

```
In [2]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import scipy
```

```
In [9]: df=pd.read_excel('F:\cleantechsolar\assignment.xlsx')
```

```
In [10]: df
```

```
Out[10]:
```

| | Date | GHI | PR |
|-----|------------|----------|-----------|
| 0 | 2019-07-01 | 3.256608 | 69.575676 |
| 1 | 2019-07-02 | 3.976767 | 79.314411 |
| 2 | 2019-07-03 | 2.811867 | 61.020006 |
| 3 | 2019-07-04 | 3.658408 | 83.262576 |
| 4 | 2019-07-05 | 5.590683 | 82.124440 |
| ... | ... | ... | ... |
| 977 | 2022-03-20 | 4.226183 | 81.632738 |
| 978 | 2022-03-21 | 3.431675 | 71.057353 |
| 979 | 2022-03-22 | 3.580492 | 81.631509 |
| 980 | 2022-03-23 | 4.997617 | 71.906149 |
| 981 | 2022-03-24 | 5.125050 | 79.911798 |

982 rows × 3 columns

```
In [6]: df.head()
```

```
Out[6]:
```

| | Date | GHI | PR |
|---|------------|----------|-----------|
| 0 | 2019-07-01 | 3.256608 | 69.575676 |
| 1 | 2019-07-02 | 3.976767 | 79.314411 |
| 2 | 2019-07-03 | 2.811867 | 61.020006 |
| 3 | 2019-07-04 | 3.658408 | 83.262576 |
| 4 | 2019-07-05 | 5.590683 | 82.124440 |

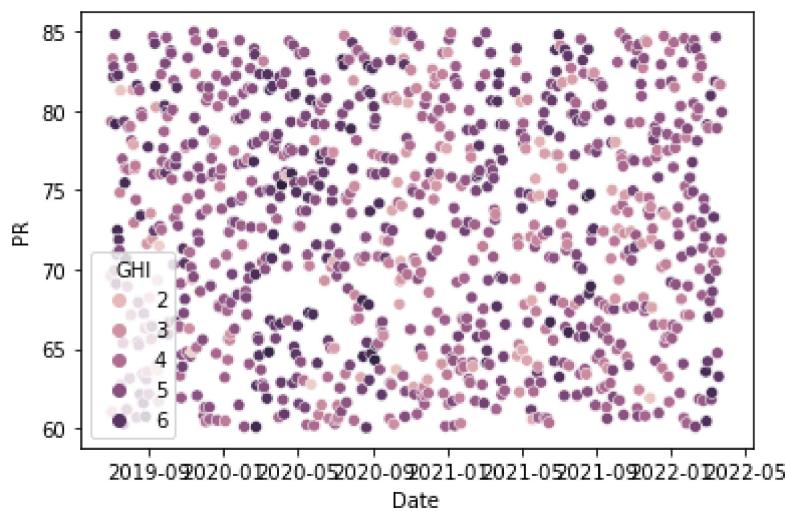
```
In [7]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 982 entries, 0 to 981
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype  
--- 
 0   Date     982 non-null    datetime64[ns]
 1   GHI      982 non-null    float64 
 2   PR       982 non-null    float64 
dtypes: datetime64[ns](1), float64(2)
memory usage: 23.1 KB
```

In []:

In [8]: `sns.scatterplot(data =df ,x = 'Date', y ='PR', hue ='GHI')`

Out[8]:

In [9]: `df['GHI'].value_counts()`

```
Out[9]: 3.256608    1
        5.541142    1
        3.492117    1
        5.729623    1
        2.506816    1
        ..
        5.529083    1
        4.094625    1
        3.191908    1
        4.843125    1
        5.125050    1
Name: GHI, Length: 982, dtype: int64
```

In [10]: `df['PR'].value_counts()`

```
Out[10]:   69.575676    1  
           81.183859    1  
           83.129711    1  
           83.929451    1  
           64.556518    1  
           ..  
           75.598299    1  
           60.144446    1  
           78.118113    1  
           74.375395    1  
           79.911798    1  
Name: PR, Length: 982, dtype: int64
```

```
In [11]: df['Date'].value_counts()
```

```
Out[11]: 2019-07-01    1  
          2021-04-20    1  
          2021-04-22    1  
          2021-04-23    1  
          2021-04-24    1  
          ..  
          2020-05-27    1  
          2020-05-28    1  
          2020-05-29    1  
          2020-05-30    1  
          2022-03-24    1  
Name: Date, Length: 982, dtype: int64
```

```
In [37]: perpr = ((np.asarray(df['PR'])).reshape(982,1))  
perghi = ((np.asarray(df['GHI'])).reshape(982,1))  
print(perpr)  
print(perghi)
```

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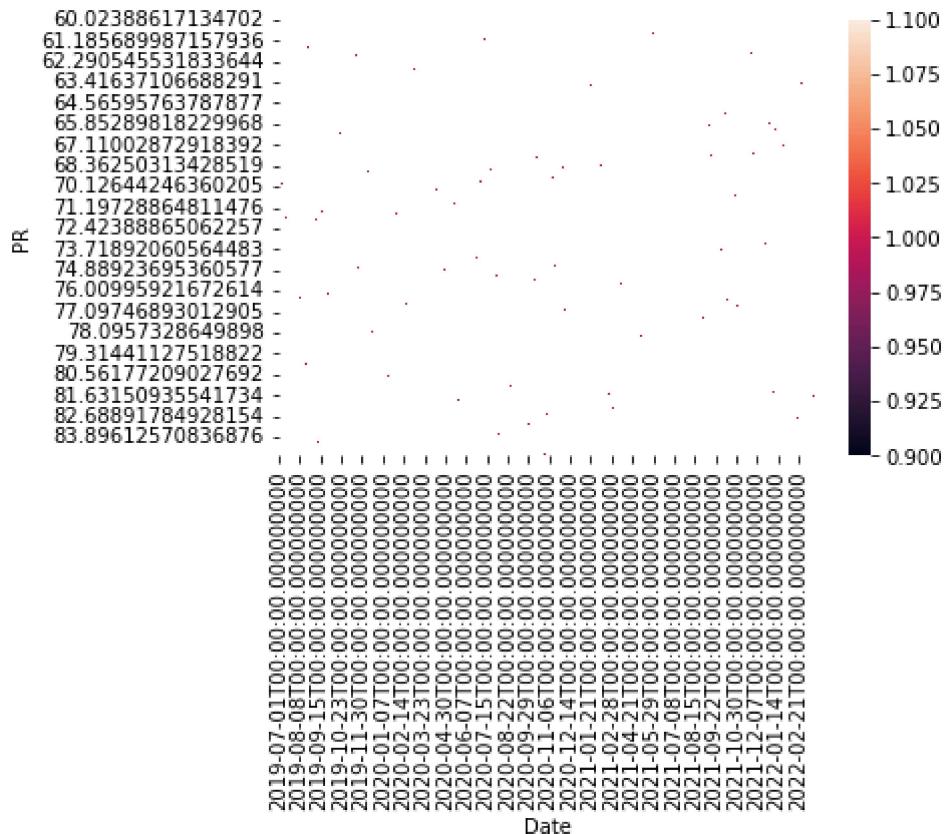
In [52]:

In [43]: `(df.groupby('PR').Date.value_counts().unstack())`

Out[43]:

| Date | 2019-07-01 | 2019-07-02 | 2019-07-03 | 2019-07-04 | 2019-07-05 | 2019-07-06 | 2019-07-07 | 2019-07-08 | 2019-07-09 | 2019-07-10 | ... | 2022-03-15 | 2022-03-16 |
|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----|------------|------------|
| PR | | | | | | | | | | | | | |
| 60.023886 | NaN | ... | NaN | NaN |
| 60.065305 | NaN | ... | NaN | NaN |
| 60.077481 | NaN | ... | NaN | NaN |
| 60.084250 | NaN | ... | NaN | NaN |
| 60.110233 | NaN | ... | NaN | NaN |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 84.910113 | NaN | ... | NaN | NaN |
| 84.924373 | NaN | ... | NaN | NaN |
| 84.961800 | NaN | ... | NaN | NaN |
| 84.966158 | NaN | ... | NaN | NaN |
| 84.980120 | NaN | ... | NaN | NaN |

982 rows × 982 columns

In [44]: `solar_data=(df.groupby('PR').Date.value_counts().unstack())`In [45]: `sns.heatmap(solar_data);`

```
In [46]: (df.groupby('GHI').Date.value_counts().unstack())
```

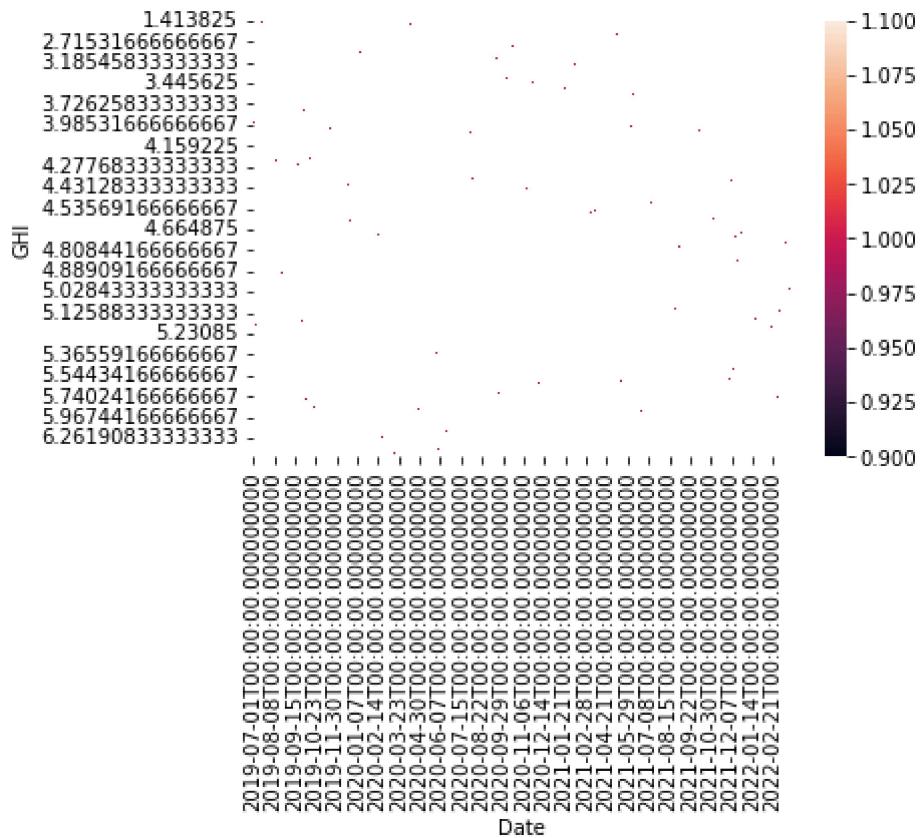
Out[46]:

| Date | 2019-07-01 | 2019-07-02 | 2019-07-03 | 2019-07-04 | 2019-07-05 | 2019-07-06 | 2019-07-07 | 2019-07-08 | 2019-07-09 | 2019-07-10 | ... | 2022-03-15 | 2022-03-16 |
|-----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----|------------|------------|
| GHI | | | | | | | | | | | | | |
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| 1.489100 | NaN | ... | NaN | NaN |
| 1.494692 | NaN | ... | NaN | NaN |
| 1.661192 | NaN | ... | NaN | NaN |
| 1.684283 | NaN | ... | NaN | NaN |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
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| 6.798442 | NaN | ... | NaN | NaN |
| 6.802625 | NaN | ... | NaN | NaN |
| 6.892742 | NaN | ... | NaN | NaN |
| 6.947317 | NaN | ... | NaN | NaN |

982 rows × 982 columns

```
In [47]: solar_data=(df.groupby('GHI').Date.value_counts().unstack())
```

```
In [48]: sns.heatmap(solar_data);
```



In []: