In [1]:

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

In [3]:

```
data = pd.read_csv('Downloads\weatherHistory.csv' , parse_dates = ['Formatted Date'] , inde
```

In [4]:

```
data.head()
```

Out[4]:

Formatted Date	Summary	Precip Type	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visi
2006-04-01 00:00:00+02:00	Partly Cloudy	rain	9.472222	7.388889	0.89	14.1197	251.0	15.
2006-04-01 01:00:00+02:00	Partly Cloudy	rain	9.355556	7.227778	0.86	14.2646	259.0	15.
2006-04-01 02:00:00+02:00	Mostly Cloudy	rain	9.377778	9.377778	0.89	3.9284	204.0	14.
2006-04-01 03:00:00+02:00	Partly Cloudy	rain	8.288889	5.944444	0.83	14.1036	269.0	15.
2006-04-01 04:00:00+02:00	Mostly Cloudy	rain	8.755556	6.977778	0.83	11.0446	259.0	15.

In [5]:

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 96453 entries, 2006-04-01 00:00:00+02:00 to 2016-09-09 23:00:00+02:00
Data columns (total 11 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Summary                   96453 non-null  object 
 1   Precip Type               95936 non-null  object 
 2   Temperature (C)           96453 non-null  float64
 3   Apparent Temperature (C)  96453 non-null  float64
 4   Humidity                  96453 non-null  float64
 5   Wind Speed (km/h)         96453 non-null  float64
 6   Wind Bearing (degrees)    96453 non-null  float64
 7   Visibility (km)           96453 non-null  float64
 8   Loud Cover                96453 non-null  float64
 9   Pressure (millibars)      96453 non-null  float64
 10  Daily Summary             96453 non-null  object 
dtypes: float64(8), object(3)
memory usage: 8.8+ MB
```

In [6]:

```
data.isnull().sum() # there are 517 null columns
```

Out[6]:

```
Summary                       0
Precip Type                 517
Temperature (C)               0
Apparent Temperature (C)      0
Humidity                      0
Wind Speed (km/h)             0
Wind Bearing (degrees)        0
Visibility (km)               0
Loud Cover                    0
Pressure (millibars)          0
Daily Summary                 0
dtype: int64
```

In [7]:

```
new_data = data.dropna() # remove null columns and store it in a new data set
```

In [8]:

```
new_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 95936 entries, 2006-04-01 00:00:00+02:00 to 2016-09-09 23:00:00+02:00
Data columns (total 11 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Summary                   95936 non-null  object 
 1   Precip Type               95936 non-null  object 
 2   Temperature (C)           95936 non-null  float64
 3   Apparent Temperature (C)  95936 non-null  float64
 4   Humidity                  95936 non-null  float64
 5   Wind Speed (km/h)         95936 non-null  float64
 6   Wind Bearing (degrees)    95936 non-null  float64
 7   Visibility (km)           95936 non-null  float64
 8   Loud Cover                95936 non-null  float64
 9   Pressure (millibars)      95936 non-null  float64
 10  Daily Summary             95936 non-null  object 
dtypes: float64(8), object(3)
memory usage: 8.8+ MB
```

In [9]:

```
new_data.describe()
```

Out[9]:

	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	
count	95936.000000	95936.000000	95936.000000	95936.000000	95936.000000	95936.000000	95
mean	11.940976	10.862531	0.734841	10.804936	187.518773	10.362402	
std	9.570671	10.717812	0.195724	6.920727	107.385351	4.173780	
min	-21.822222	-27.716667	0.000000	0.000000	0.000000	0.000000	
25%	4.604167	2.276389	0.600000	5.796000	116.000000	8.372000	
50%	12.033333	12.033333	0.780000	9.933700	180.000000	10.046400	
75%	18.844444	18.844444	0.890000	14.135800	290.000000	14.812000	
max	39.905556	39.344444	1.000000	63.852600	359.000000	16.100000	

In [10]:

```
new_data.index = pd.to_datetime(new_data.index , utc =True)
```

In [11]:

```
resampled_data = new_data.resample('M').mean() # resample accroading to Month end ('M')
```

In [12]:

```
resampled_data.head()
```

Out[12]:

Formatted Date	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Loud Cover
2005-12-31 00:00:00+00:00	0.577778	-4.050000	0.890000	17.114300	140.000000	9.982000	0.0
2006-01-31 00:00:00+00:00	-1.677942	-4.173708	0.834610	8.894211	161.018817	7.894064	0.0
2006-02-28 00:00:00+00:00	-0.065394	-2.990716	0.843467	10.957008	197.886905	7.418794	0.0
2006-03-31 00:00:00+00:00	4.559274	1.969780	0.778737	14.421488	195.059140	9.602590	0.0
2006-04-30 00:00:00+00:00	12.635031	12.098827	0.728625	10.930670	191.877778	10.626760	0.0

In [13]:

```
resampled_data.tail()
```

Out[13]:

Formatted Date	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Loud Cover
2016-08-31 00:00:00+00:00	21.420296	21.383094	0.674046	9.151378	184.563172	13.948140	0.0
2016-09-30 00:00:00+00:00	18.467924	18.355833	0.688833	6.849029	177.738889	13.723260	0.0
2016-10-31 00:00:00+00:00	10.593141	9.825775	0.827951	11.075846	206.046914	9.208206	0.0
2016-11-30 00:00:00+00:00	5.158800	2.860089	0.848847	10.507636	163.690511	8.725824	0.0
2016-12-31 00:00:00+00:00	1.239158	-2.017272	0.887981	11.024860	179.064603	7.460627	0.0

In [14]:

```
resampled_data['month'] = resampled_data.index.month
```

In [15]:

```
resampled_data['year'] = resampled_data.index.year
```

In [16]:

```
resampled_data.head()
```

Out[16]:

Formatted Date	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Loud Cover
2005-12-31 00:00:00+00:00	0.577778	-4.050000	0.890000	17.114300	140.000000	9.982000	0.0
2006-01-31 00:00:00+00:00	-1.677942	-4.173708	0.834610	8.894211	161.018817	7.894064	0.0
2006-02-28 00:00:00+00:00	-0.065394	-2.990716	0.843467	10.957008	197.886905	7.418794	0.0
2006-03-31 00:00:00+00:00	4.559274	1.969780	0.778737	14.421488	195.059140	9.602590	0.0
2006-04-30 00:00:00+00:00	12.635031	12.098827	0.728625	10.930670	191.877778	10.626760	0.0

In [17]:

```
resampled_data.index = resampled_data.index.date
```

In [18]:

```
resampled_data = resampled_data[1:] # remove column with year 2005 column
```

In [19]:

```
resampled_data.head()
```

Out[19]:

	Temperature (C)	Apparent Temperature (C)	Humidity	Wind Speed (km/h)	Wind Bearing (degrees)	Visibility (km)	Loud Cover	Pressu (milliba
2006-01-31	-1.677942	-4.173708	0.834610	8.894211	161.018817	7.894064	0.0	1021.2049
2006-02-28	-0.065394	-2.990716	0.843467	10.957008	197.886905	7.418794	0.0	995.1839
2006-03-31	4.559274	1.969780	0.778737	14.421488	195.059140	9.602590	0.0	976.4362
2006-04-30	12.635031	12.098827	0.728625	10.930670	191.877778	10.626760	0.0	1013.4936
2006-05-31	15.650732	15.539479	0.721801	10.174161	209.310484	11.748066	0.0	1016.6297

In [20]:

```
month_to_month_AT = {}
for month in range(1,13):
    month_to_month_AT[month] = list(resampled_data[resampled_data['month'] == month]['Appar
```

In [21]:

```
title = {1:'Jan',2:'Feb',3:'March',4:'April',5:'May',6:'June',7:'July',8:'Aug',9:'Sep',
         10:'Oct',11:'Nov',12:'Dec'}
def plot_AT_or_Humidity(what_for , month_dict):
    for index in range(1,13):
        t = title[index]
        plt.plot(range(2006,2017),month_dict[index])
        plt.title(what_for + ' for ' +t+' Month')
        plt.show()
```

In [22]:

```
month_to_month_Humidity = {}
for month in range(1,13):
    month_to_month_Humidity[month] = list(resampled_data[resampled_data['month'] == month][
```

In [23]:

```
def find_avg_difference(month_dict):
    difference = []
    for month in range(1,13):
        difference.append(np.mean(month_dict[month]))
    return difference
```

In [24]:

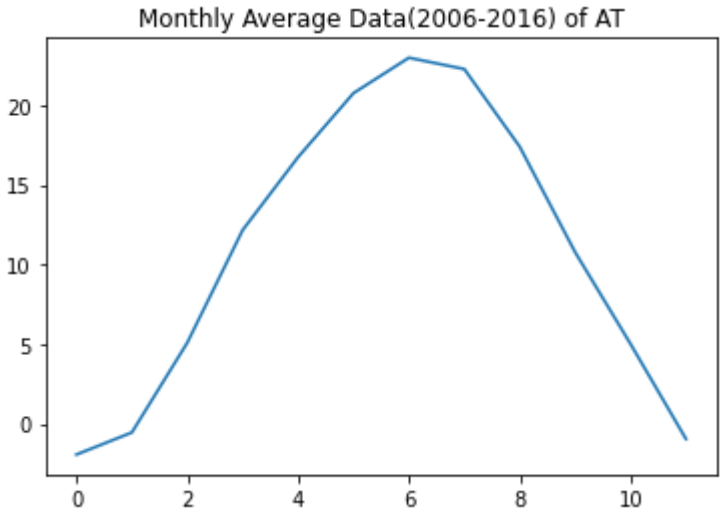
```
AT_difference_monthly = find_avg_difference(month_to_month_AT)
Humidity_difference_monthly = find_avg_difference(month_to_month_Humidity)
```

In [25]:

```
plt.plot(AT_difference_monthly)
plt.title('Monthly Average Data(2006-2016) of AT')
```

Out[25]:

```
Text(0.5, 1.0, 'Monthly Average Data(2006-2016) of AT')
```

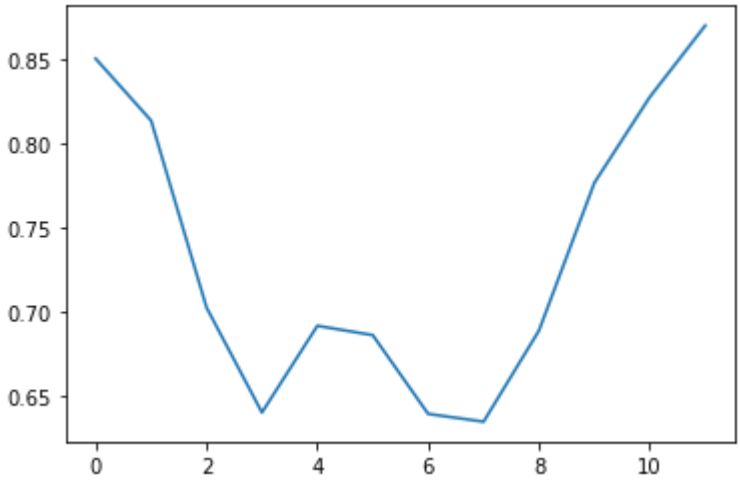


In [26]:

```
plt.plot(Humidity_difference_monthly)
```

Out[26]:

```
[<matplotlib.lines.Line2D at 0x1dda78c3310>]
```



In [27]:

```
new_data.index = new_data.index.date
```

In [28]:

```
new_data.index = pd.DatetimeIndex(new_data.index)
```

In [29]:

```
pd.options.mode.chained_assignment = None
```

In [30]:

```
new_data['month'] = new_data.index.month
new_data['year'] = new_data.index.year
```

In [31]:

```
def find_average_monthly_AT_or_Humidity(what_for):
    avg_data_tempreature_monthly = {}
    for year in range(2006,2017):
        for month in range(1,13):
            result = list(new_data.loc[(new_data['month'] == month)&(new_data['year']==year
            if month not in avg_data_tempreature_monthly:
                avg_data_tempreature_monthly[month] = [np.mean(result)]
            else:
                avg_data_tempreature_monthly[month].append(np.mean(result))
    return avg_data_tempreature_monthly
```

In [32]:

```
AT_monthly_average = find_average_monthly_AT_or_Humidity('Apparent Temperature (C)')
Humidity_monthly_average = find_average_monthly_AT_or_Humidity('Humidity')
```

In [33]:

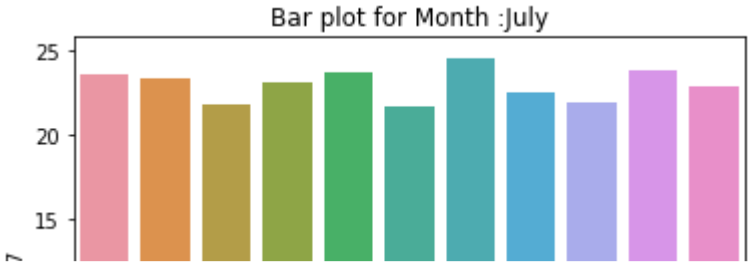
```
AT = pd.DataFrame(AT_monthly_average)
AT['year'] = range(2006,2017)
```

In [34]:

```
H = pd.DataFrame(Humidity_monthly_average)
H['year'] = range(2006,2017)
```

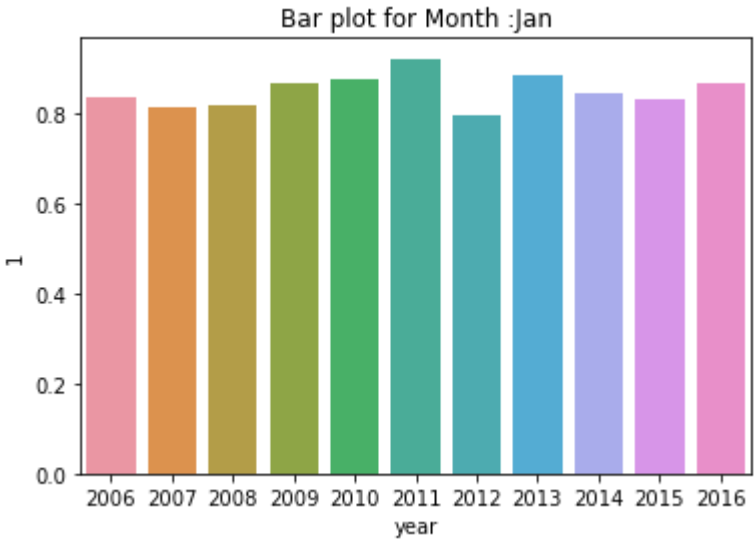
In [35]:

```
for month in range(1,13):
    sns.barplot(x = AT['year'] , y = AT[month])

    plt.title('Bar plot for Month :' + title[month])
    plt.show()
```



In [36]:

```
for month in range(1,13):
    sns.barplot(x = H['year'] , y = H[month])

    plt.title('Bar plot for Month :' + title[month])
    plt.show()
```

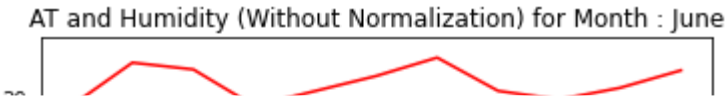


In [37]:

```
def plot_Humidty_and_AT():
    for month in range(1,12):
        plt.plot(range(2006,2017),AT_monthly_average[month] , label = 'AT' , color = 'red')
        plt.plot(range(2006,2017),Humidity_monthly_average[month] , label = 'Humidity')
        plt.legend()
        plt.title('AT and Humidity (Without Normalization) for Month : '+ title[month])
        plt.show()
```

In [38]:

```
plot_Humidty_and_AT()
```



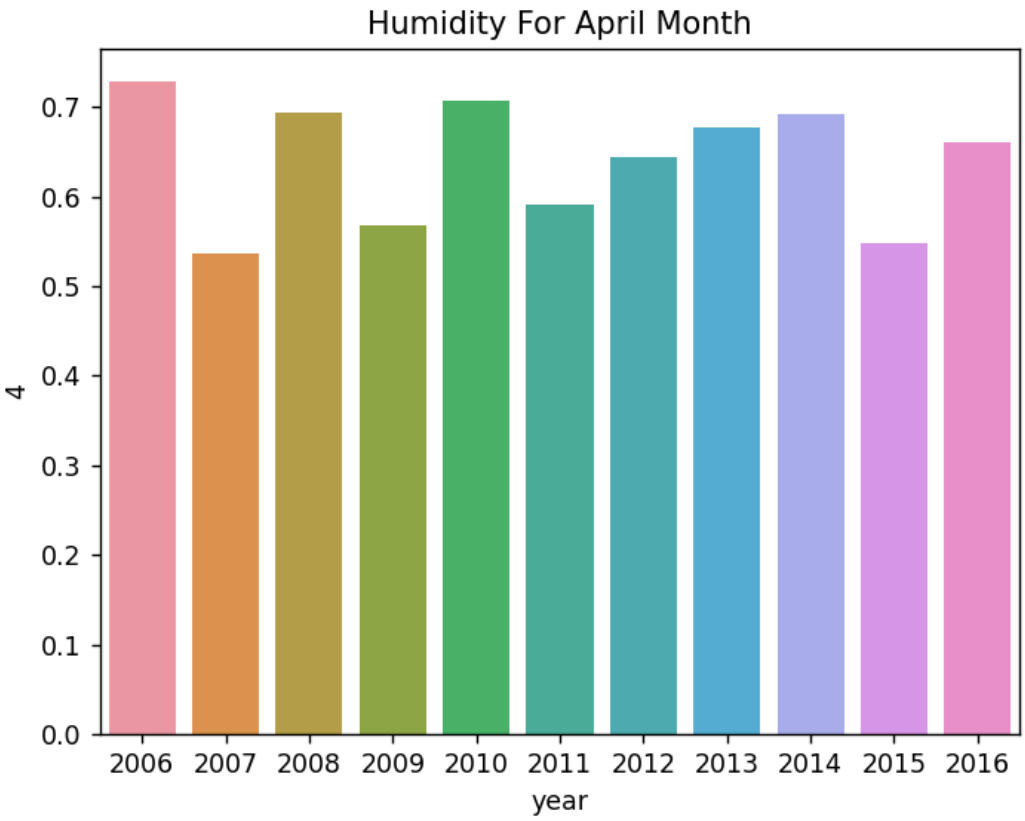
In [41]:

```
%matplotlib notebook
```

In [42]:

```
sns.barplot(H['year'] , H[4])
plt.title('Humidity For April Month')
plt.show()
```

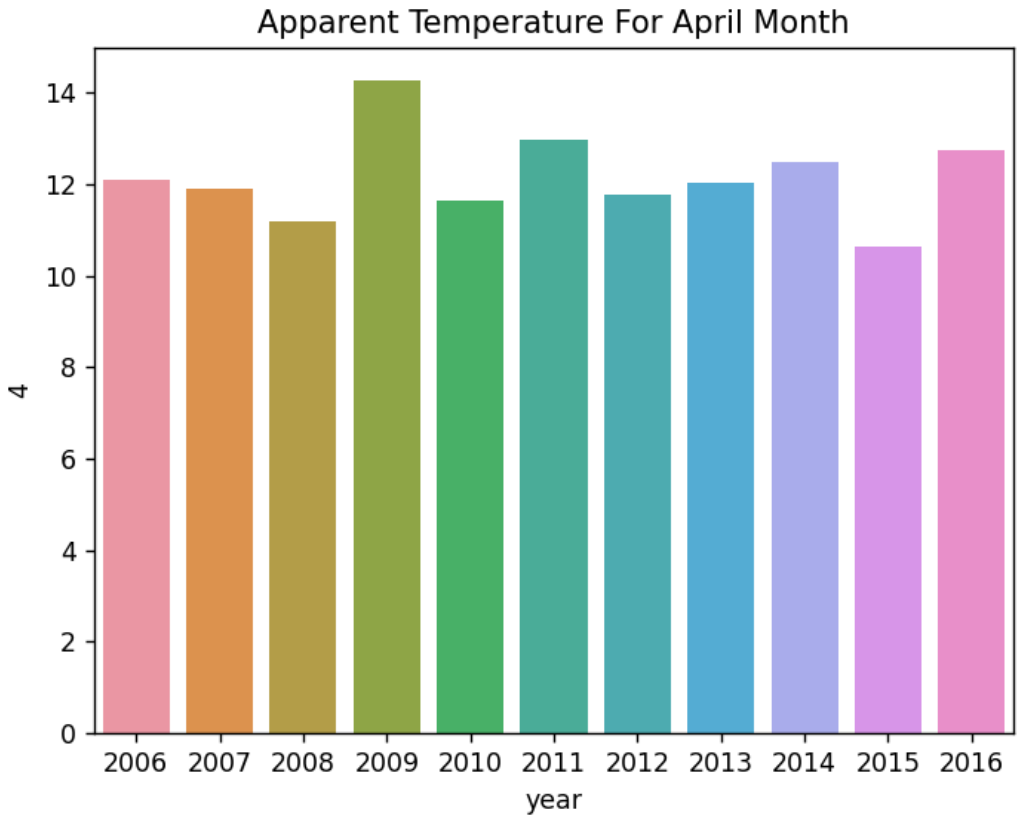
```
C:\Users\Sameeksha Vishwakarm\ML\lib\site-packages\seaborn\_decorators.py:3
6: FutureWarning: Pass the following variables as keyword args: x, y. From v
ersion 0.12, the only valid positional argument will be `data`, and passing
other arguments without an explicit keyword will result in an error or misin
terpretation.
  warnings.warn(
```



In [43]:

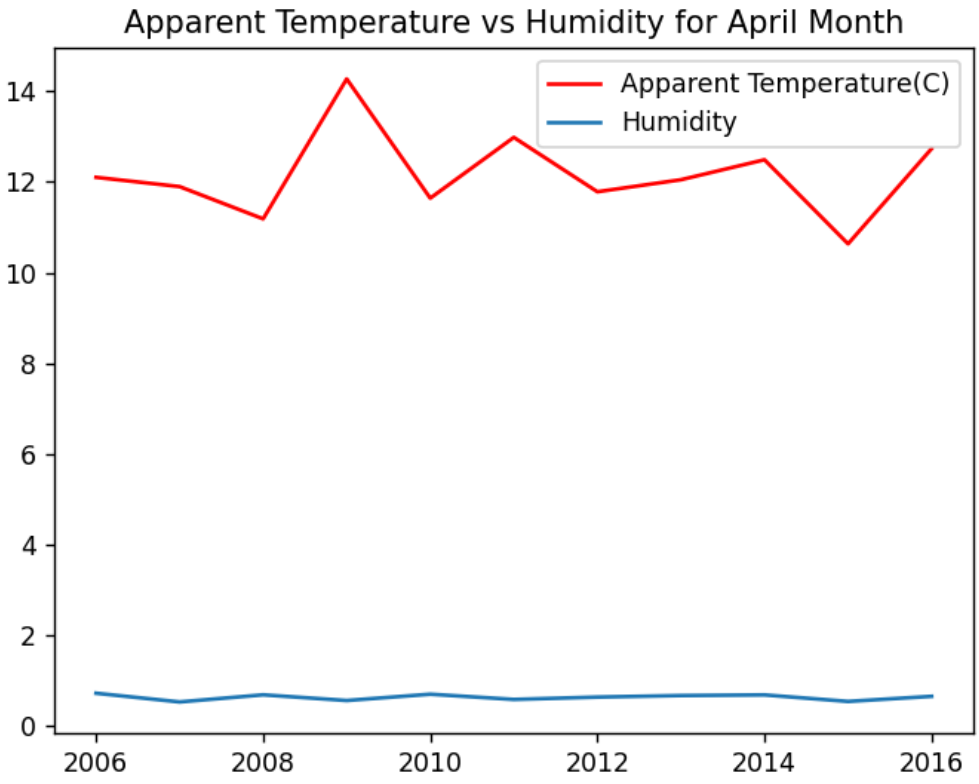
```
sns.barplot(AT['year'] , AT[4])
plt.title('Apparent Temperature For April Month')
plt.show()
```

```
C:\Users\Sameeksha Vishwakarm\ML\lib\site-packages\seaborn\_decorators.py:3
6: FutureWarning: Pass the following variables as keyword args: x, y. From v
ersion 0.12, the only valid positional argument will be `data`, and passing
other arguments without an explicit keyword will result in an error or misin
terpretation.
  warnings.warn(
```



In [44]:

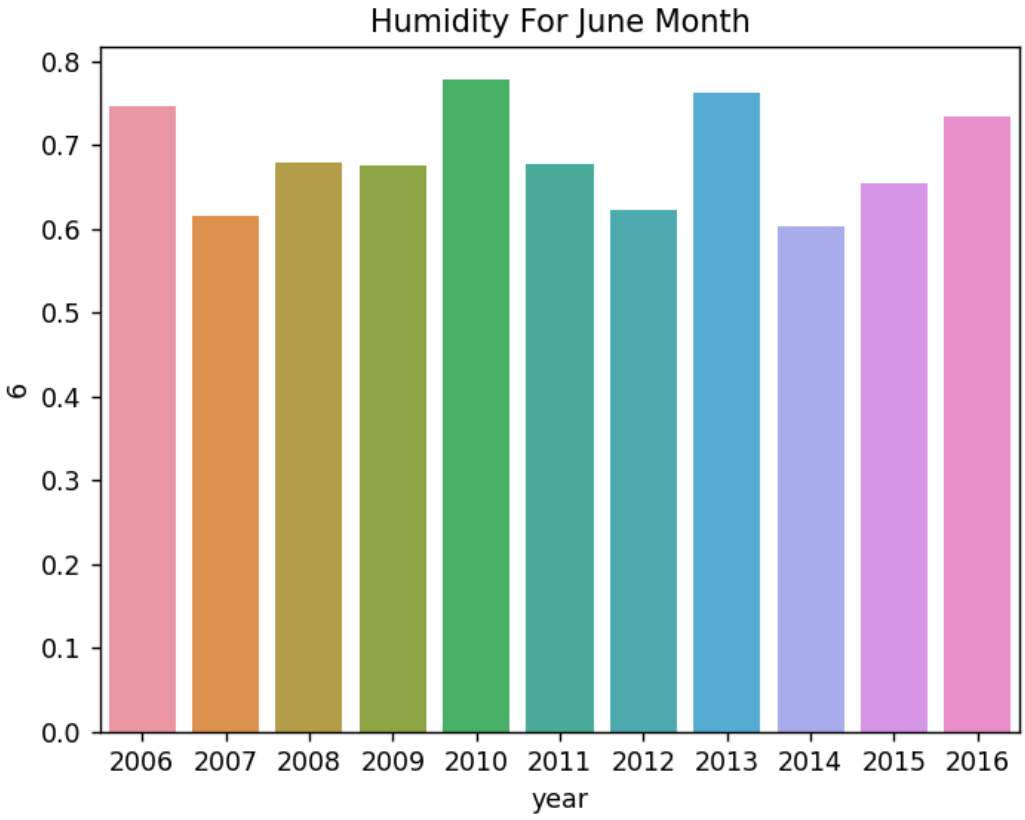
```
plt.plot(range(2006,2017),AT_monthly_average[4] , label = 'Apparent Temperature(C)' , color
plt.plot(range(2006,2017),Humidity_monthly_average[4] , label = 'Humidity')
plt.legend()
plt.title('Apparent Temperature vs Humidity for April Month')
plt.show()
```



In [45]:

```
sns.barplot(H['year'] , H[6])
plt.title('Humidity For June Month')
plt.show()
```

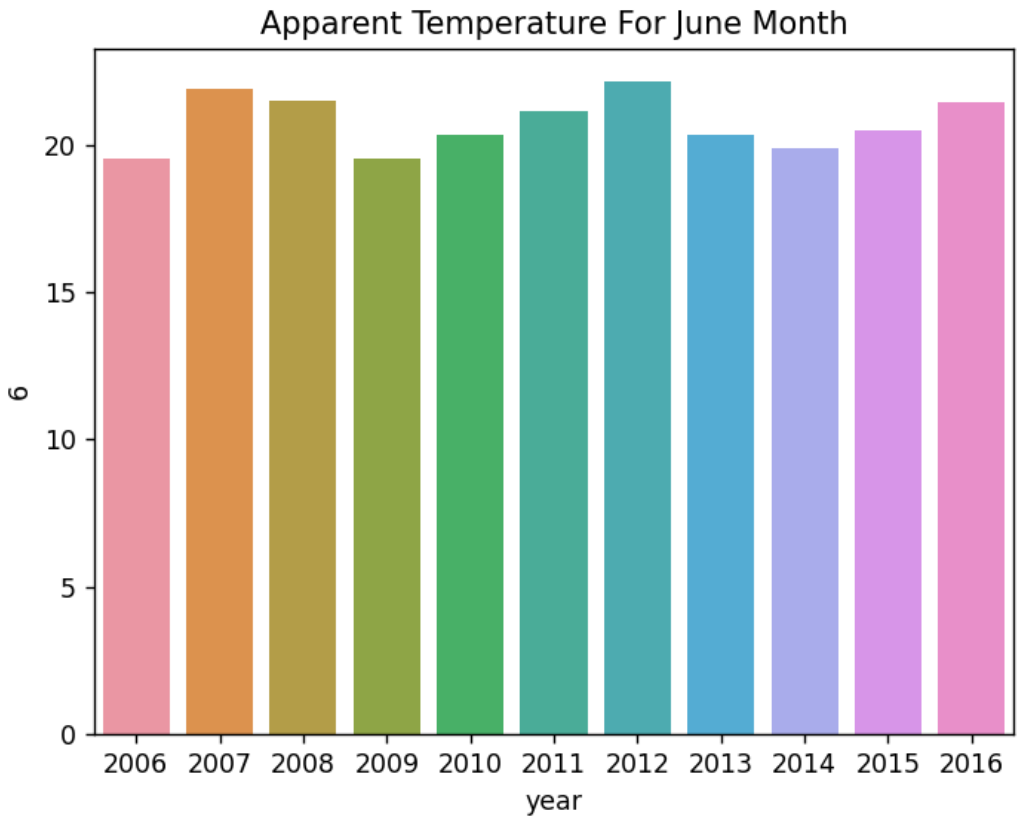
```
C:\Users\Sameeksha Vishwakarm\ML\lib\site-packages\seaborn\_decorators.py:3
6: FutureWarning: Pass the following variables as keyword args: x, y. From v
ersion 0.12, the only valid positional argument will be `data`, and passing
other arguments without an explicit keyword will result in an error or misin
terpretation.
  warnings.warn(
```



In [46]:

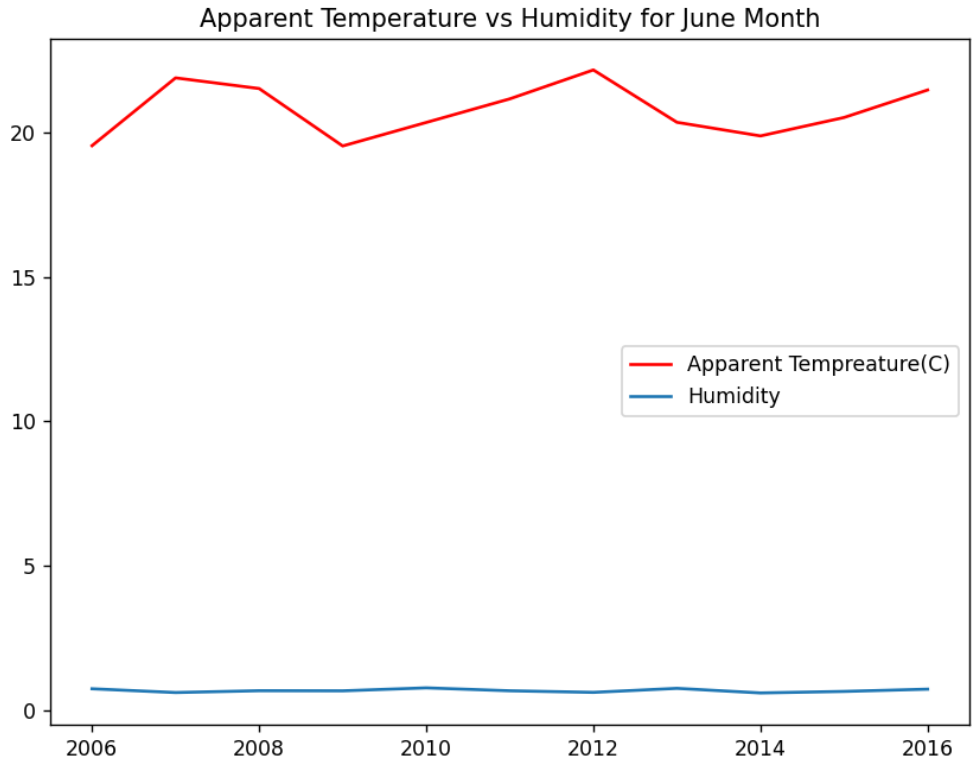
```
sns.barplot(AT['year'] , AT[6])
plt.title('Apparent Temperature For June Month')
plt.show()
```

```
C:\Users\Sameeksha Vishwakarm\ML\lib\site-packages\seaborn\_decorators.py:3
6: FutureWarning: Pass the following variables as keyword args: x, y. From v
ersion 0.12, the only valid positional argument will be `data`, and passing
other arguments without an explicit keyword will result in an error or misin
terpretation.
  warnings.warn(
```



In [47]:

```
plt.plot(range(2006,2017),AT_monthly_average[6] , label = 'Apparent Tempreature(C)' , color
plt.plot(range(2006,2017),Humidity_monthly_average[6] , label = 'Humidity')
plt.legend()
plt.title('Apparent Temperature vs Humidity for June Month')
plt.show()
```



In [48]:

```
print("Completed by Sameeksha Vishwakarma")
```

```
Completed by Sameeksha Vishwakarma
```

In [ ]:

```

```