hwk3

November 3, 2018

0.1 Homework 3 Yuqi(Peggy) Cao

This jupyter notebook is presented for MUSI 6001 homework 3. I use python and write it in jupyter notebook

1) I use the pandas library to parse the csv file and import as a dataframe called "df".

```
In [1]: import pandas


        from IPython.display import HTML, display

        df = pandas.read_csv('airquality.csv', header=0,
                names=['No.','Ozone',  'Solar.R',  'Wind',  'Temp',  'Month',  'Day'])
        # print(df)
```

2) Then I used pandas library's functions to calcuate the mean, median, and mode for the wind speed and temperature variables.

```
In [2]: mean_windspeed = df['Wind'].mean() # calculates the average of values under "Wind"
        mean_temp = df['Temp'].mean() # calculates the average of values under "Temp"
        median_windspeed = df['Wind'].median()
        median_temp = df['Temp'].median()
        mode_windspeed = df['Wind'].mode()
        mode_temp = df['Temp'].mode()
        # print(mode_windspeed[0])
        # print(mode_temp[0])
```

Then I wrote those data as a table and print those out in pandas 's dataframe format

```
In [3]: table = [
        [mean_windspeed, mean_temp],
        [median_windspeed, median_temp],
        [str.format('{0:.2f}', mode_windspeed[0]), str.format('{0:.2f}', mode_temp[0])]
        ]

        pandas.DataFrame(table, columns=["Wind speed", "Temperature"],
                         index=["Mean", "Median", "Mode"])
```

```
Out[3]:        Wind speed Temperature
        Mean      9.95752     77.8824
        Median        9.7          79
        Mode        11.50       81.00
```

3) I use the matplotlib to plot those two plots

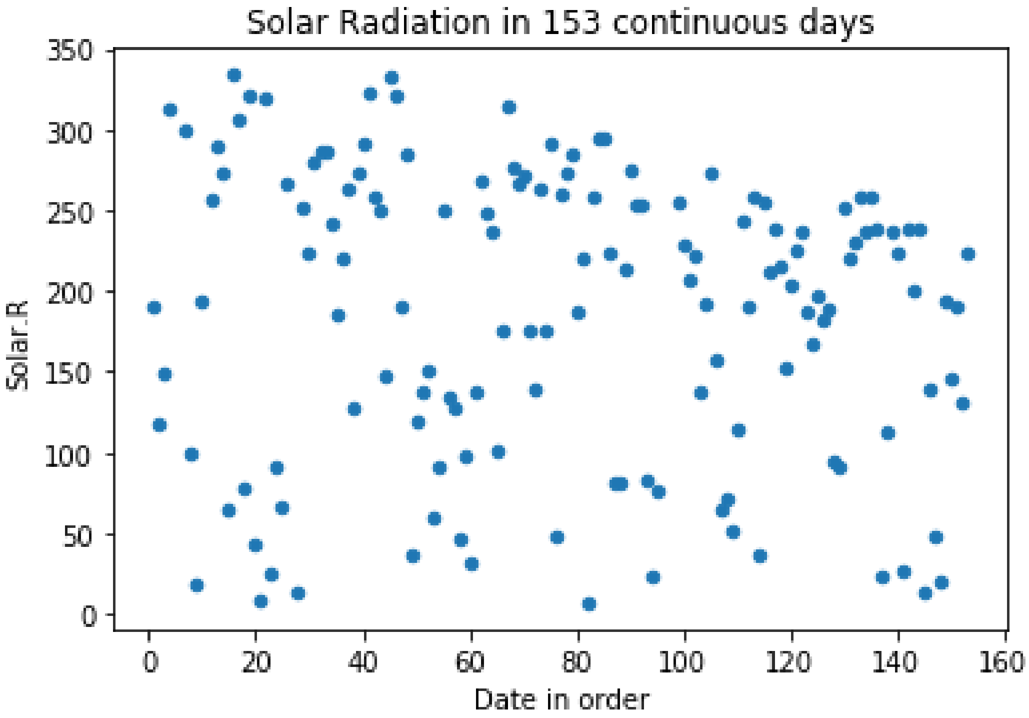
```
In [4]: import matplotlib.pyplot as plt
        import numpy as np
        # xxx = np.arange(1, 154, 1)
        # print xxx

        plot1 = df.plot(kind='scatter',x='No.',y='Solar.R',
                        title='Solar Radiation in 153 continuous days')
        plot1.set_xlabel("Date in order")

Out[4]: Text(0.5,0,u'Date in order')

In [5]: plot2 = df.plot(kind='scatter',x='No.',y='Temp',
                        title='Temperature in 153 continuous days')
        plot2.set_xlabel("Date in order")

Out[5]: Text(0.5,0,u'Date in order')
```



It seems that the temperature is closer to resembling a normal distribution

4) I used pandas 's functions to calculate the mean, the range (i.e., maximum and minimum values), and the standard deviation of the ozone values. Then simply print them out

```
In [6]: mean1 = df['Ozone'].mean()
        max1 = df['Ozone'].max() # calculates the max of all values under the Salary column
        min1 = df['Ozone'].min()
        std1 = df['Ozone'].std ()
        print("mean: " + str.format('{0:.4f}', mean1))
        range = (min1, max1)
        print("range: " + str(range))
        print("standard deviation: " + str.format('{0:.4f}', std1))
```

```
mean: 42.1293
range: (1.0, 168.0)
standard deviation: 32.9879
```

5) First, I calculate the range of 2 standard deviations of the mean

```
In [7]: min_s = mean1 - std1 * 2
        max_s = mean1 + std1 * 2
        print min_s, max_s
```

```
-23.846458684 108.105079374
```

Then I iterate through the column of Ozone to count how many data is in this range. Then calculate the percent of it.

```
In [8]: count = 0
        rows = df['Ozone']
        for row in rows:
            if min_s<=row<= max_s:
                count +=1
        ans = count/153.0
        print ans
```

```
0.718954248366
```

There's only 71.90% of the data fit within 2 standard deviations

6) In order to calculate the lowest temperature in May, I first group the dataframe with "Month" = 5, then use build-in function from pandas library to find the lowest temperature

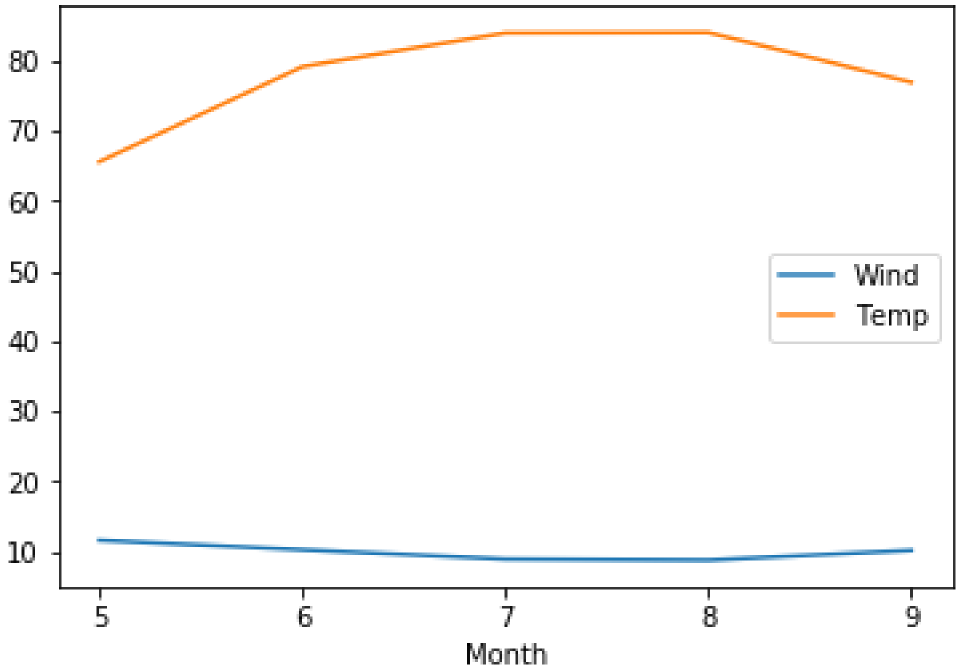
```
In [9]: is5 = df['Month']==5
        newgroup = df[is5]
        # print newgroup
        print newgroup['Temp'].min()
```

56

7) I group the original data by Month and calculate mean value of colunn "Wind" and "Temp". Then plot them in the same figure with xticks well-setted.

```
In [10]: mean_w = df.groupby('Month')['Wind','Temp'].mean()
         # mean_t = df.groupby('Month')['Temp'].mean()
         new_plot = mean_w.plot(legend=True)
         new_plot.set_xticks(mean_w.index)
         print mean_w
         # mean_w.plot(x='Month', y=['Wind', 'Temp'])
```

```
            Wind       Temp
Month
5      11.622581  65.548387
6      10.266667  79.100000
7       8.941935  83.903226
8       8.793548  83.967742
9      10.180000  76.900000
```


Month
Wind
Temp