数据预处理-2

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作业3

一些额外的**Trick:**

- 比如想要产生新的一列来统计同一时间内所有地方的PM指数和 df['sumOfPM']=df['PM_US_POST']+df['PM_Nongzhanguan']+df['PM_Dongsi']+df['PM_Dongsihuan']

- 比如想要按照某一列排序,升序 def top(df,n=5,colunm='PRES'): return df.sort_values(by=column)[-n:]

- apply函数是pandas里面所有函数中自由度最高的函数。该函数如下： DataFrame.apply(func, axis=0, broadcast=False, raw=False...) 该函数最有用的是第一个参数，这个参数是函数，相当于C/C++的函数指针。

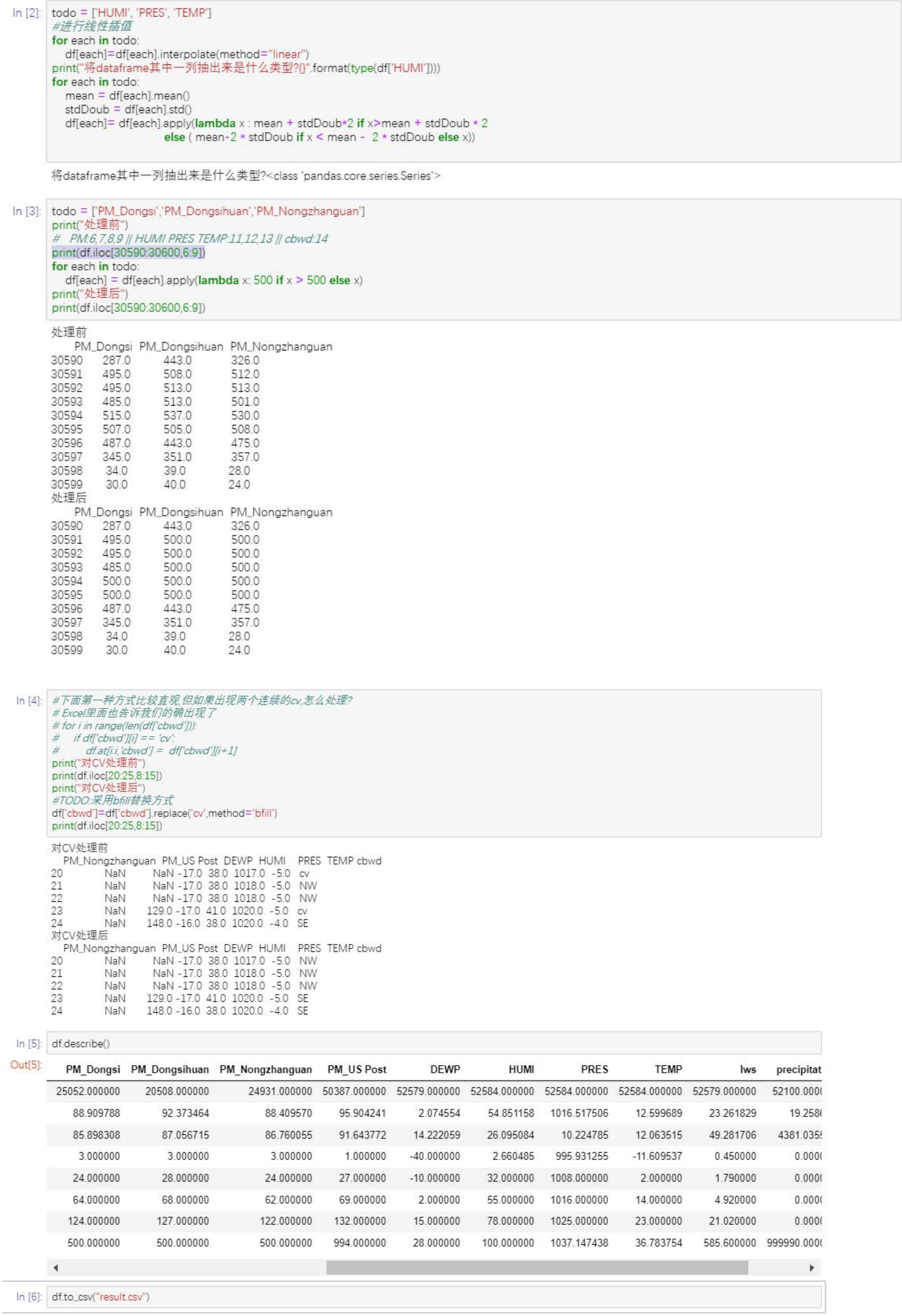
- 这次预处理实验和上次预处理实验后,我明显感受到直接按列操作比遍历每一个csv中的cell效率高得多,减小了IO时间

```
import numpy as np
import pandas as pd
import time
import matplotlib.pyplot as plt

df = pd.read_csv("BeijingPM20100101_20151231.csv",encoding='utf-8')
df.describe()
```

Out[1]:

PM_Dongsi	PM_Dongsihuan	PM_Nongzhanguan	PM_US Post	DEWP	HUMI	PRES	TEMP	Iws	precipitatio
25052.000000	20508.000000	24931.000000	50387.000000	52579.000000	52245.000000	52245.000000	52579.000000	52579.000000	52100.00000
89.154439	92.560806	88.643737	95.904241	2.074554	54.602421	1016.465442	12.587040	23.261829	19.25868
87.239267	88.027434	88.041166	91.643772	14.222059	25.991338	10.295070	12.098527	49.281706	4381.03553
3.000000	3.000000	3.000000	1.000000	-40.000000	2.000000	991.000000	-19.000000	0.450000	0.00000
24.000000	28.000000	24.000000	27.000000	-10.000000	31.000000	1008.000000	2.000000	1.790000	0.00000
64.000000	68.000000	62.000000	69.000000	2.000000	55.000000	1016.000000	14.000000	4.920000	0.00000
124.000000	127.000000	122.000000	132.000000	15.000000	78.000000	1025.000000	23.000000	21.020000	0.00000
737.000000	672.000000	844.000000	994.000000	28.000000	100.000000	1046.000000	42.000000	585.600000	999990.00000



In [2]:

```
todo = ['HUMI', 'PRES', 'TEMP']
#进行线性插值
for each in todo:
    df[each]=df[each].interpolate(method="linear")
print("将dataframe其中一列抽出来是什么类型?{}".format(type(df['HUMI'])))
for each in todo:
    mean = df[each].mean()
    stdDoub = df[each].std()
    df[each]= df[each].apply(lambda x : mean + stdDoub*2 if x>mean + stdDoub * 2
                            else ( mean-2 * stdDoub if x < mean -  2 * stdDoub else x))
```

```
将dataframe其中一列抽出来是什么类型?<class 'pandas.core.series.Series'>
```

In [3]:

```
todo = ['PM_Dongsi','PM_Dongsihuan','PM_Nongzhanguan']
print("处理前")
#   PM:6,7,8,9 || HUMI PRES TEMP:11,12,13 || cbwd:14
print(df.iloc[30590:30600,6:9])
for each in todo:
    df[each] = df[each].apply(lambda x: 500 if x > 500 else x)
print("处理后")
print(df.iloc[30590:30600,6:9])
```

```
处理前
      PM_Dongsi  PM_Dongsihuan  PM_Nongzhanguan
30590      287.0          443.0            326.0
30591      495.0          508.0            512.0
30592      495.0          513.0            513.0
30593      485.0          513.0            501.0
30594      515.0          537.0            530.0
30595      507.0          505.0            508.0
30596      487.0          443.0            475.0
30597      345.0          351.0            357.0
30598       34.0           39.0             28.0
30599       30.0           40.0             24.0
处理后
      PM_Dongsi  PM_Dongsihuan  PM_Nongzhanguan
30590      287.0          443.0            326.0
30591      495.0          500.0            500.0
30592      495.0          500.0            500.0
30593      485.0          500.0            500.0
30594      500.0          500.0            500.0
30595      500.0          500.0            500.0
30596      487.0          443.0            475.0
30597      345.0          351.0            357.0
30598       34.0           39.0             28.0
30599       30.0           40.0             24.0
```

In [4]:

```
#下面第一种方式比较直观,但如果出现两个连续的cv,怎么处理?
# Excel里面也告诉我们的确出现了
# for i in range(len(df['cbwd'])):
#     if df['cbwd'][i] == 'cv':
#         df.at[i:i,'cbwd'] =  df['cbwd'][i+1]
print("对CV处理前")
print(df.iloc[20:25,8:15])
print("对CV处理后")
#TODO:采用bfill替换方式
df['cbwd']=df['cbwd'].replace('cv',method='bfill')
print(df.iloc[20:25,8:15])
```

```
对CV处理前
   PM_Nongzhanguan  PM_US Post  DEWP  HUMI    PRES  TEMP cbwd
20             NaN         NaN -17.0  38.0  1017.0  -5.0   cv
21             NaN         NaN -17.0  38.0  1018.0  -5.0   NW
22             NaN         NaN -17.0  38.0  1018.0  -5.0   NW
23             NaN       129.0 -17.0  41.0  1020.0  -5.0   cv
24             NaN       148.0 -16.0  38.0  1020.0  -4.0   SE
对CV处理后
   PM_Nongzhanguan  PM_US Post  DEWP  HUMI    PRES  TEMP cbwd
20             NaN         NaN -17.0  38.0  1017.0  -5.0   NW
21             NaN         NaN -17.0  38.0  1018.0  -5.0   NW
22             NaN         NaN -17.0  38.0  1018.0  -5.0   NW
23             NaN       129.0 -17.0  41.0  1020.0  -5.0   SE
24             NaN       148.0 -16.0  38.0  1020.0  -4.0   SE
```

In [5]:

```
df.describe()
```

Out[5]:

PM_Dongsi	PM_Dongsihuan	PM_Nongzhanguan	PM_US Post	DEWP	HUMI	PRES	TEMP	Iws	precipitat
25052.000000	20508.000000	24931.000000	50387.000000	52579.000000	52584.000000	52584.000000	52584.000000	52579.000000	52100.000
88.909788	92.373464	88.409570	95.904241	2.074554	54.851158	1016.517506	12.599689	23.261829	19.258
85.898308	87.056715	86.760055	91.643772	14.222059	26.095084	10.224785	12.063515	49.281706	4381.035
3.000000	3.000000	3.000000	1.000000	-40.000000	2.660485	995.931255	-11.609537	0.450000	0.000
24.000000	28.000000	24.000000	27.000000	-10.000000	32.000000	1008.000000	2.000000	1.790000	0.000
64.000000	68.000000	62.000000	69.000000	2.000000	55.000000	1016.000000	14.000000	4.920000	0.000
124.000000	127.000000	122.000000	132.000000	15.000000	78.000000	1025.000000	23.000000	21.020000	0.000
500.000000	500.000000	500.000000	994.000000	28.000000	100.000000	1037.147438	36.783754	585.600000	999990.000

In [6]:

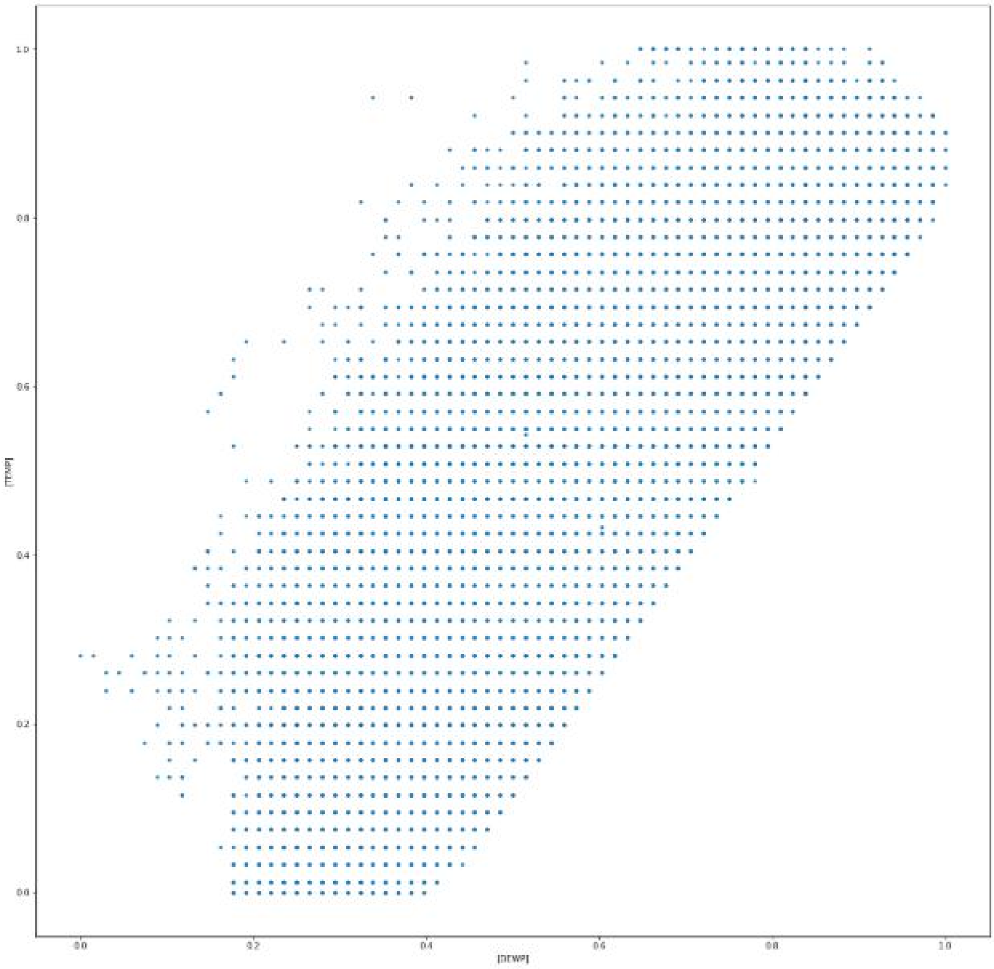
```
df.to_csv("result.csv")
```

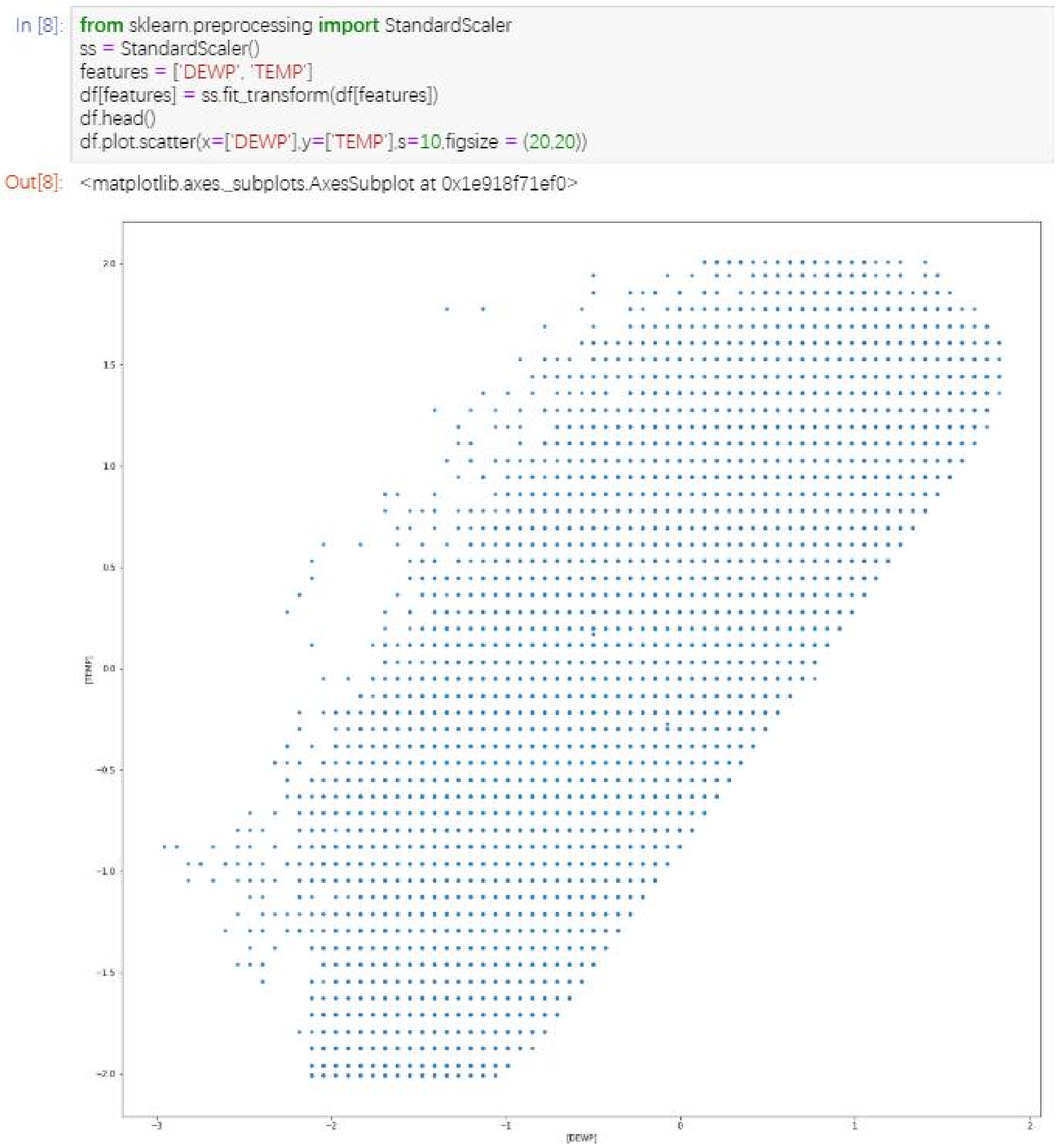
比较前后的描述信息,可以较为明显地看出有关标准差采取的措施带来的改变

作业4

In [7]:
```
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
features = ['DEWP', 'TEMP']
df[features] = scaler.fit_transform(df[features])
df.head()
df.plot.scatter(x=['DEWP'],y=['TEMP'],s=10,figsize = (20,20))
```

Out[7]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1e91b7291d0>
```

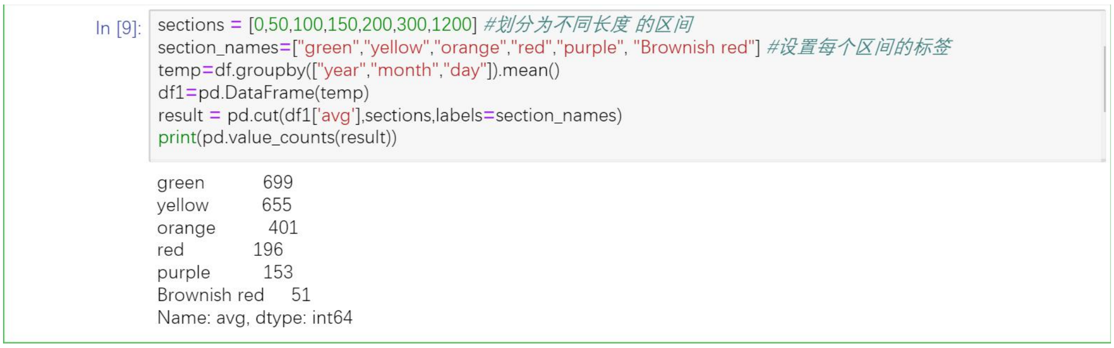




```
In [8]: from sklearn.preprocessing import StandardScaler
        ss = StandardScaler()
        features = ['DEWP', 'TEMP']
        df[features] = ss.fit_transform(df[features])
        df.head()
        df.plot.scatter(x=['DEWP'],y=['TEMP'],s=10,figsize = (20,20))

Out[8]: <matplotlib.axes._subplots.AxesSubplot at 0x1e918f71ef0>
```

以下是我们实现的按天分类统计,这里之前没注意到题目的需求,也这学期也没学数据库,做的时候的确有点烧脑.



```
In [9]: sections = [0,50,100,150,200,300,1200] #划分为不同长度 的区间
        section_names=["green","yellow","orange","red","purple", "Brownish red"] #设置每个区间的标签
        temp=df.groupby(["year","month","day"]).mean()
        df1=pd.DataFrame(temp)
        result = pd.cut(df1['avg'],sections,labels=section_names)
        print(pd.value_counts(result))

        green          699
        yellow         655
        orange         401
        red            196
        purple         153
        Brownish red    51
        Name: avg, dtype: int64
```