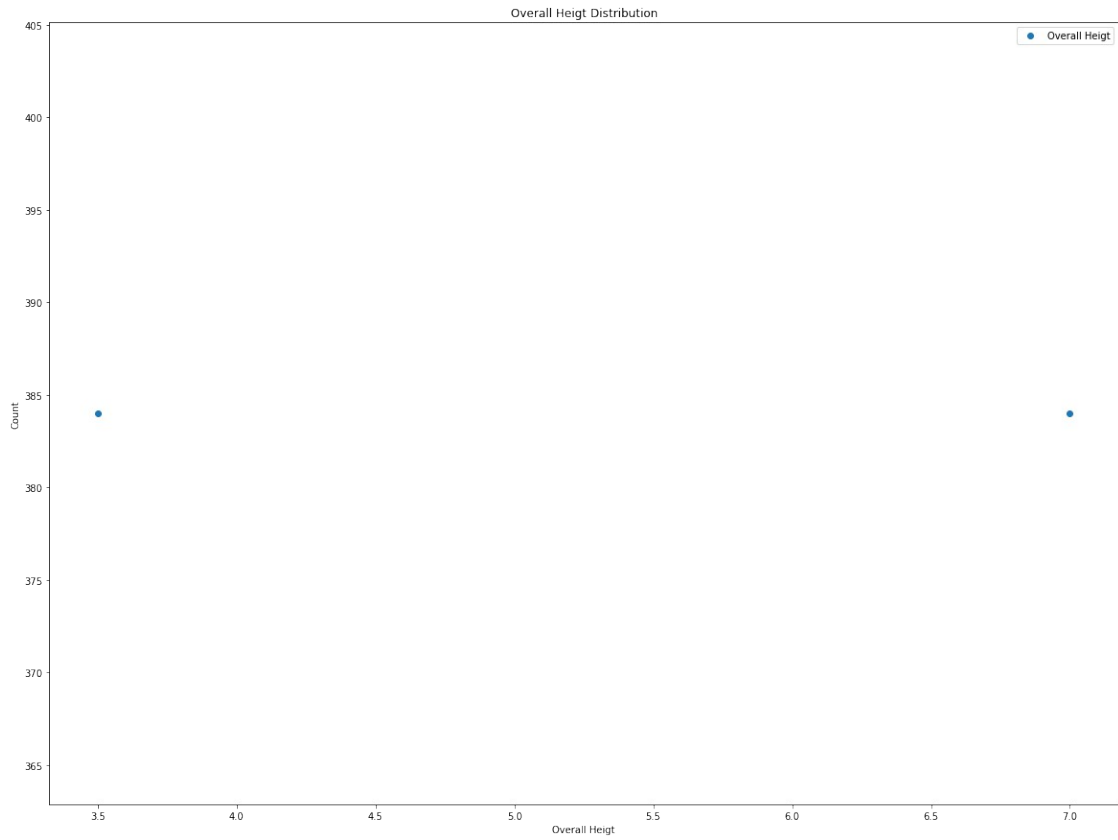
DOT PLOT

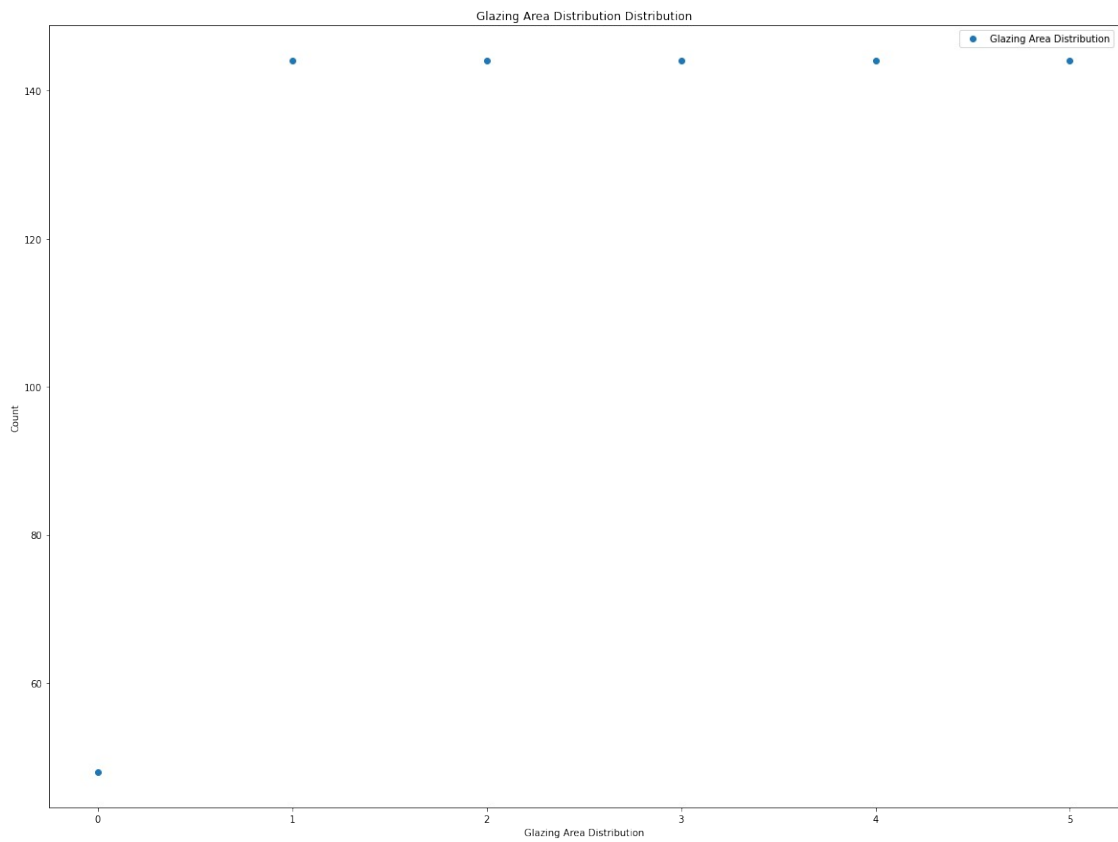
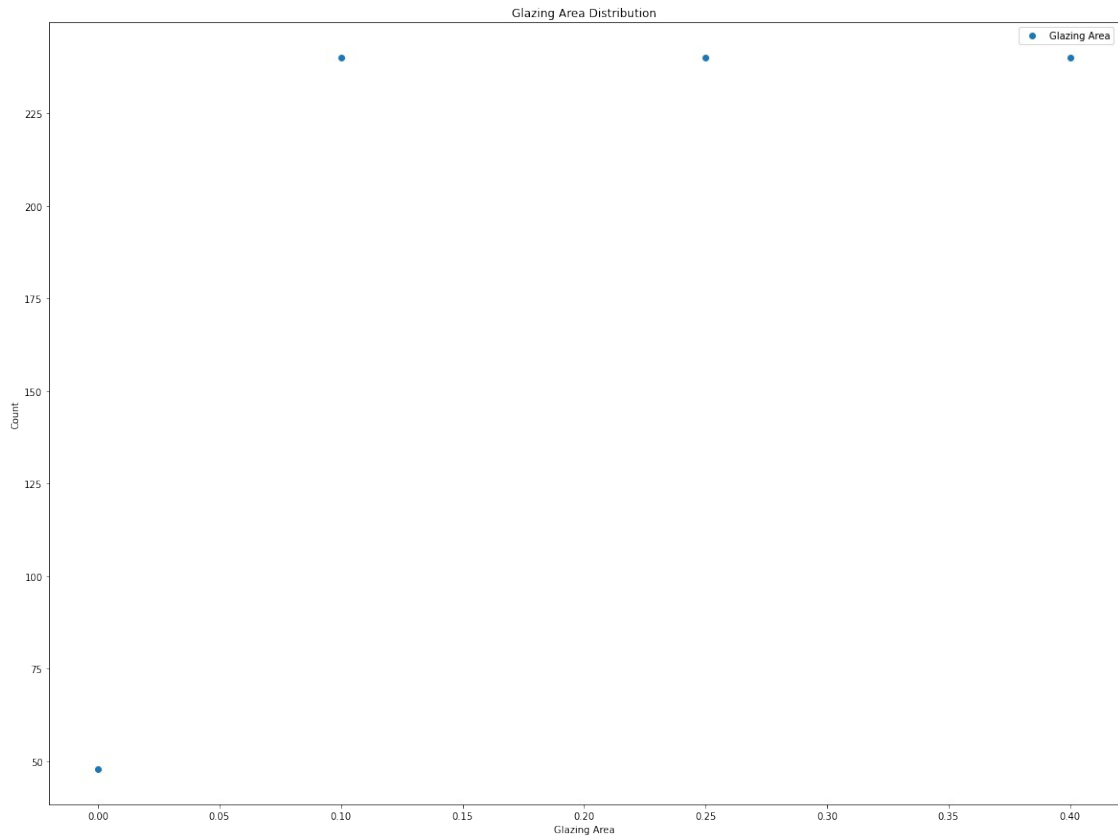
```
# read the data from CSV file into a pandas DataFrame
df = pd.read_csv('dataset.csv')

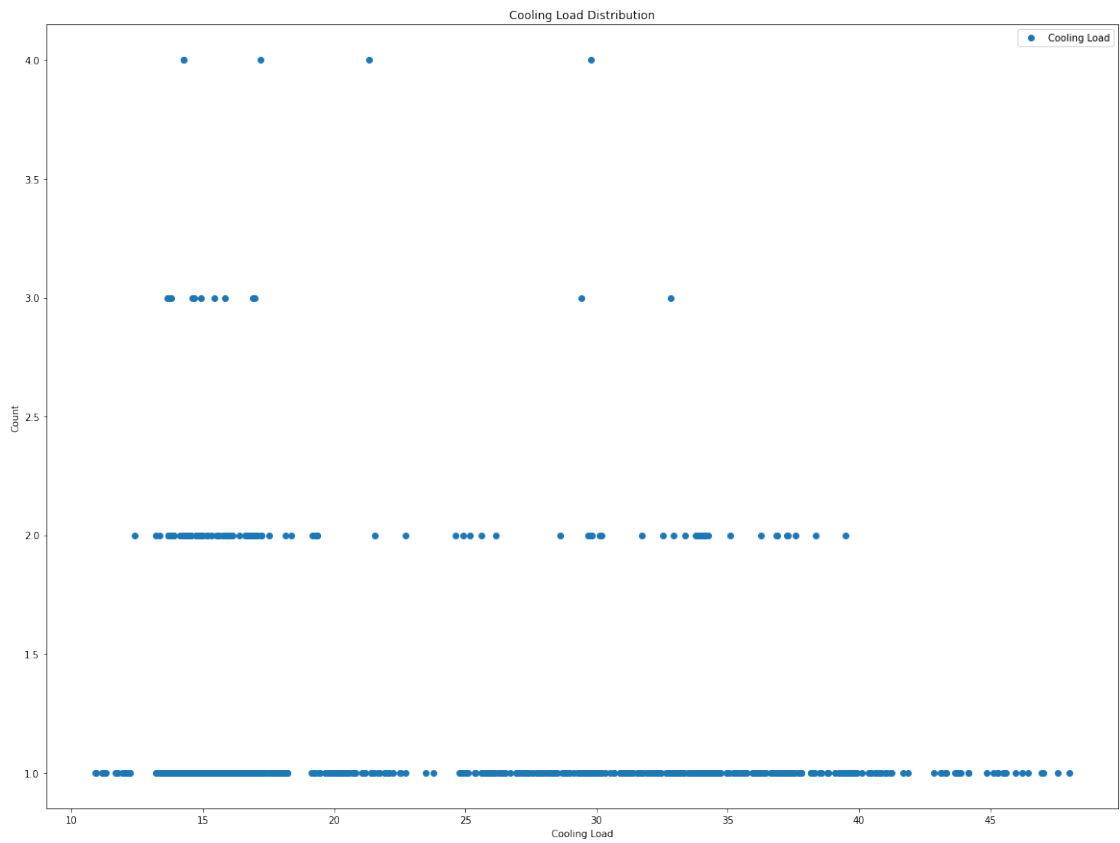
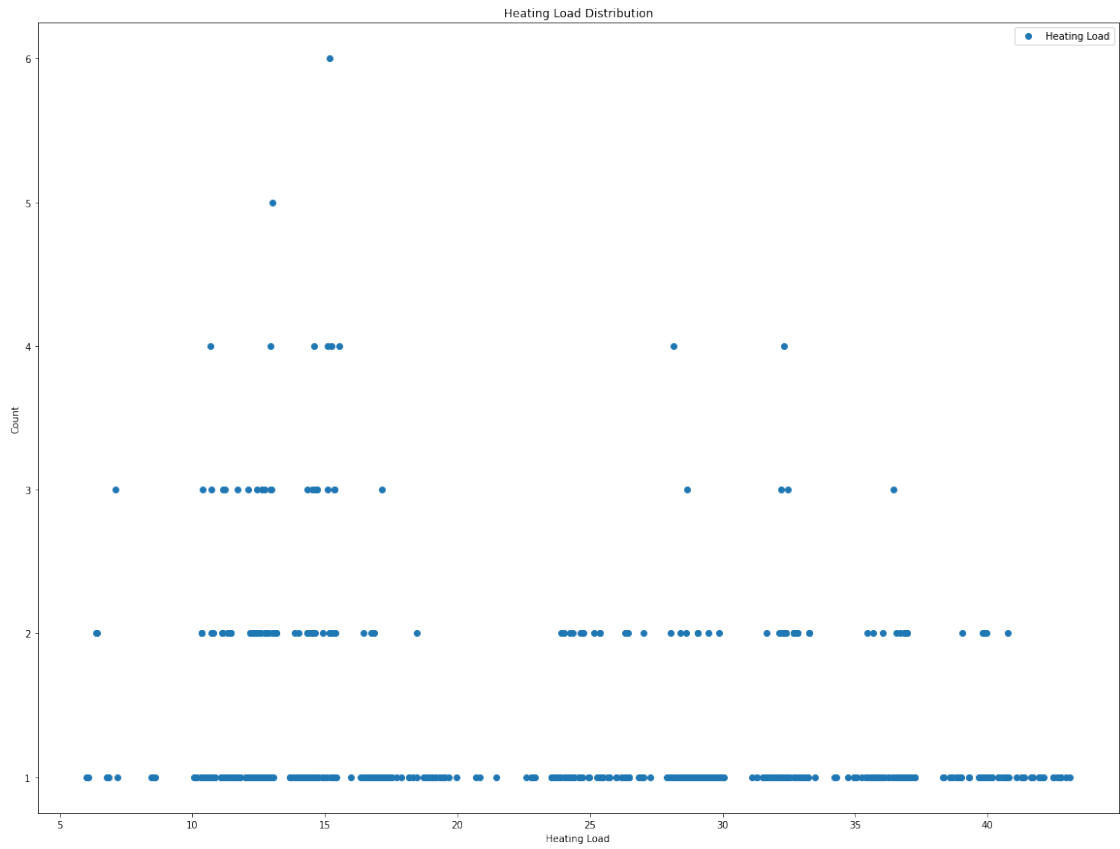
# iterate through the columns of the DataFrame and create a dot plot
for each column
for col in df.columns:
    fig, ax = plt.subplots(figsize=(20, 15))
    df[col].value_counts().sort_index().plot(style='o', ax=ax)
    ax.set_xlabel(col)
    ax.set_ylabel('Count')
    ax.set_title(f'{col} Distribution')
    ax.legend()
    plt.show()
```









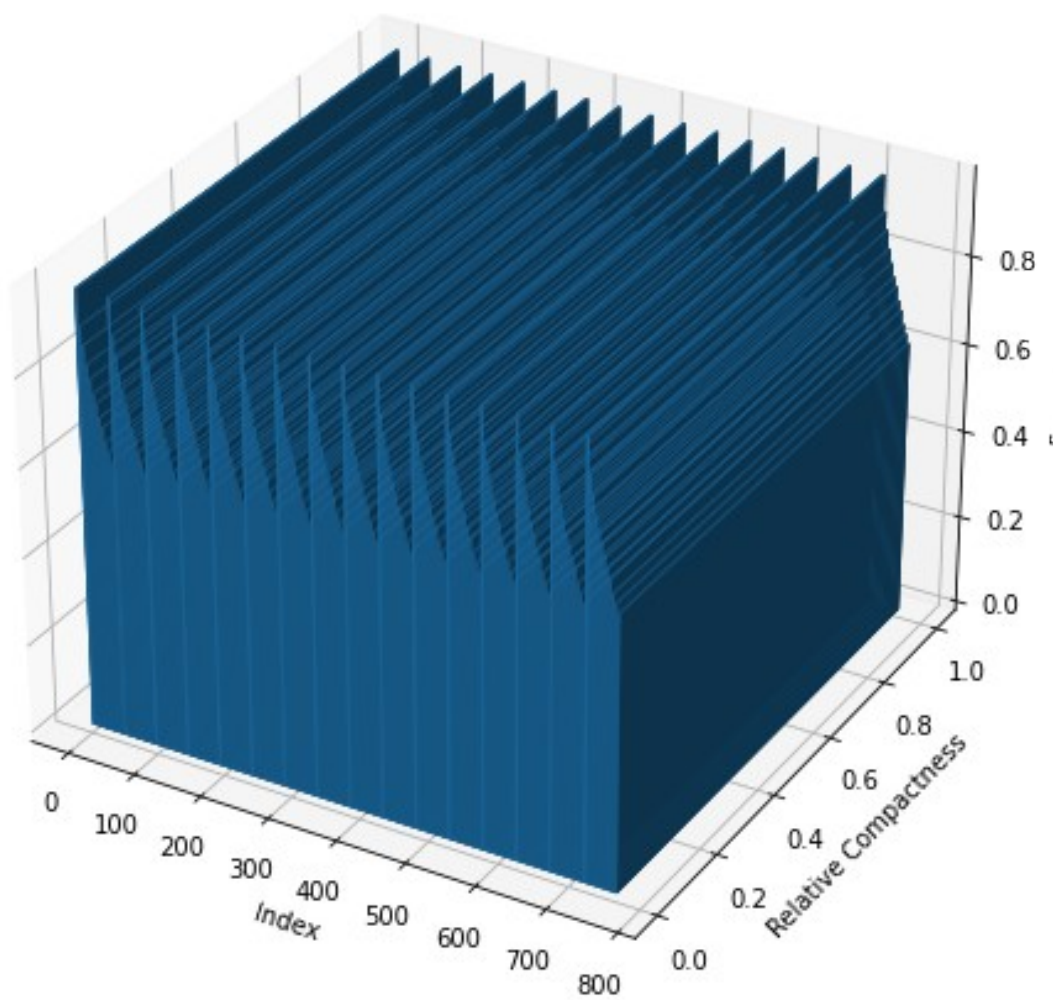


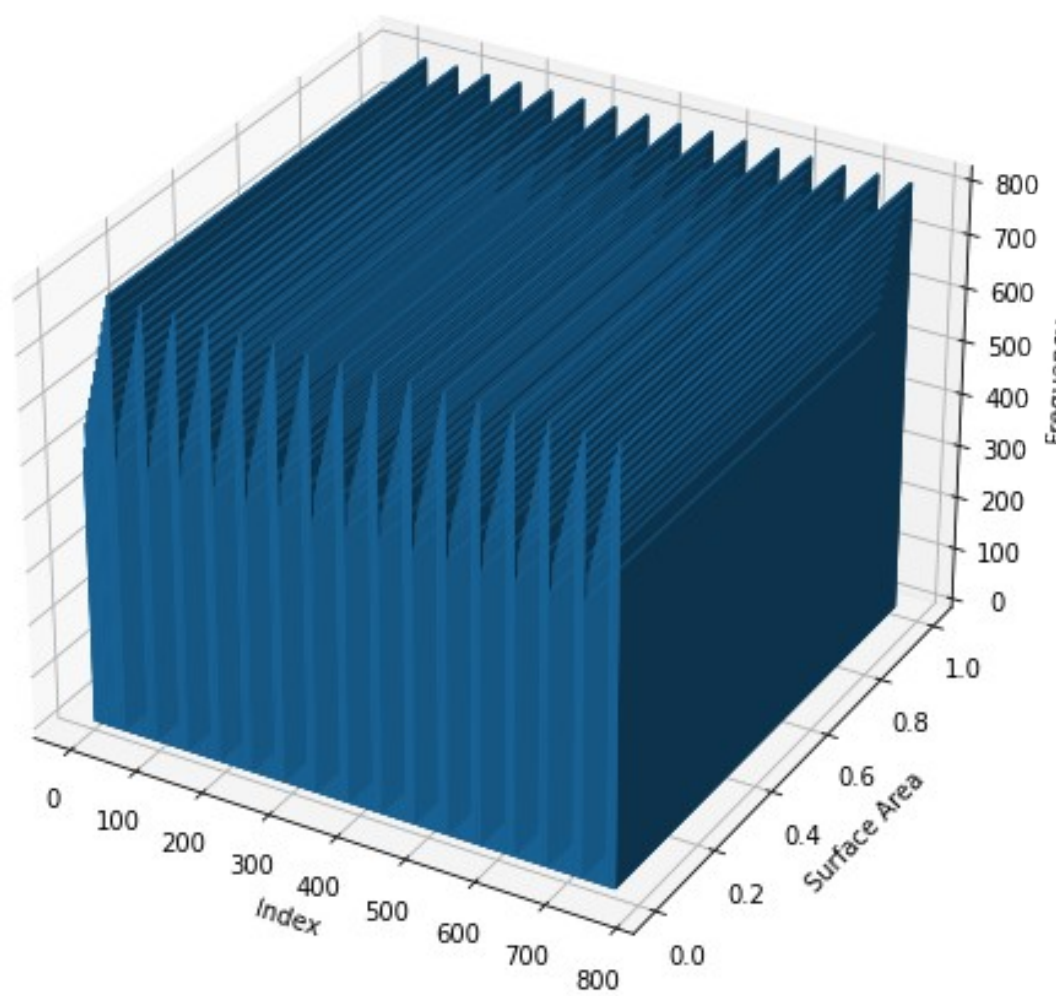
3D BAR CHART

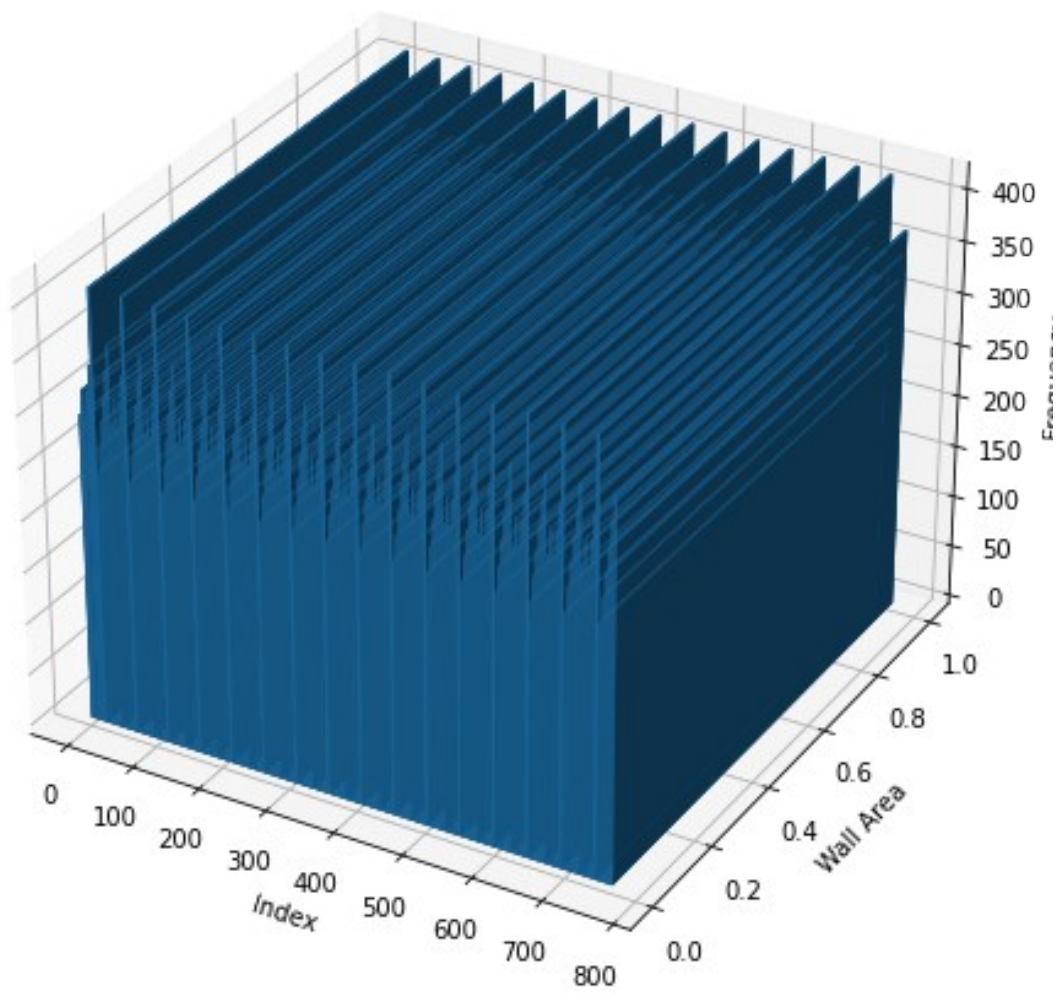
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D

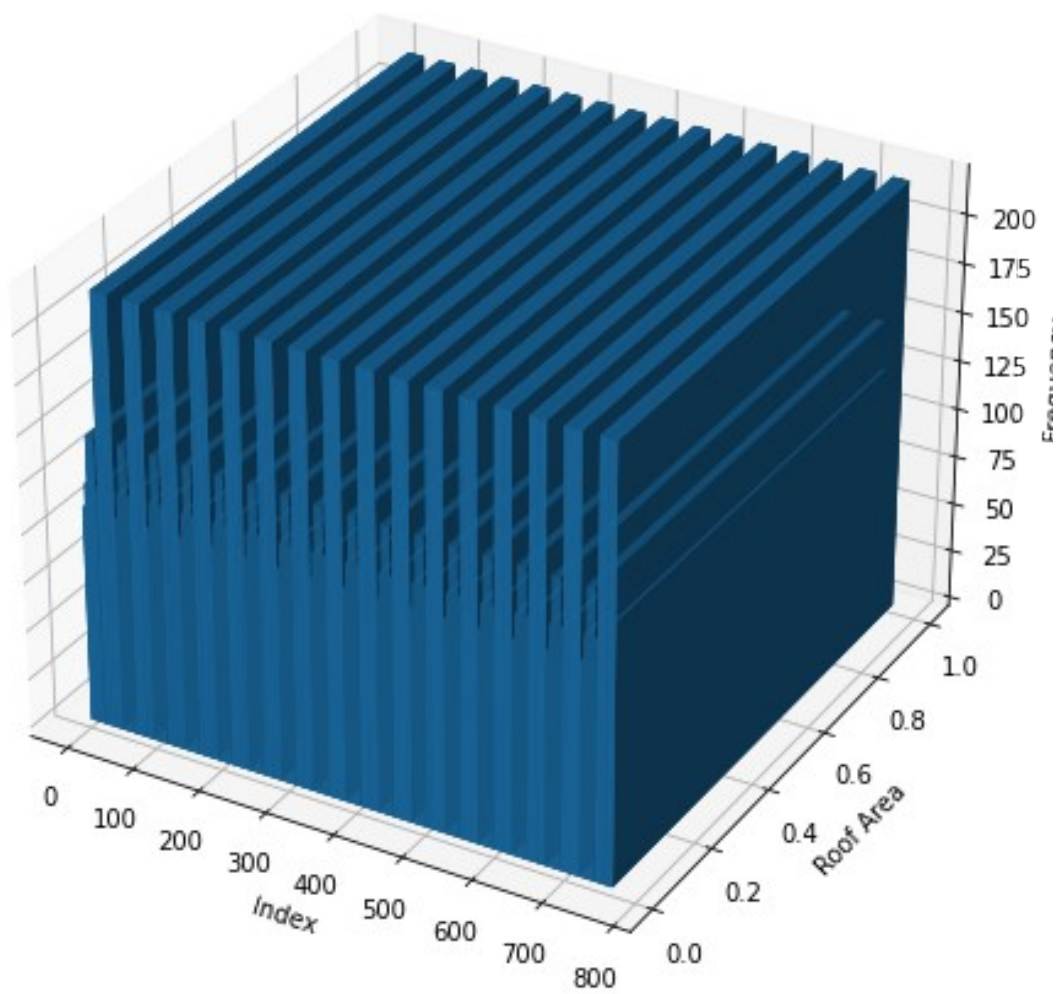
# load data from csv file
data = pd.read_csv("dataset.csv")

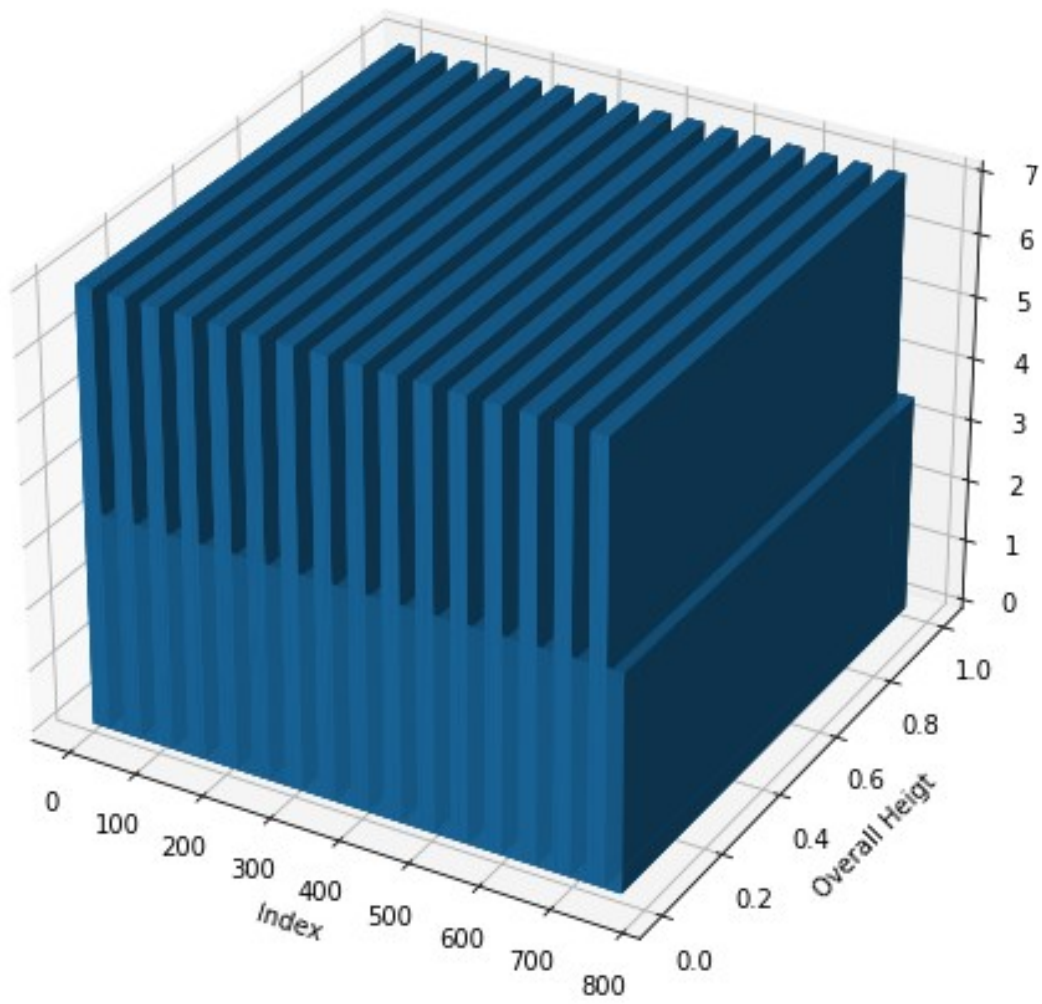
# create a 3D bar chart for each attribute in the data
for column in data.columns:
    fig = plt.figure(figsize=(10, 8))
    ax = fig.add_subplot(111, projection='3d')
    x_data = np.arange(len(data[column]))
    y_data = np.zeros(len(data[column]))
    z_data = data[column]
    dx = np.ones(len(data[column]))
    dy = np.ones(len(data[column]))
    dz = z_data
    ax.bar3d(x_data, y_data, np.zeros_like(z_data), dx, dy, dz)
    ax.set_xlabel('Index')
    ax.set_ylabel(column)
    ax.set_zlabel('Frequency')
    plt.show()
```

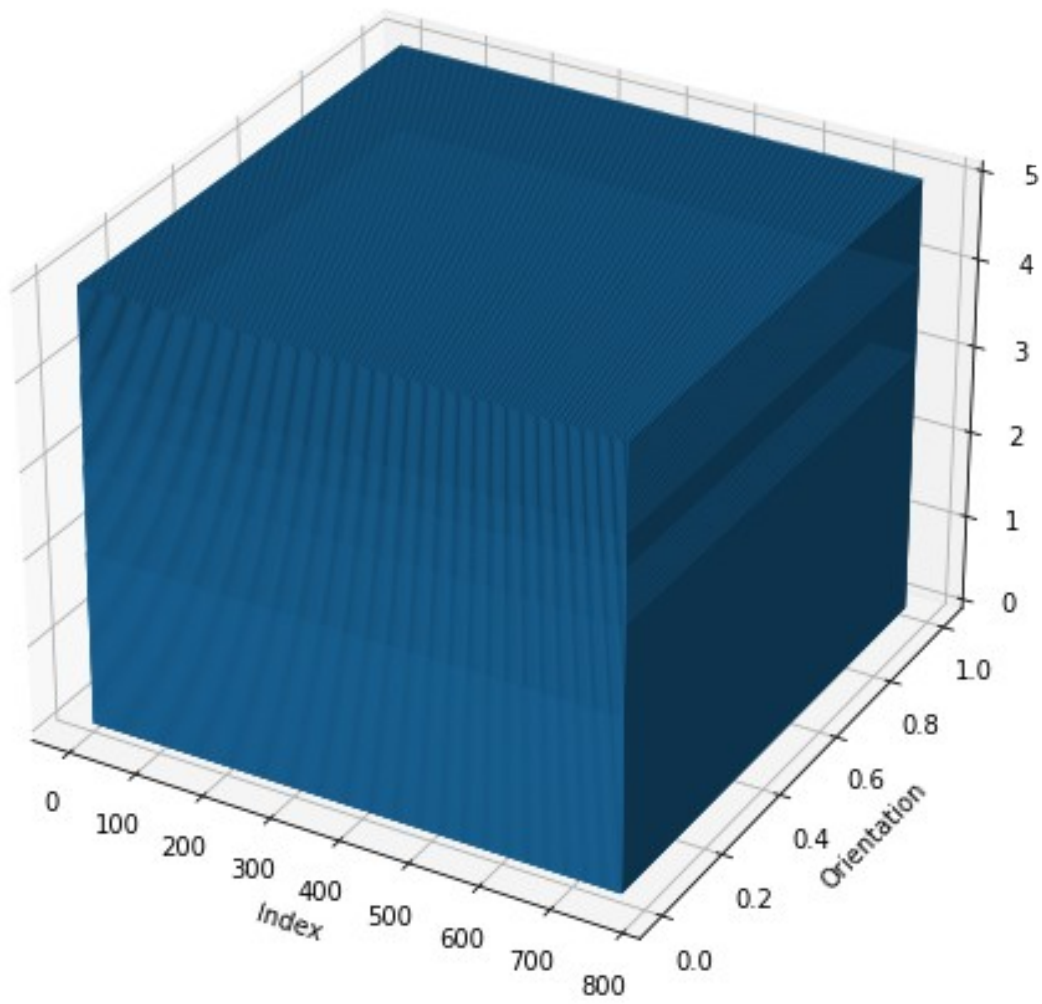


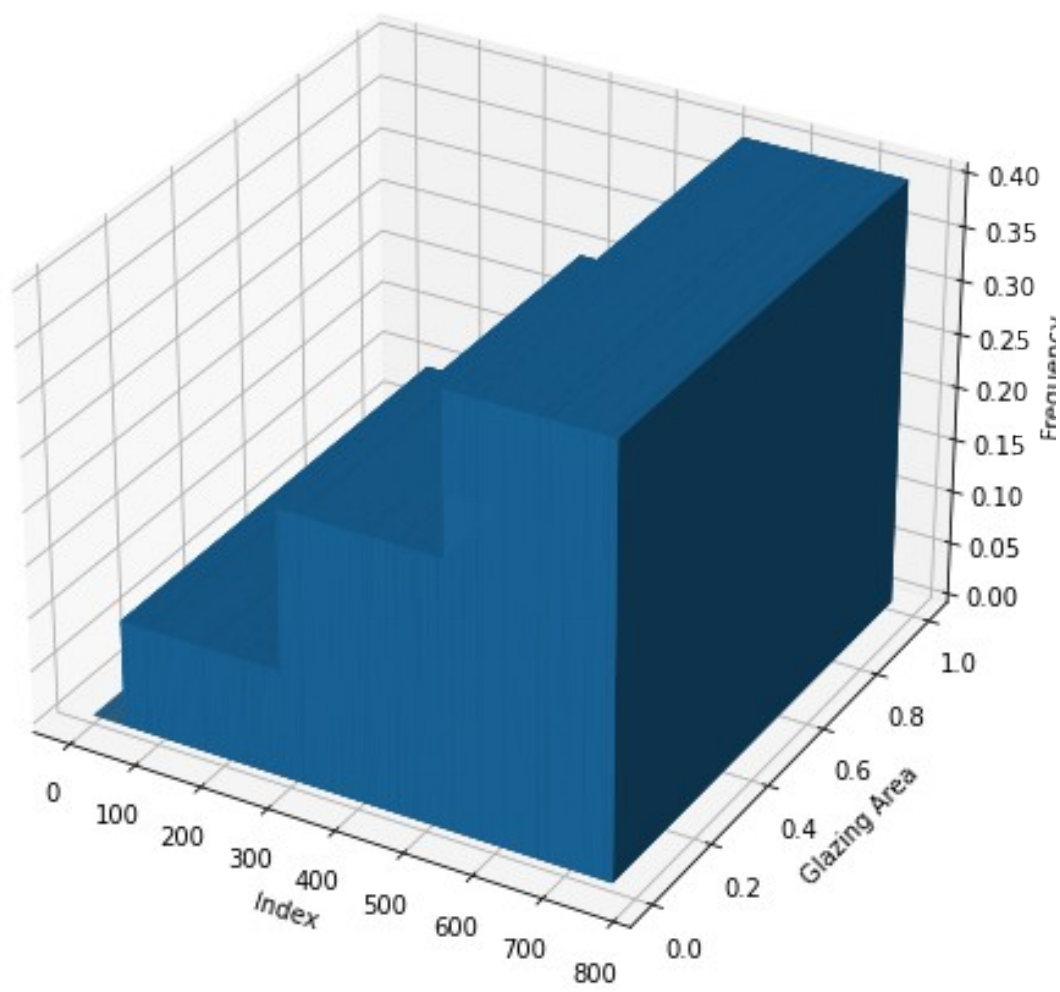


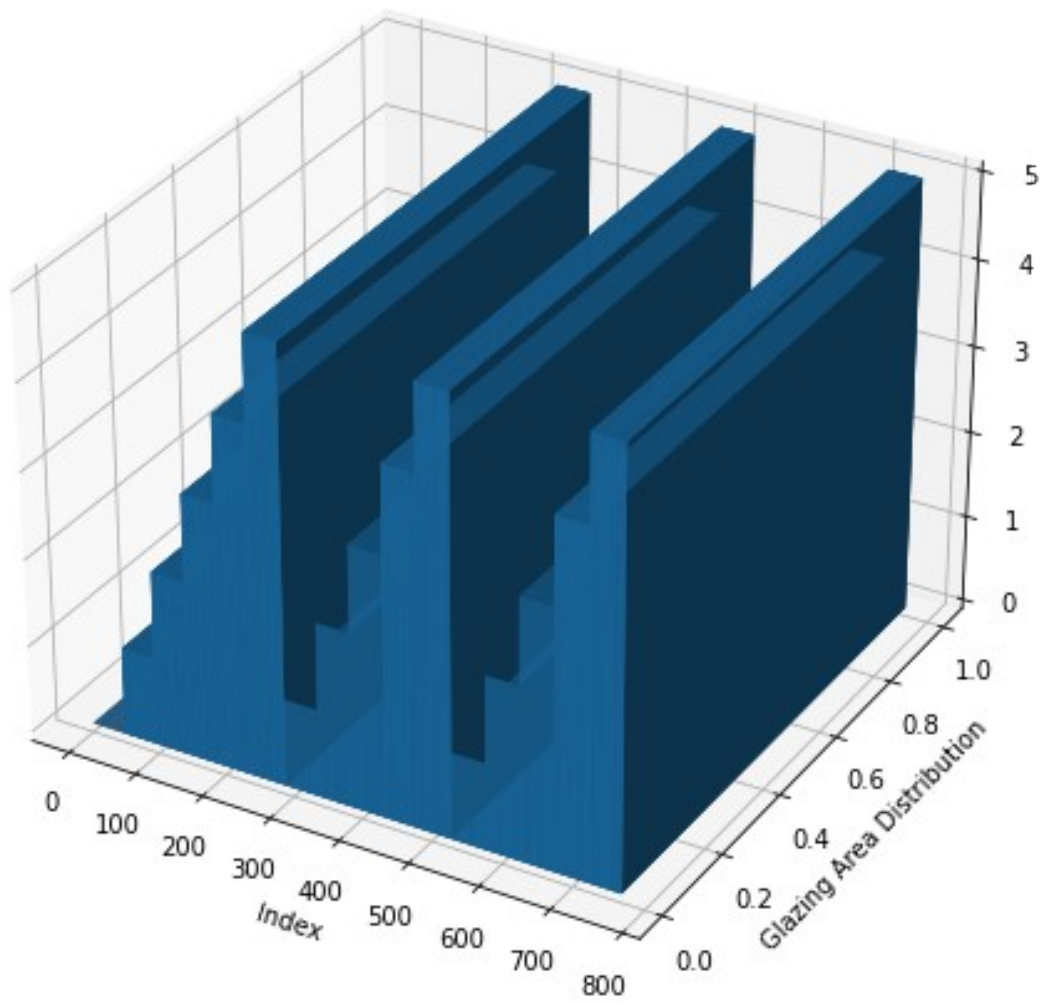


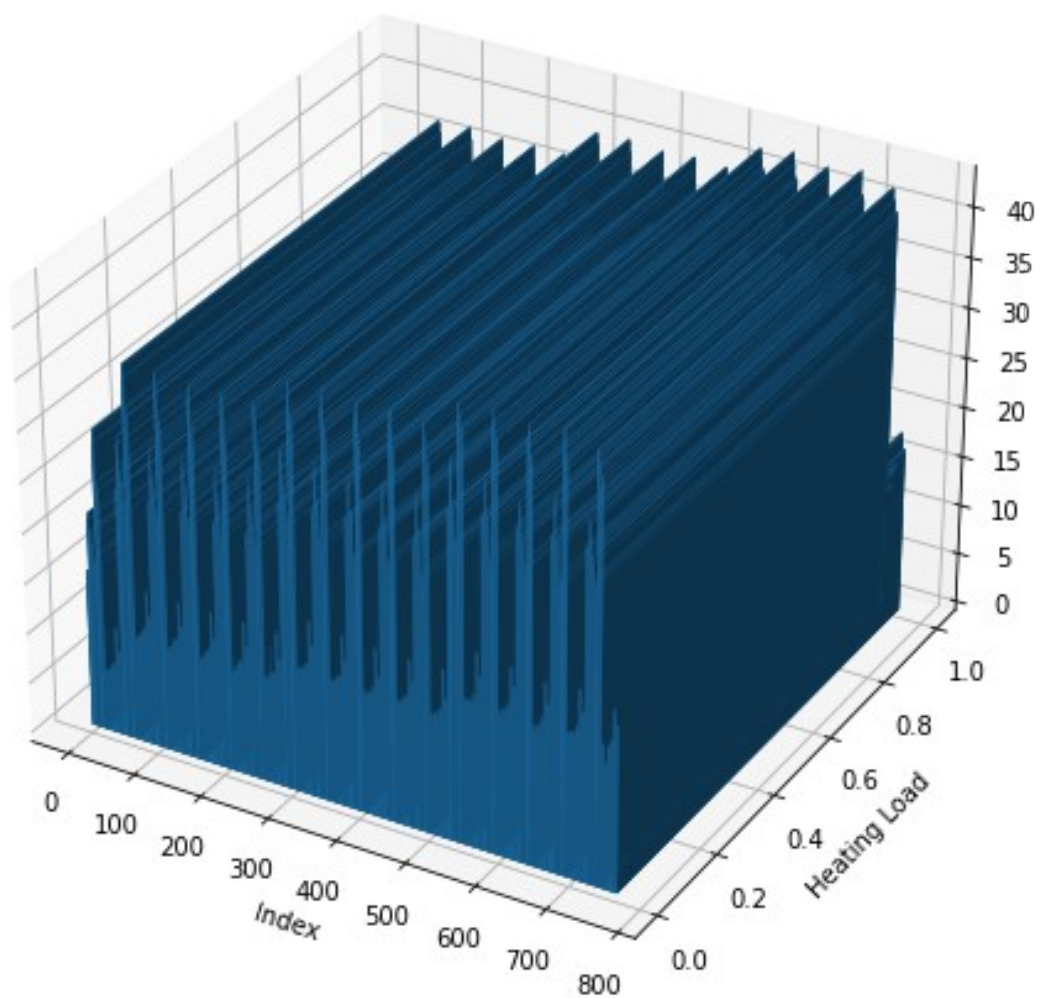


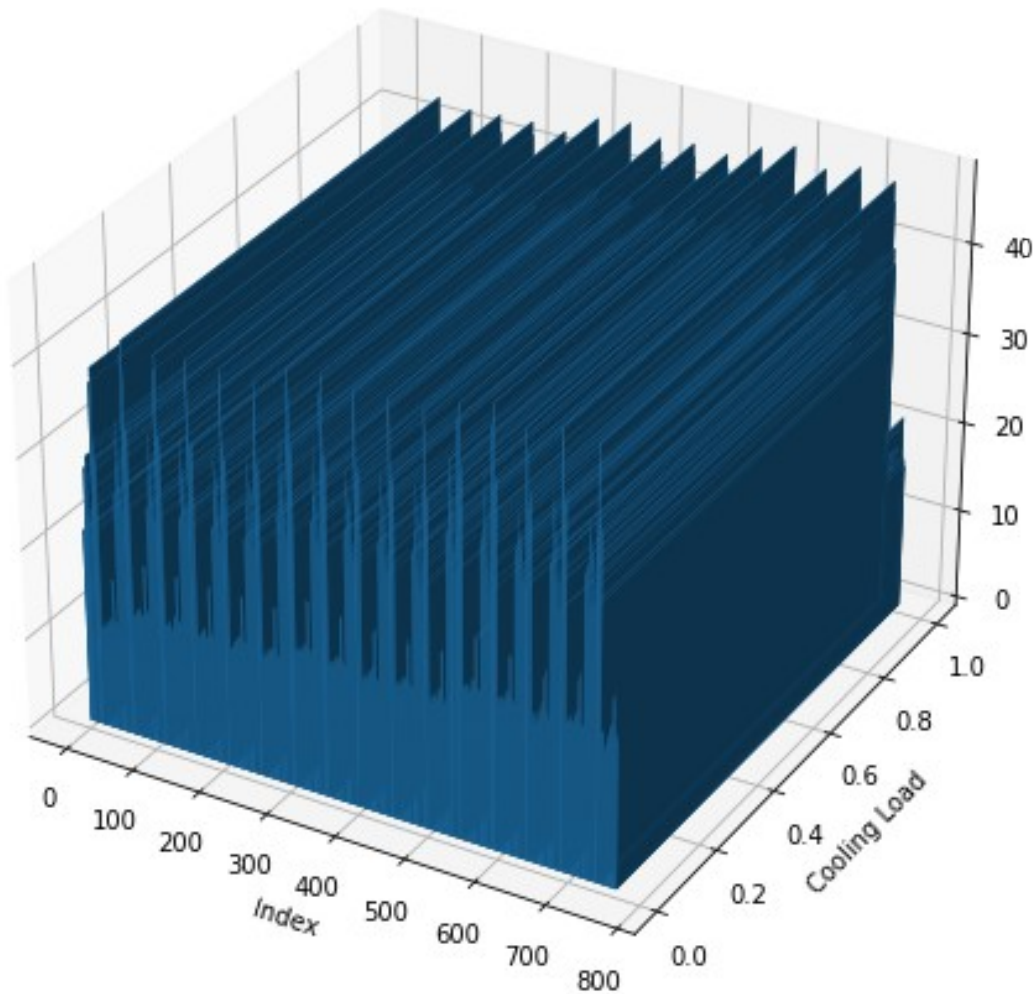












RADIAL BAR PLOT

```
# Load data from CSV file
data = pd.read_csv('dataset.csv')

# Define function to create radial bar plot
def radial_bar_plot(data, attribute):
    angles = np.linspace(0, 2*np.pi, len(data[attribute]),
endpoint=False)
    angles = np.concatenate((angles,[angles[0]]))
    values = data[attribute].values.tolist()
    values.append(values[0])

    fig = plt.figure(figsize=(8, 8))
    ax = fig.add_subplot(111, polar=True)
    labels = data.index.tolist()
```

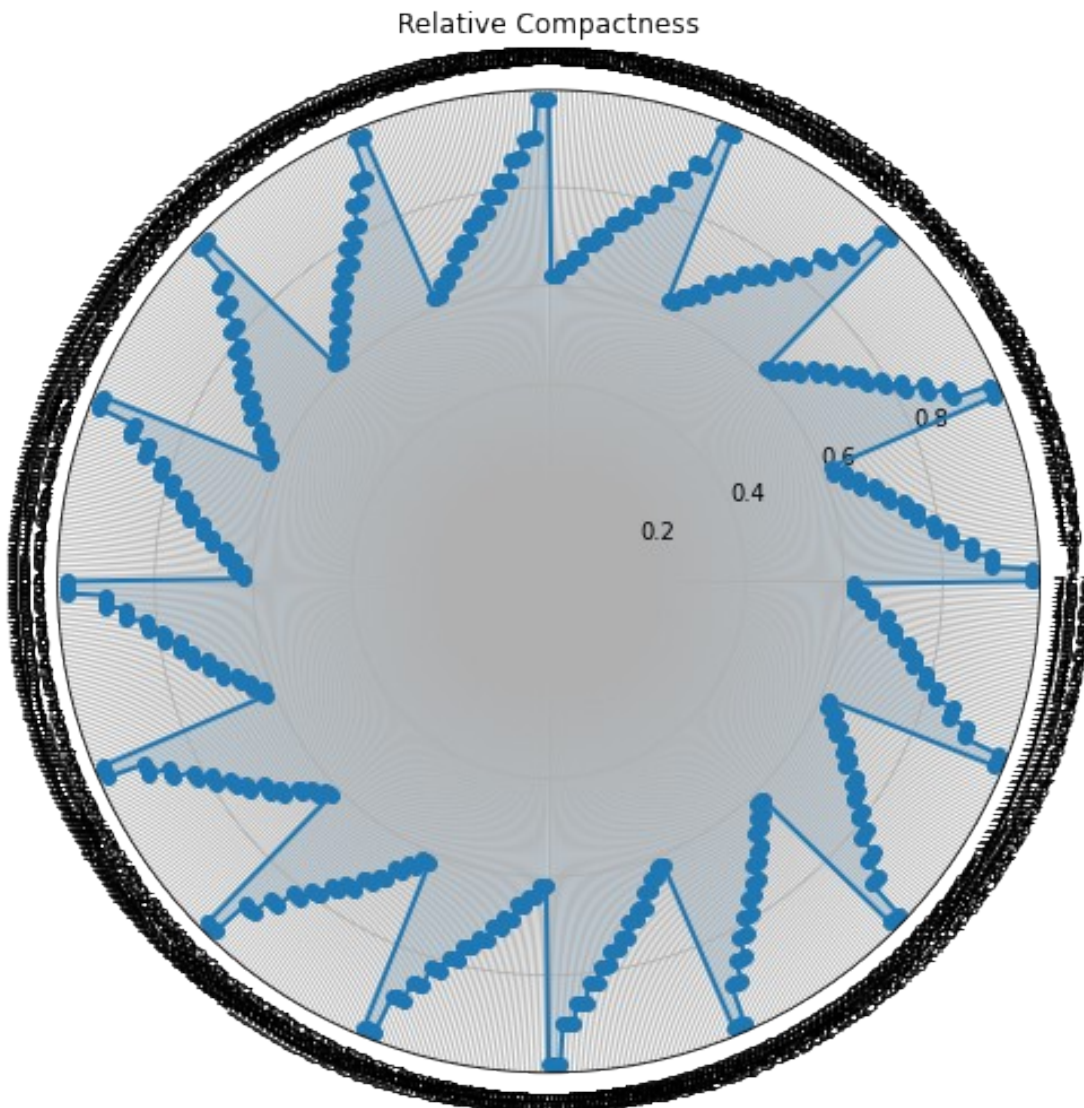
```

labels.append('')
ax.plot(angles, values, 'o-', linewidth=2)
ax.fill(angles, values, alpha=0.25)
ax.set_thetagrids(angles * 180/np.pi, labels)
ax.set_title(attribute)
ax.grid(True)

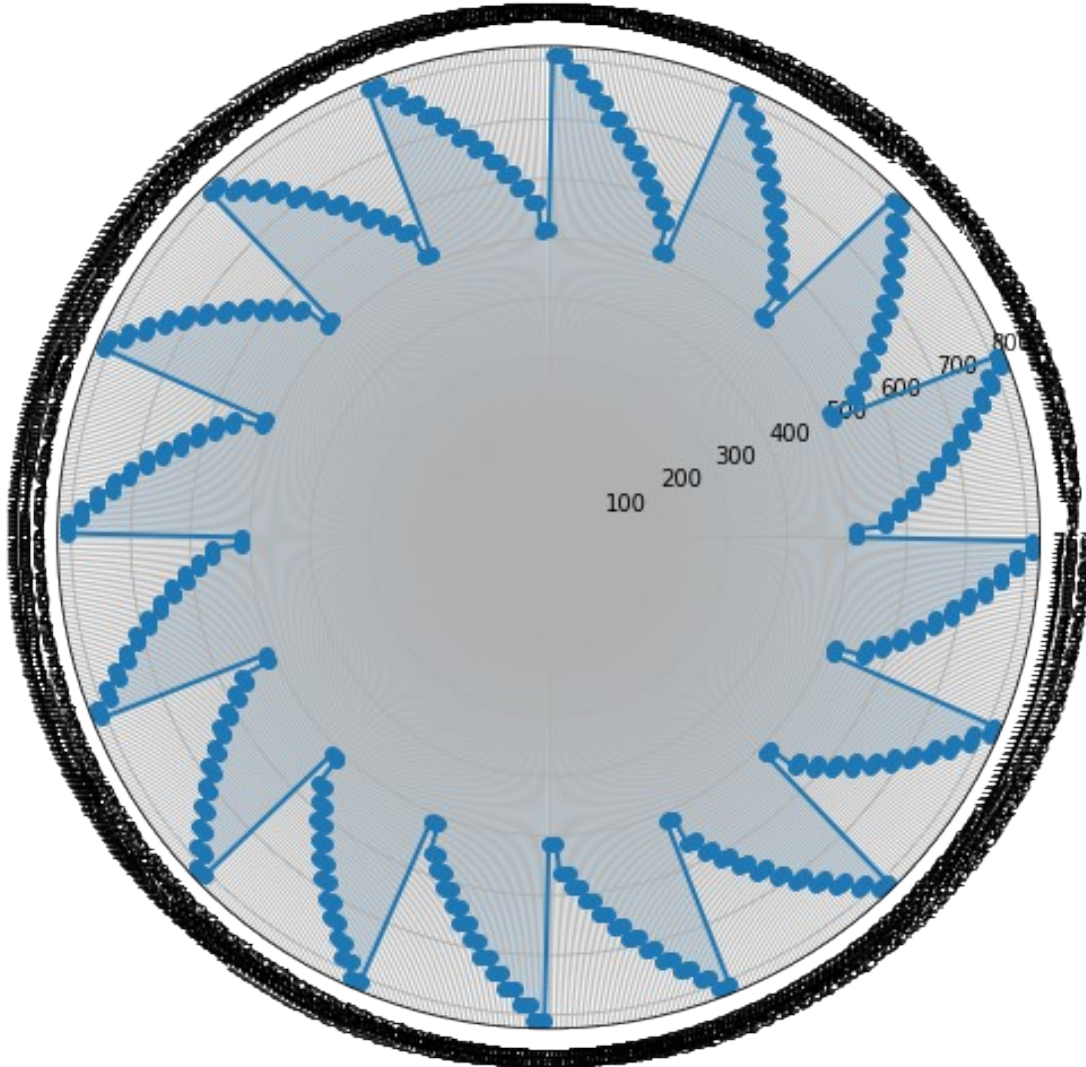
for attribute in data.columns:
    radial_bar_plot(data, attribute)

plt.show()

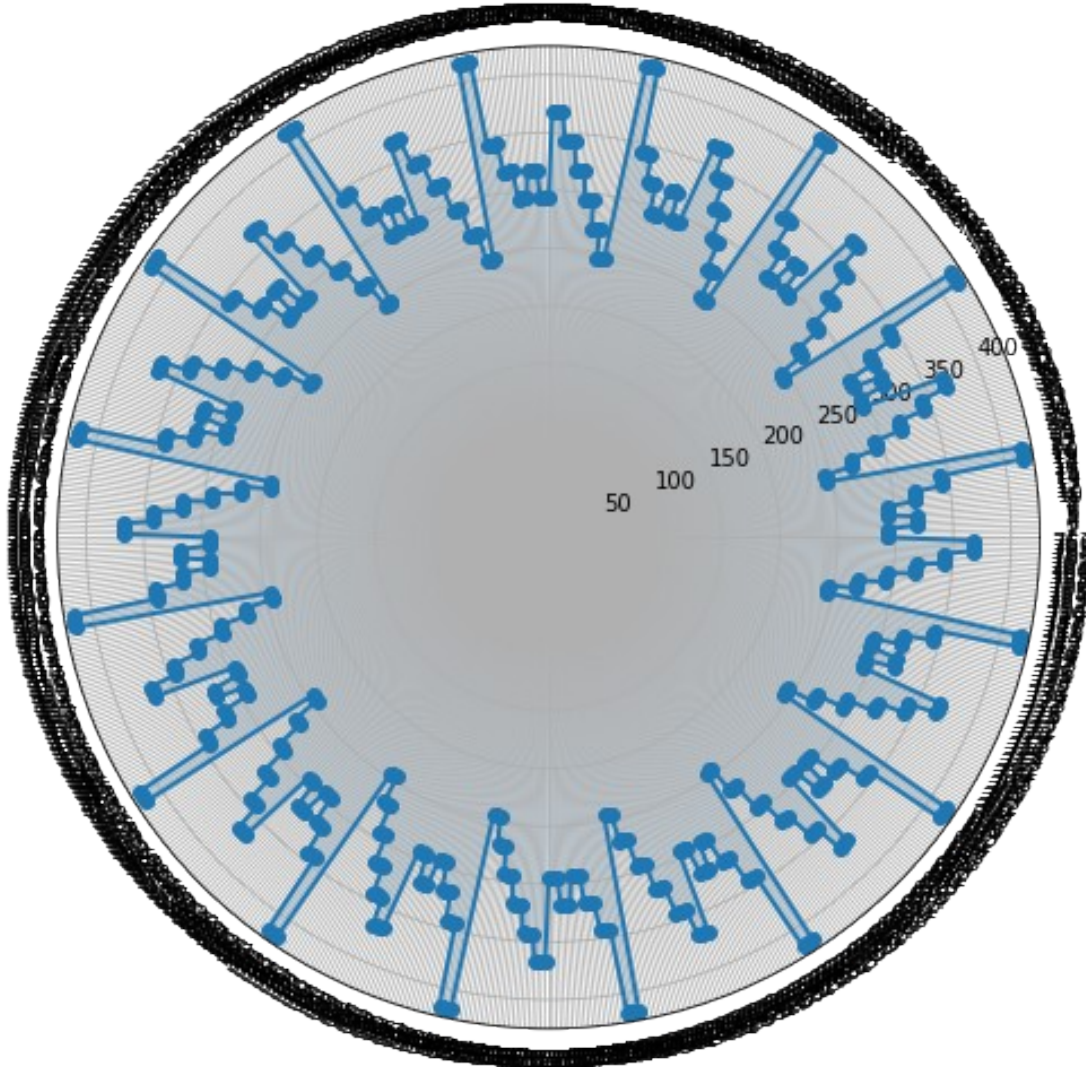
```



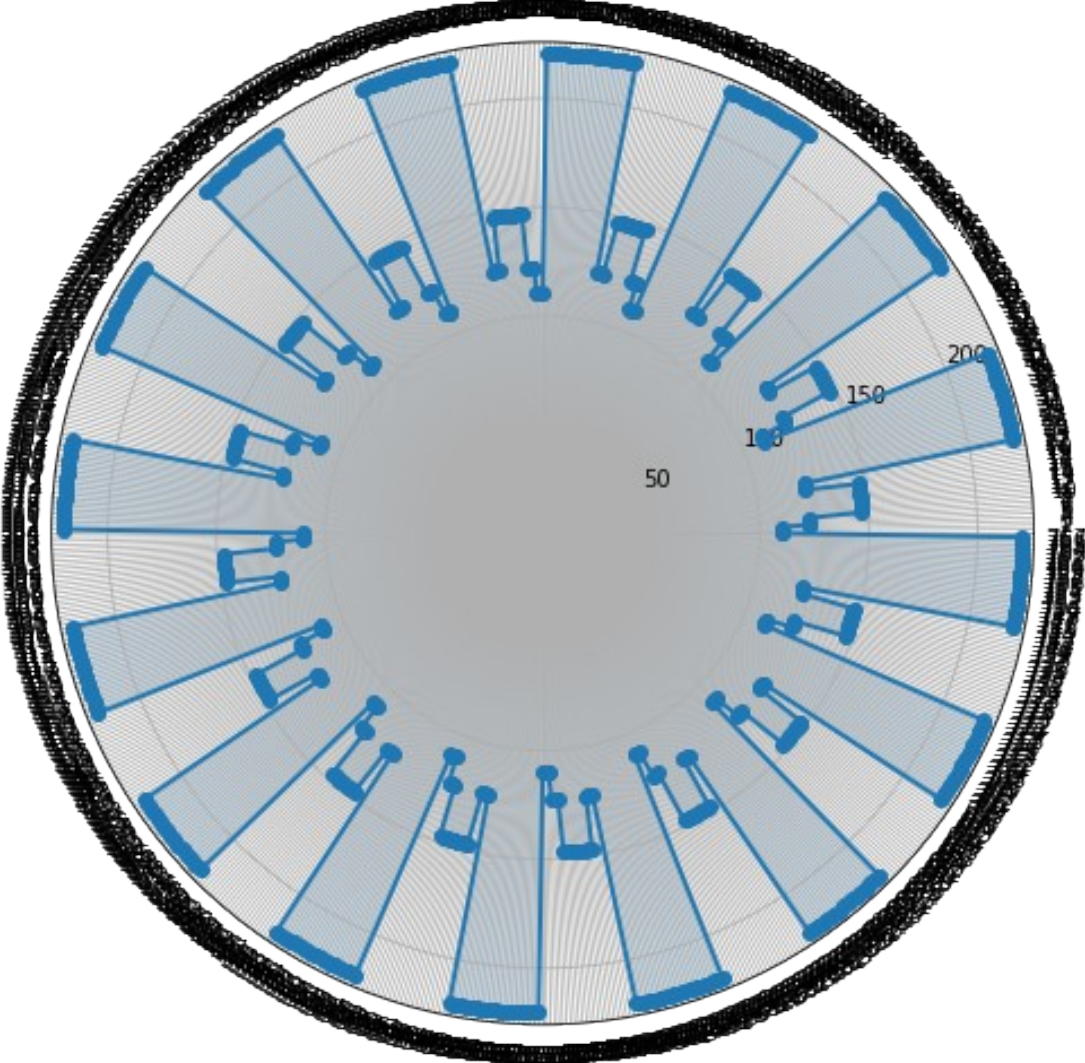
Surface Area



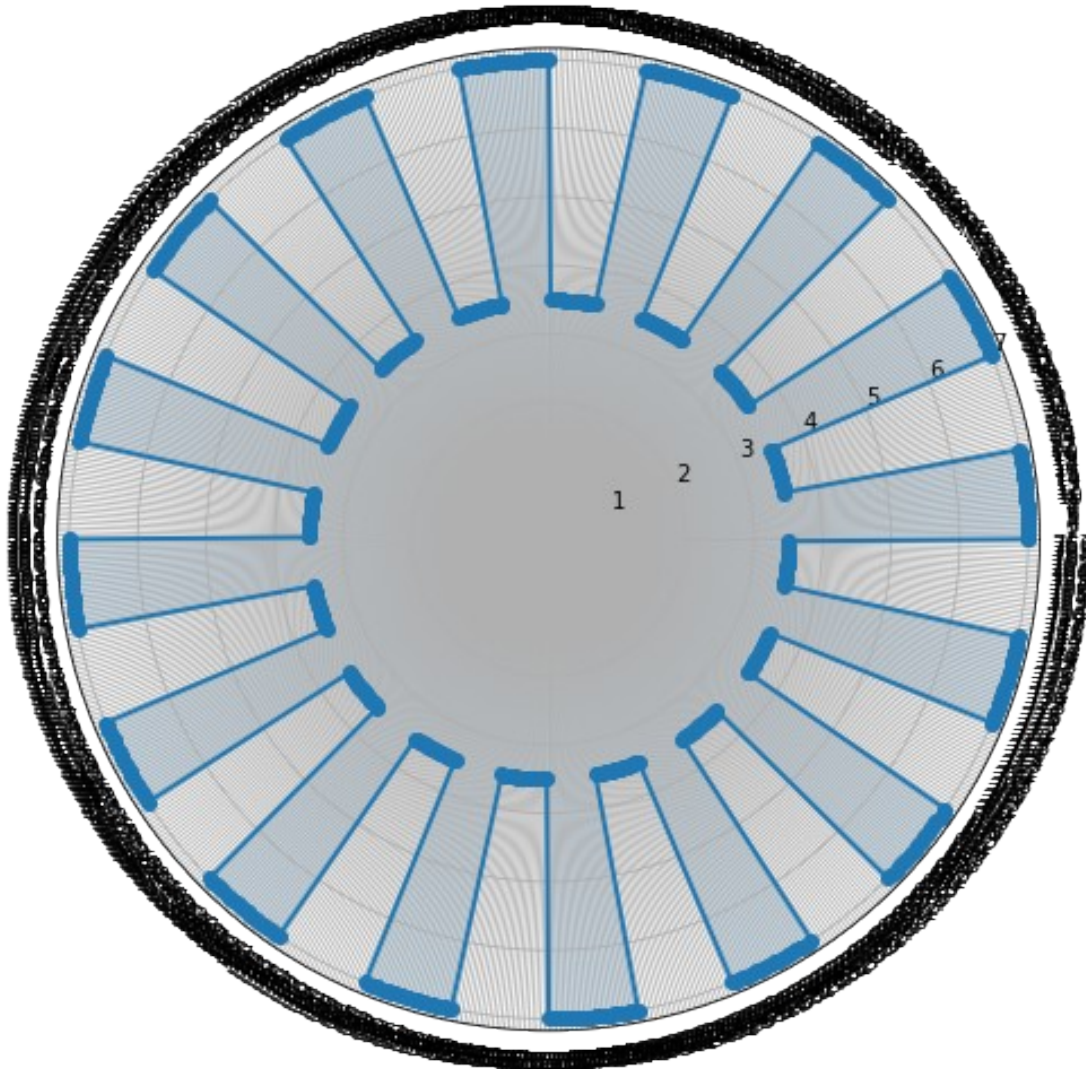
Wall Area



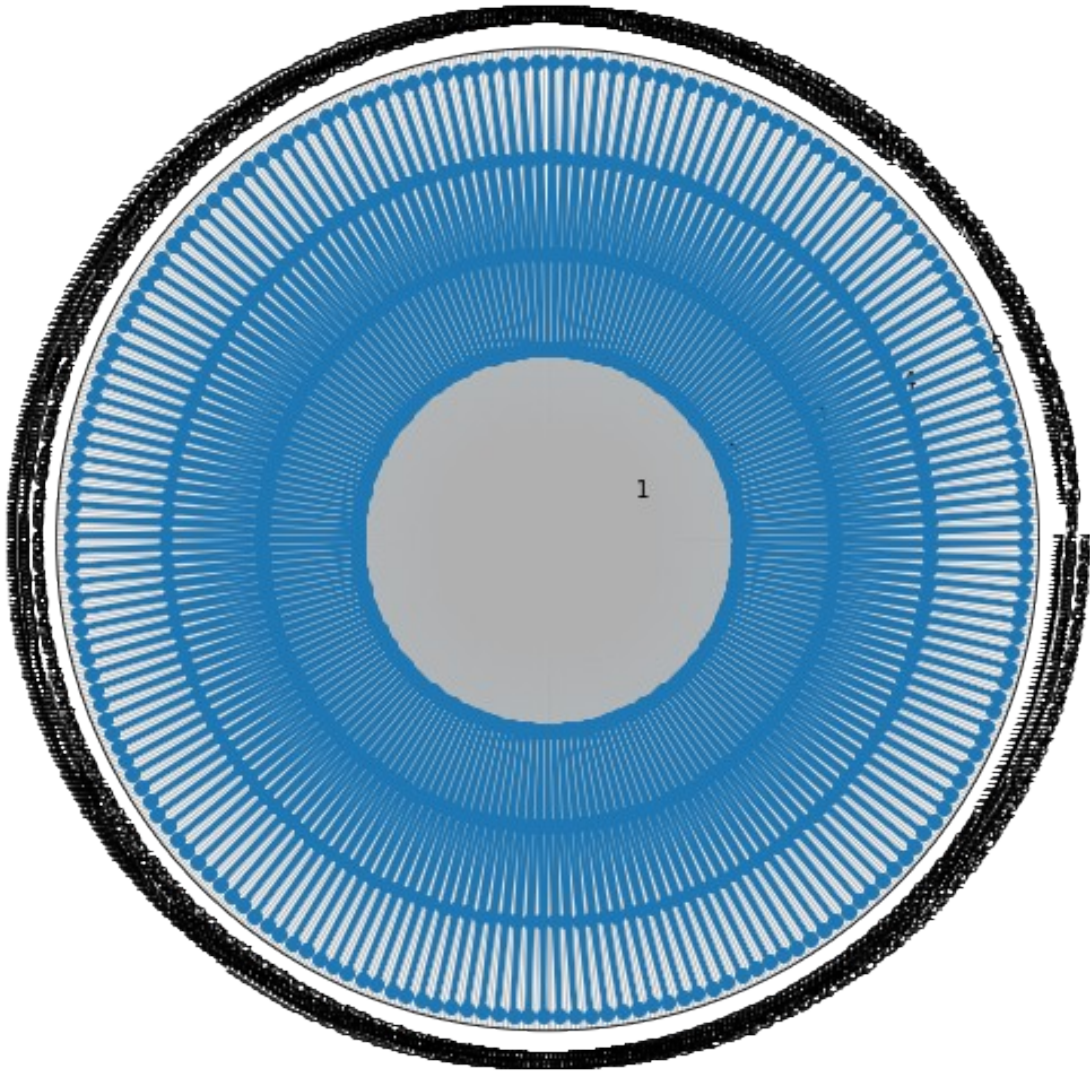
Roof Area



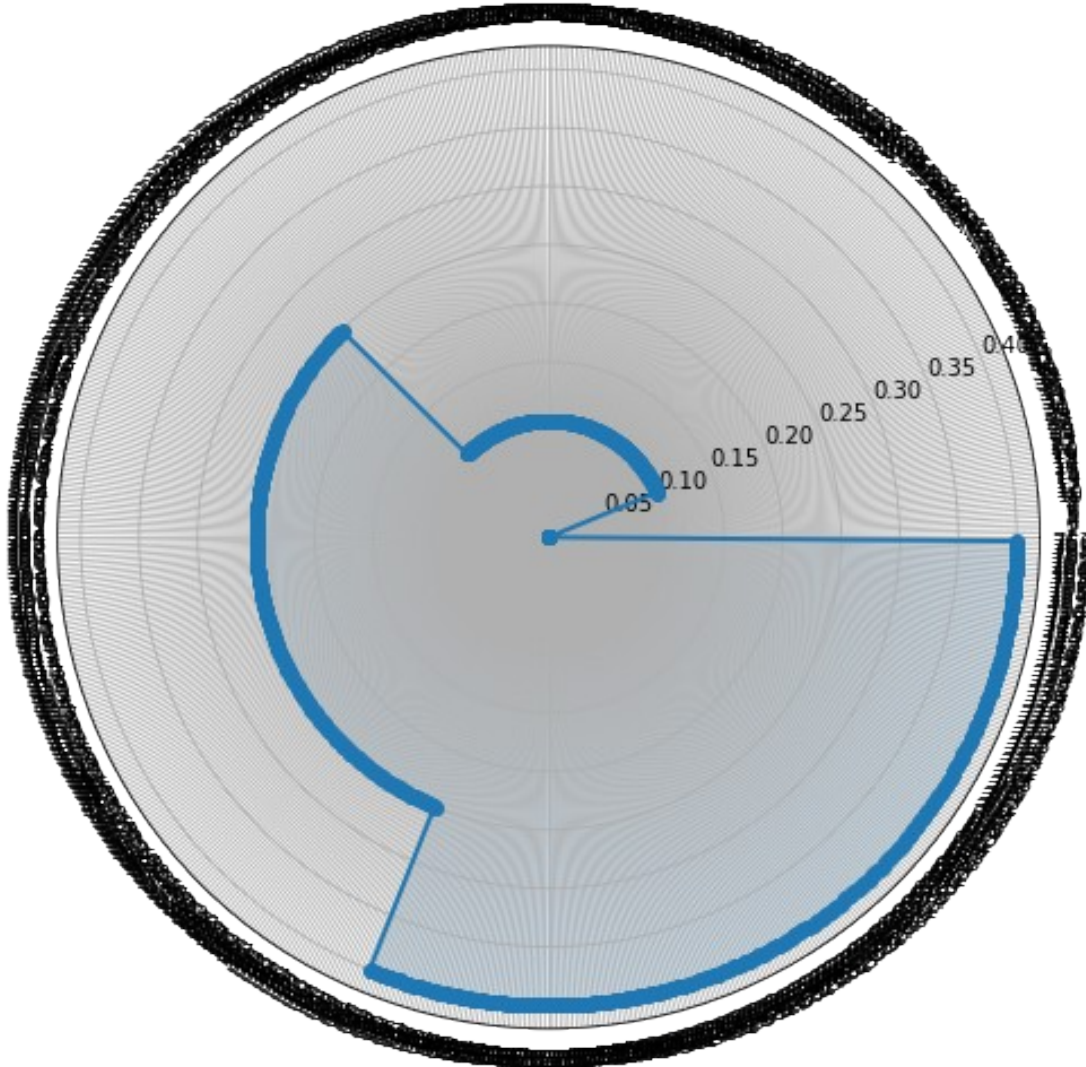
Overall Height



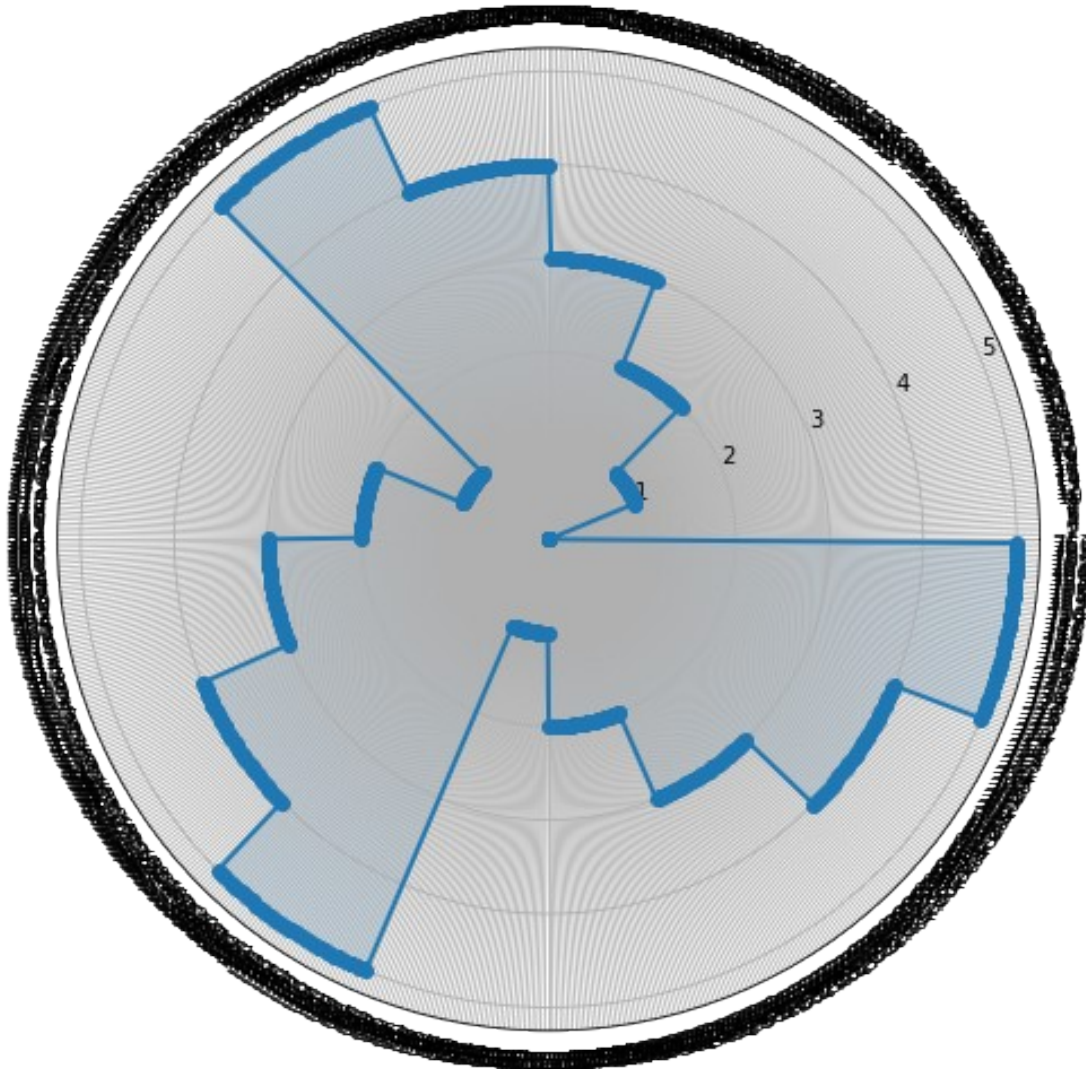
Orientation



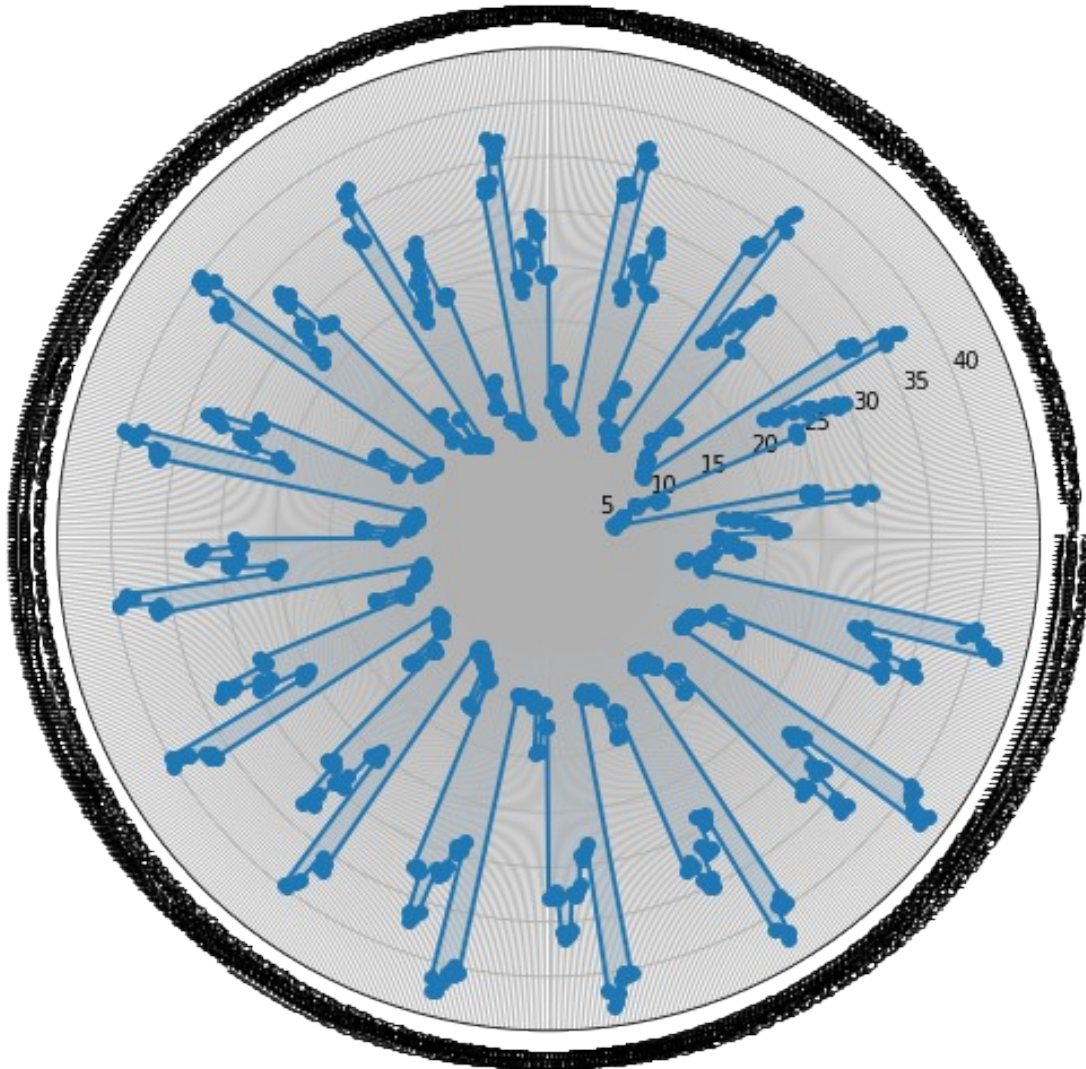
Glazing Area

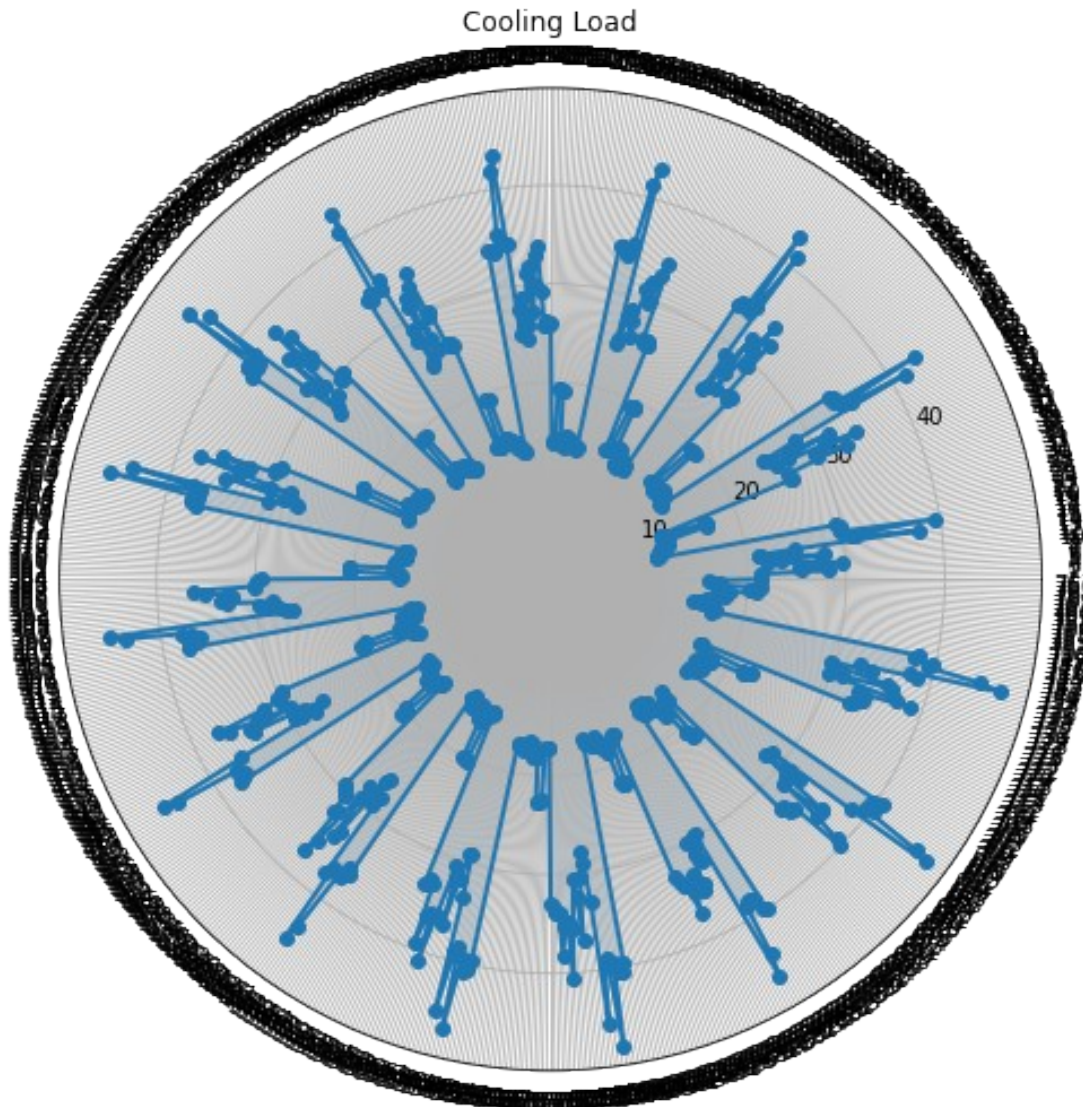


Glazing Area Distribution



Heating Load

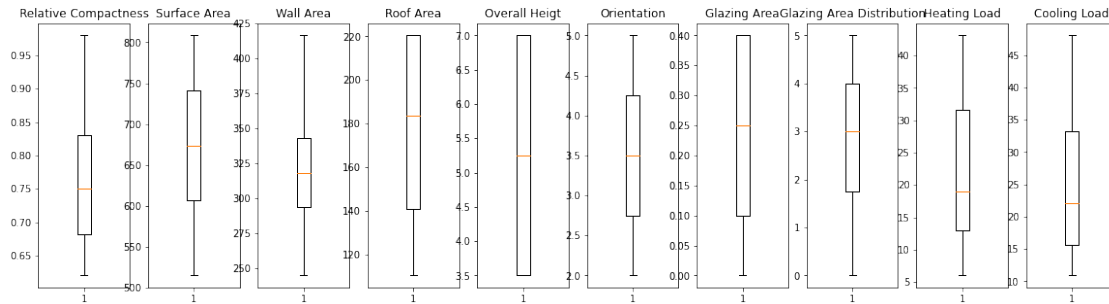




BOX PLOT

```
# Load data from CSV file
data = pd.read_csv('dataset.csv')

# Create box plot for each attribute in data
fig, axes = plt.subplots(nrows=1, ncols=len(data.columns),
    figsize=(20, 5))
for i, attribute in enumerate(data.columns):
    axes[i].boxplot(data[attribute])
    axes[i].set_title(attribute)
plt.show()
```



The command `pandas_profiling.ProfileReport(data)` generates a report that provides a comprehensive summary of a pandas DataFrame.

The `pandas_profiling` library generates a HTML report that includes statistics such as the number of missing values, the range of values, the data type of each column, and correlation between columns. The report also includes histograms, scatterplots, and other visualizations that can be useful for exploring the data.

```
pandas_profiling.ProfileReport(data)
```

```
{"model_id": "8eaaf1a162b44828b46b518496824ed3", "version_major": 2, "version_minor": 0}
```

```
{"model_id": "d22f5ee9c2924b53b9abe712d59a569b", "version_major": 2, "version_minor": 0}
```

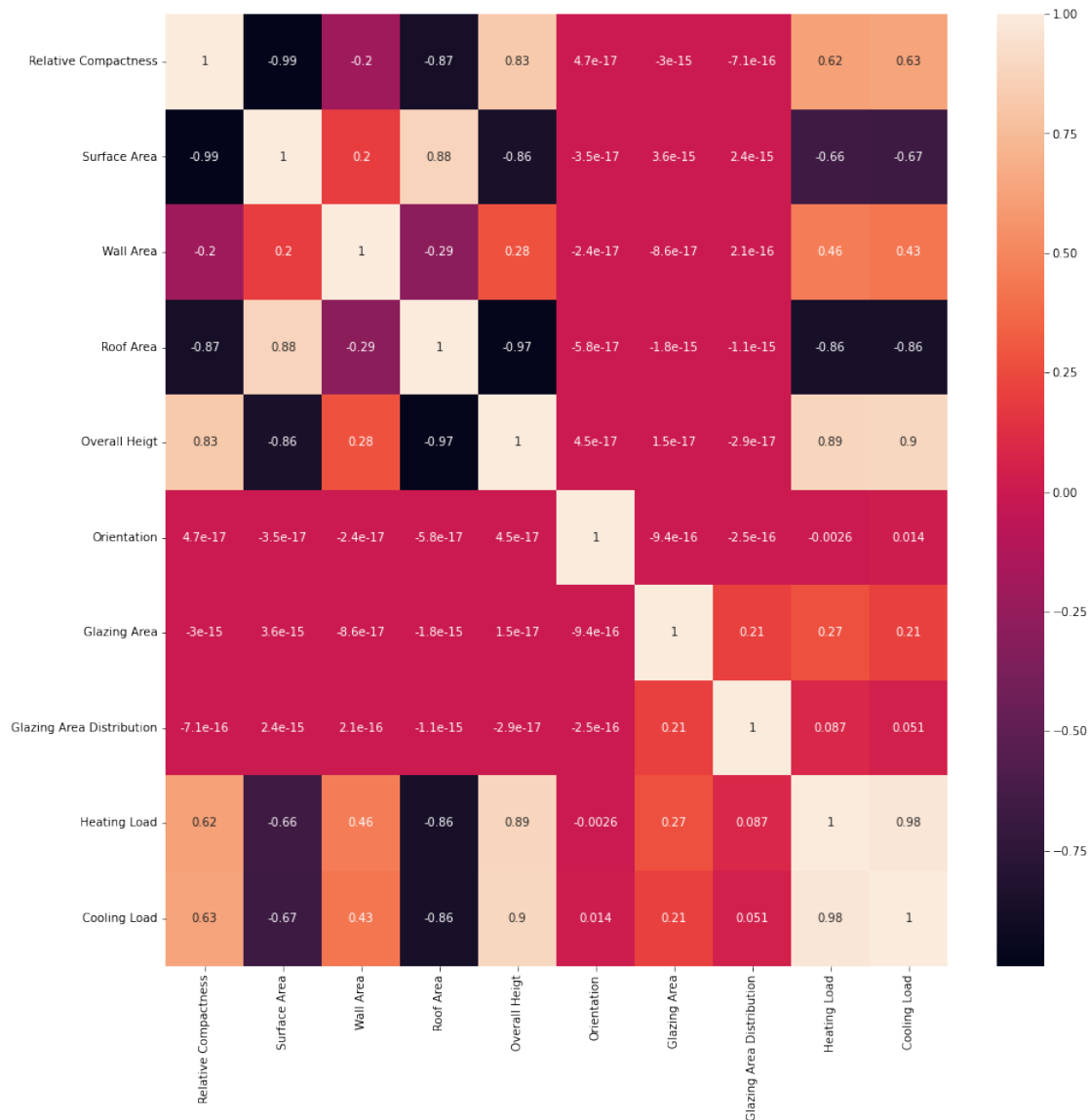
```
{"model_id": "233c76cf8698414bb1be95987b30bc56", "version_major": 2, "version_minor": 0}
```

```
<IPython.core.display.HTML object>
```

PLOTTING HEATMAP

```
plt.figure(figsize=(15,15))
sns.heatmap(data.corr(), annot=True)
```

```
<Axes: >
```



This code has two parts, let me explain them one by one:

`pd.set_option('display.float_format',lambda x: '{:,.2f}'.format(x) if abs(x) < 10000 else '{:,.0f}'.format(x))` This line of code is using the `set_option` method from the pandas library to set the formatting of float values that are displayed in the output. Specifically, it is setting the float format to display two decimal places if the absolute value of the float is less than 10,000, and to display no decimal places if the absolute value of the float is greater than or equal to 10,000. The lambda function is used to define the formatting behavior for each float value. It takes a single input (x), which is the float value being formatted, and applies the appropriate formatting rule based on the absolute value of x.

`data.corr()` This line of code is calling the `corr()` method on a pandas DataFrame named 'data'. The `corr()` method calculates the pairwise correlation between columns of a DataFrame, returning a new DataFrame of correlation coefficients. The resulting

DataFrame will have the same column and index labels as the original DataFrame, with correlation values ranging from -1 to 1.

```
pd.set_option('display.float_format', lambda x: '{:,.2f}'.format(x) if
abs(x) < 10000 else '{:,.0f}'.format(x))
data.corr()
```

	Relative Compactness	Surface Area	Wall
Area \			
Relative Compactness	1.00	-0.99	-
0.20			
Surface Area	-0.99	1.00	
0.20			
Wall Area	-0.20	0.20	
1.00			
Roof Area	-0.87	0.88	-
0.29			
Overall Height	0.83	-0.86	
0.28			
Orientation	0.00	-0.00	-
0.00			
Glazing Area	-0.00	0.00	-
0.00			
Glazing Area Distribution	-0.00	0.00	
0.00			
Heating Load	0.62	-0.66	
0.46			
Cooling Load	0.63	-0.67	
0.43			

	Roof Area	Overall Height	Orientation \
Relative Compactness	-0.87	0.83	0.00
Surface Area	0.88	-0.86	-0.00
Wall Area	-0.29	0.28	-0.00
Roof Area	1.00	-0.97	-0.00
Overall Height	-0.97	1.00	0.00
Orientation	-0.00	0.00	1.00
Glazing Area	-0.00	0.00	-0.00
Glazing Area Distribution	-0.00	-0.00	-0.00
Heating Load	-0.86	0.89	-0.00
Cooling Load	-0.86	0.90	0.01

	Glazing Area	Glazing Area Distribution \
Relative Compactness	-0.00	-0.00
Surface Area	0.00	0.00
Wall Area	-0.00	0.00
Roof Area	-0.00	-0.00
Overall Height	0.00	-0.00
Orientation	-0.00	-0.00
Glazing Area	1.00	0.21

Glazing Area Distribution	0.21	1.00
Heating Load	0.27	0.09
Cooling Load	0.21	0.05

	Heating Load	Cooling Load
Relative Compactness	0.62	0.63
Surface Area	-0.66	-0.67
Wall Area	0.46	0.43
Roof Area	-0.86	-0.86
Overall Height	0.89	0.90
Orientation	-0.00	0.01
Glazing Area	0.27	0.21
Glazing Area Distribution	0.09	0.05
Heating Load	1.00	0.98
Cooling Load	0.98	1.00