Data Preprocessing(screen shots)

Importing libaries ,Reading Dataset.Analyse the data

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Importing libraries

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

Reading Dataset

In [5]:
```
data = pd.read_csv('water_dataX.csv',encoding='ISO-8859-1',low_memory=False)
```

Analyse the data

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

Out[6]:

	STATION CODE	LOCATIONS	STATE	Temp	D.O. (mg/l)	PH	CONDUCTIVITY (µmhos/cm)	B.O.D. (mg/l)	NITRATENAN N+ NITRITENANN (mg/l)	FECAL COLIFORM (MPN/100ml)	TOTAL COLIFORM (MPN/100ml)Mean	year
0	1393	DAMANGANGA AT D/S OF MADHUBAN, DAMAN	DAMAN & DIU	30.6	6.7	7.5	203	NAN	0.1	11	27	2014
1	1399	ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANAL JOI...	GOA	29.8	5.7	7.2	189	2	0.2	4953	8391	2014
2	1475	ZUARI AT PANCHAWADI	GOA	29.5	6.3	6.9	179	1.7	0.1	3243	5330	2014

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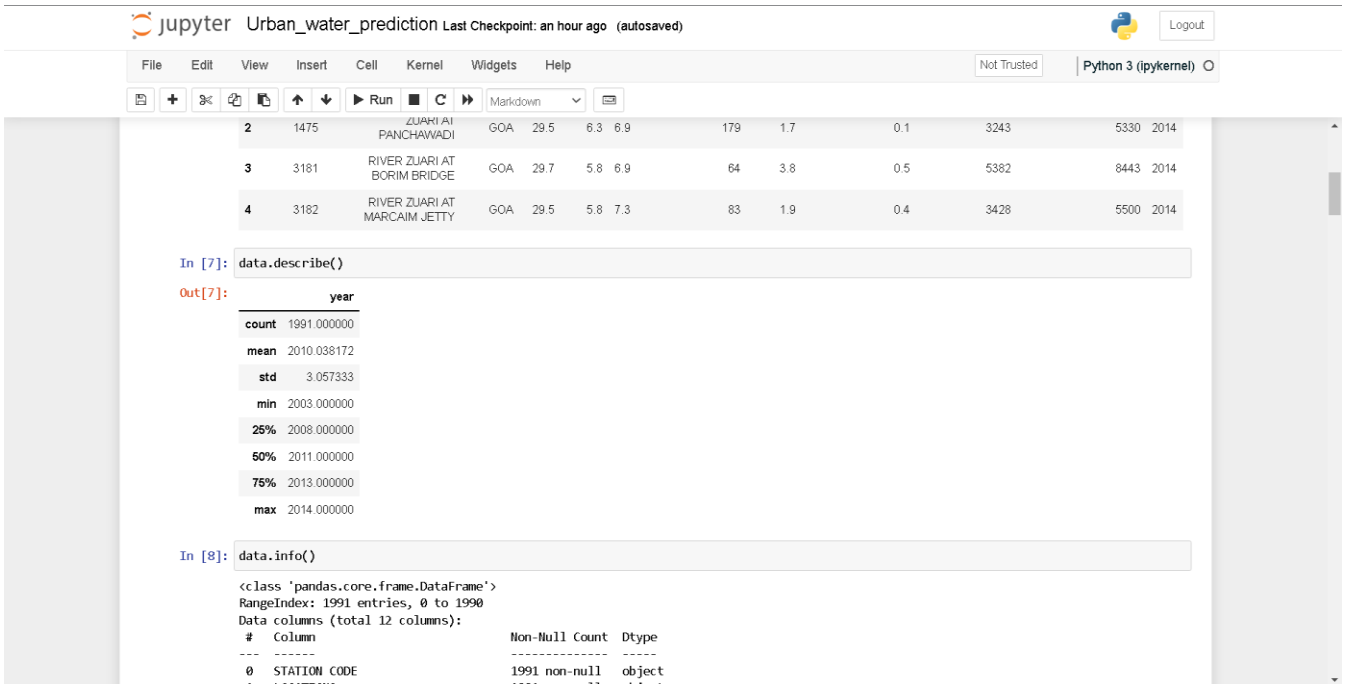
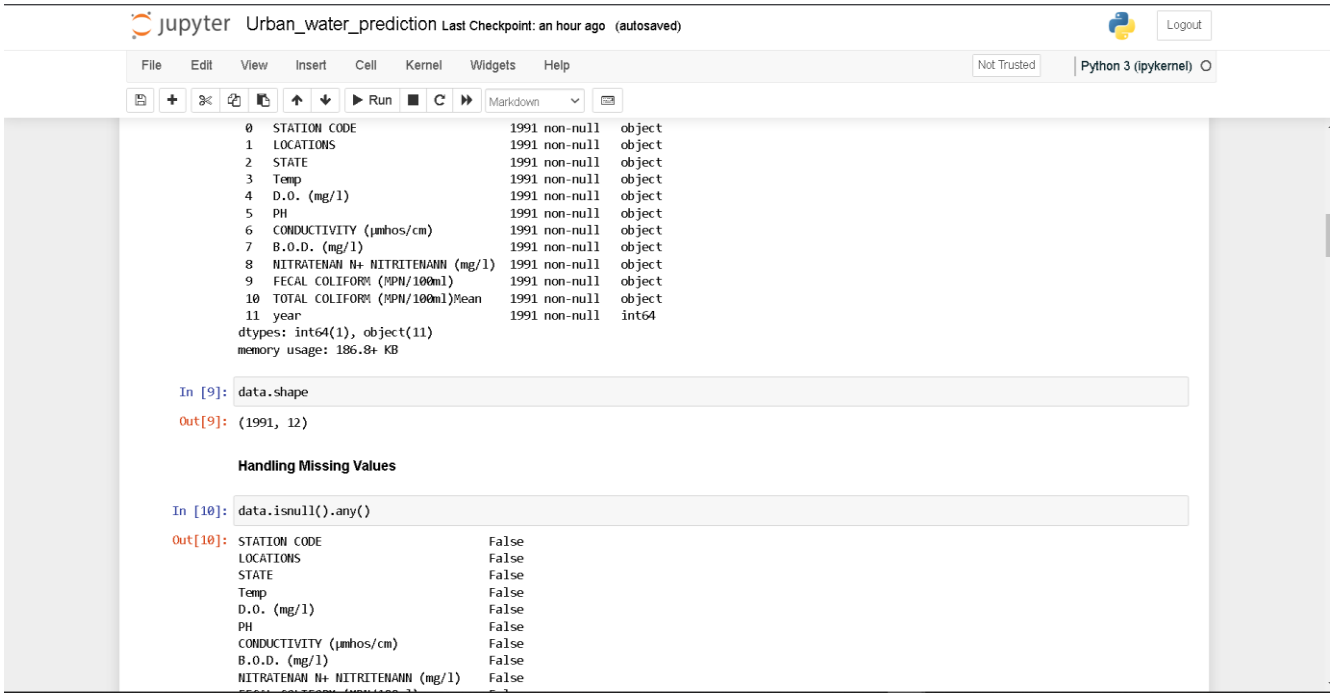
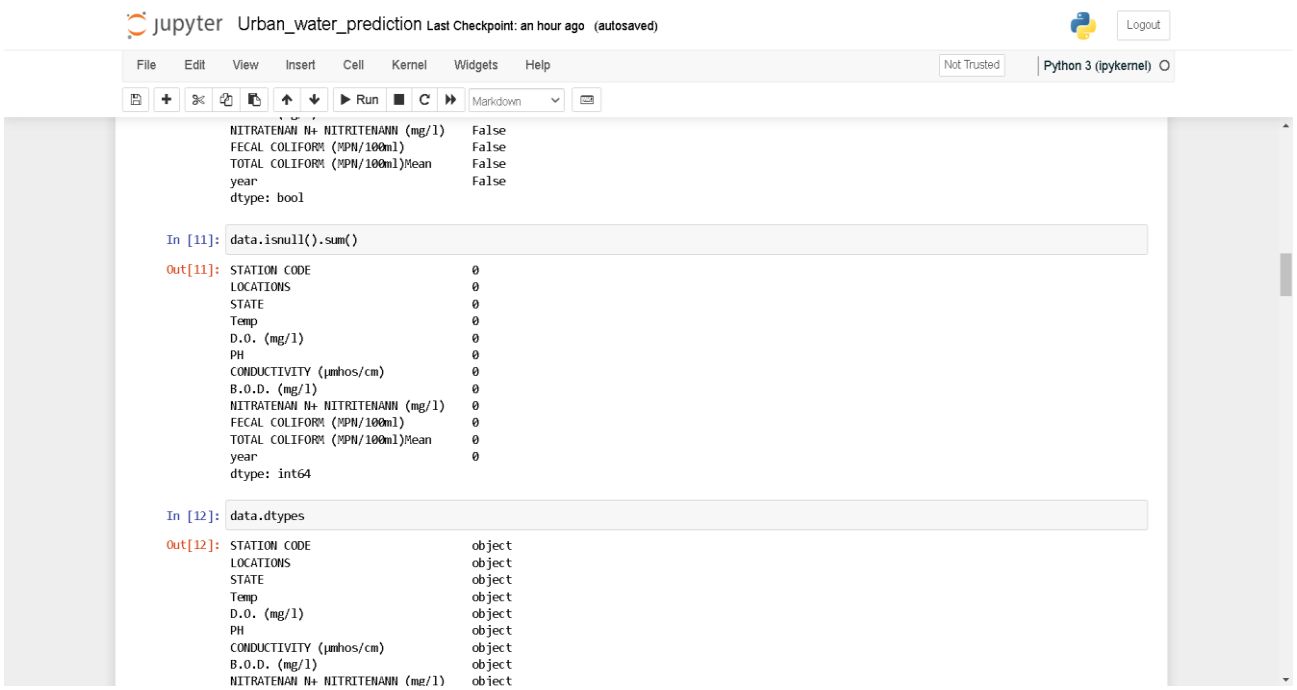
Out[24]:

	station	location	state	Temp	do	ph	co	bod	na	tc	...	nbdo	nec	nna	wph	wdo	wbdo	wec	wna	wco	
0	1393	DAMANGANGA AT D/S OF MADHUBAN, DAMAN	DAMAN & DIU	30.600000	6.7	7.5	203.0	6.940049	0.100000	27.0	...	60	60	100	16.5	28.10	14.04	0.54	2.8	22.48	84
1	1399	ZUARI AT D/S OF PT. WHERE KUMBARJRIA CANAL JOI...	GOA	29.800000	5.7	7.2	189.0	2.000000	0.200000	8391.0	...	100	60	100	16.5	22.48	23.40	0.54	2.8	11.24	76
2	1475	ZUARI AT PANCHAWADI	GOA	29.500000	6.3	6.9	179.0	1.700000	0.100000	5330.0	...	100	60	100	13.2	28.10	23.40	0.54	2.8	11.24	79
3	3181	RIVER ZUARI AT BORIM BRIDGE	GOA	29.700000	5.8	6.9	64.0	3.800000	0.500000	8443.0	...	80	100	100	13.2	22.48	18.72	0.90	2.8	11.24	66
4	3182	RIVER ZUARI AT MARCAIM JETTY	GOA	29.500000	5.8	7.3	83.0	1.900000	0.400000	5500.0	...	100	80	100	16.5	22.48	23.40	0.72	2.8	11.24	77
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
1986	1330	TAMBIRAPARANI AT ARUMUGANERI, TAMILNADU	NAN	26.209814	7.9	738.0	7.2	2.700000	0.518000	202.0	...	100	100	100	0.0	28.10	23.40	0.90	2.8	16.86	72
1987	1450	PALAR AT VANIYAMBADI WATER SUPPLY HEAD WORK, T...	NAN	29.000000	7.5	585.0	6.3	2.600000	0.155000	315.0	...	100	100	100	0.0	28.10	23.40	0.90	2.8	16.86	72
1988	1403	GUMTI AT U/S SOUTH TRIPURA,TRIPURA	NAN	28.000000	7.6	98.0	6.2	1.200000	1.623079	570.0	...	100	100	100	0.0	28.10	23.40	0.90	2.8	11.24	66
1989	1404	GUMTI AT D/S SOUTH TRIPURA, TRIPURA	NAN	28.000000	7.7	91.0	6.5	1.300000	1.623079	562.0	...	100	100	100	0.0	28.10	23.40	0.90	2.8	11.24	66



Handling Missing Data

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Python 3 (ipykernel)
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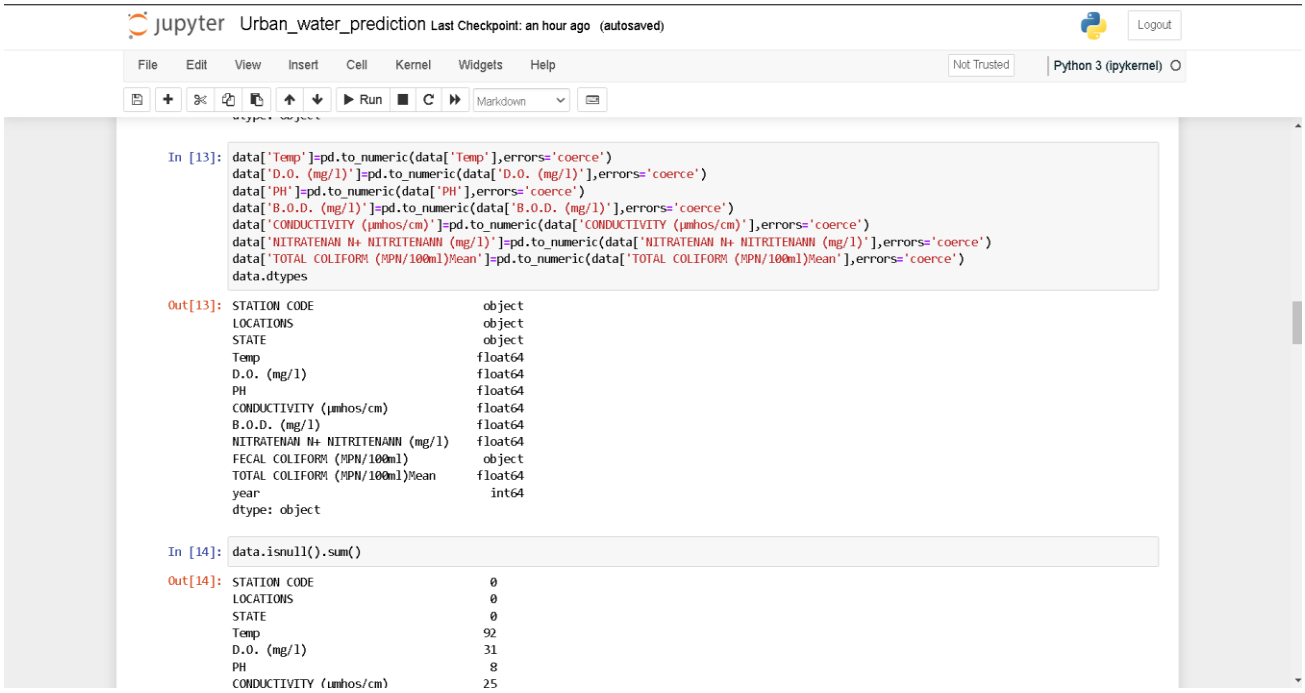
NITRATENAN N+ NITRITENANN (mg/l) False
FECAL COLIFORM (MPN/100ml) False
TOTAL COLIFORM (MPN/100ml)Mean False
year False
dtype: bool
In [11]: data.isnull().sum()
Out[11]: STATION CODE 0
LOCATIONS 0
STATE 0
Temp 0
D.O. (mg/l) 0
PH 0
CONDUCTIVITY (µmhos/cm) 0
B.O.D. (mg/l) 0
NITRATENAN N+ NITRITENANN (mg/l) 0
FECAL COLIFORM (MPN/100ml) 0
TOTAL COLIFORM (MPN/100ml)Mean 0
year 0
dtype: int64
In [12]: data.dtypes
Out[12]: STATION CODE object
LOCATIONS object
STATE object
Temp object
D.O. (mg/l) object
PH object
CONDUCTIVITY (µmhos/cm) object
B.O.D. (mg/l) object
NITRATENAN N+ NITRITENANN (mg/l) object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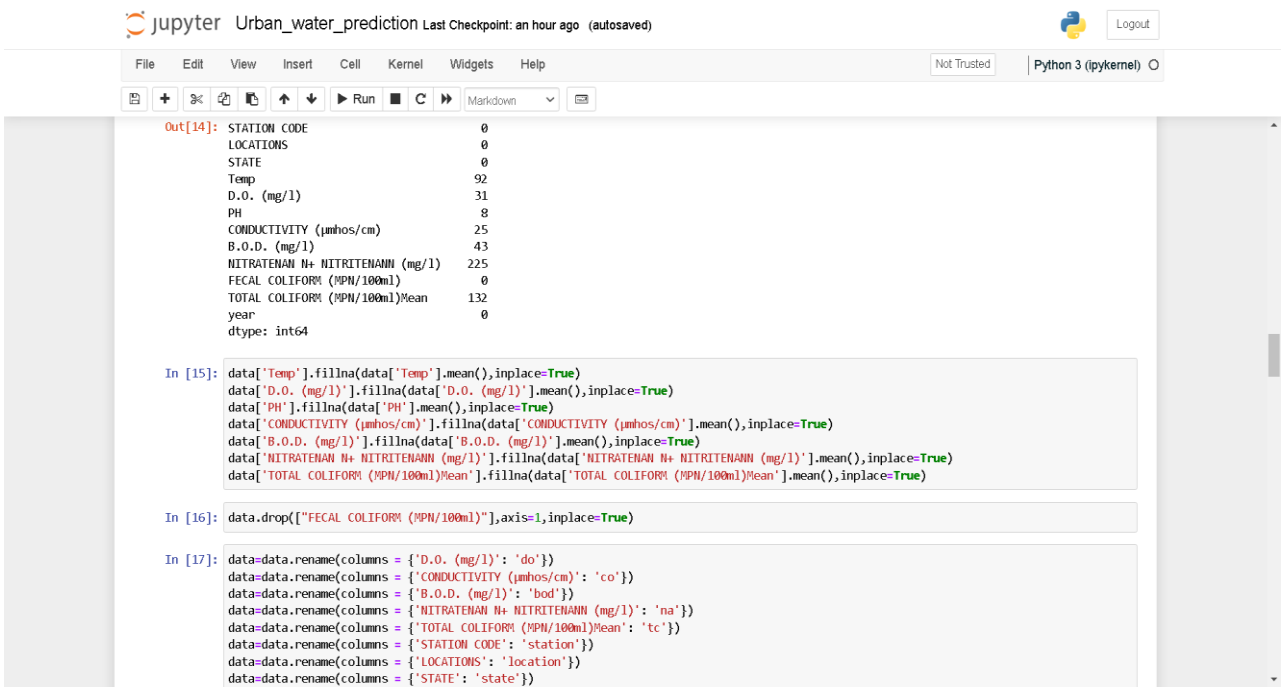
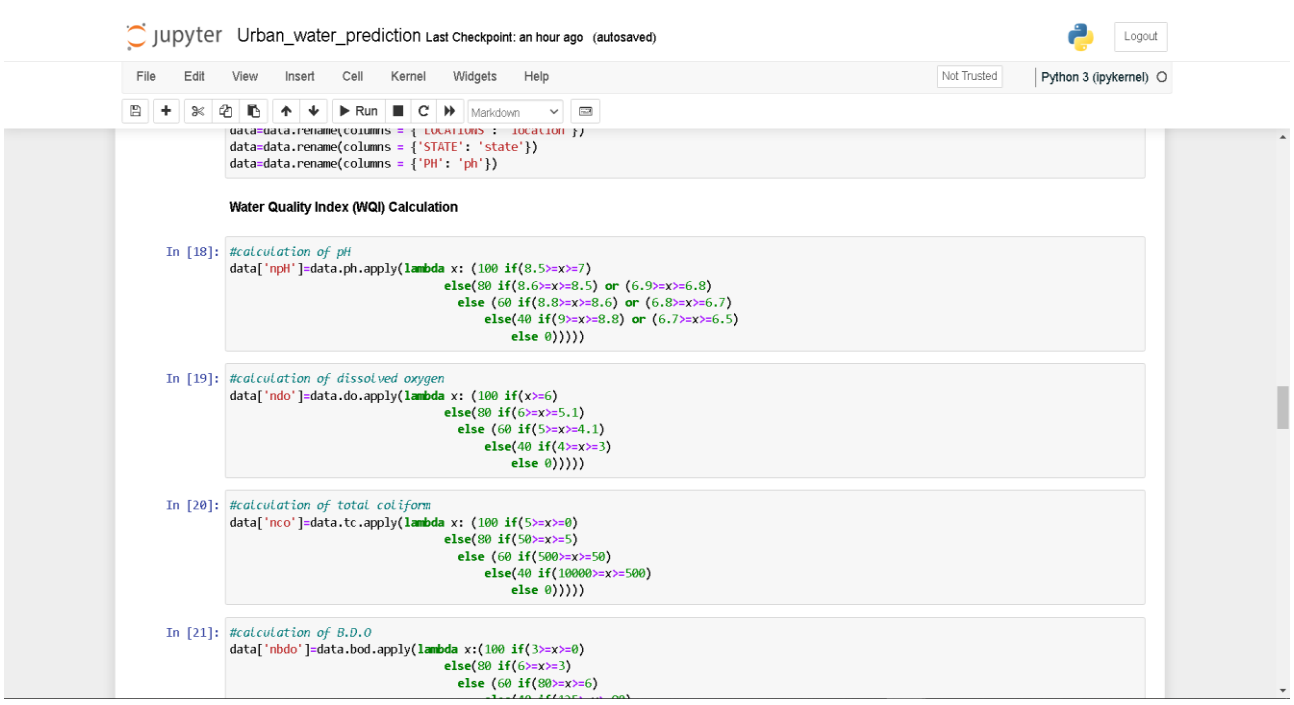
Python 3 (ipykernel)
Run
Markdown
In [13]: data['Temp']=pd.to_numeric(data['Temp'],errors='coerce')
data['D.O. (mg/l)']=pd.to_numeric(data['D.O. (mg/l)'],errors='coerce')
data['PH']=pd.to_numeric(data['PH'],errors='coerce')
data['B.O.D. (mg/l)']=pd.to_numeric(data['B.O.D. (mg/l)'],errors='coerce')
data['CONDUCTIVITY (µmhos/cm)']=pd.to_numeric(data['CONDUCTIVITY (µmhos/cm)'],errors='coerce')
data['NITRATENAN N+ NITRITENANN (mg/l)']=pd.to_numeric(data['NITRATENAN N+ NITRITENANN (mg/l)'],errors='coerce')
data['TOTAL COLIFORM (MPN/100ml)Mean']=pd.to_numeric(data['TOTAL COLIFORM (MPN/100ml)Mean'],errors='coerce')
data.dtypes
Out[13]: STATION CODE object
LOCATIONS object
STATE object
Temp float64
D.O. (mg/l) float64
PH float64
CONDUCTIVITY (µmhos/cm) float64
B.O.D. (mg/l) float64
NITRATENAN N+ NITRITENANN (mg/l) float64
FECAL COLIFORM (MPN/100ml) object
TOTAL COLIFORM (MPN/100ml)Mean float64
year int64
dtype: object
In [14]: data.isnull().sum()
Out[14]: STATION CODE 0
LOCATIONS 0
STATE 0
Temp 92
D.O. (mg/l) 31
PH 8
CONDUCTIVITY (µmhos/cm) 25



Water Quality Index Calculation



```
                                    else (60 if(80>=x>=6)
                                        else(40 if(125>=x>=80)
                                            else 0)))))
```

In [22]:
```
#calculation of electric conductivity
data['nec']=data.co.apply(lambda x:(100 if(75>=x>=0)
                                    else(80 if(150>=x>=75)
                                      else (60 if(225>=x>=150)
                                          else(40 if(300>=x>=225)
                                              else 0)))))
```

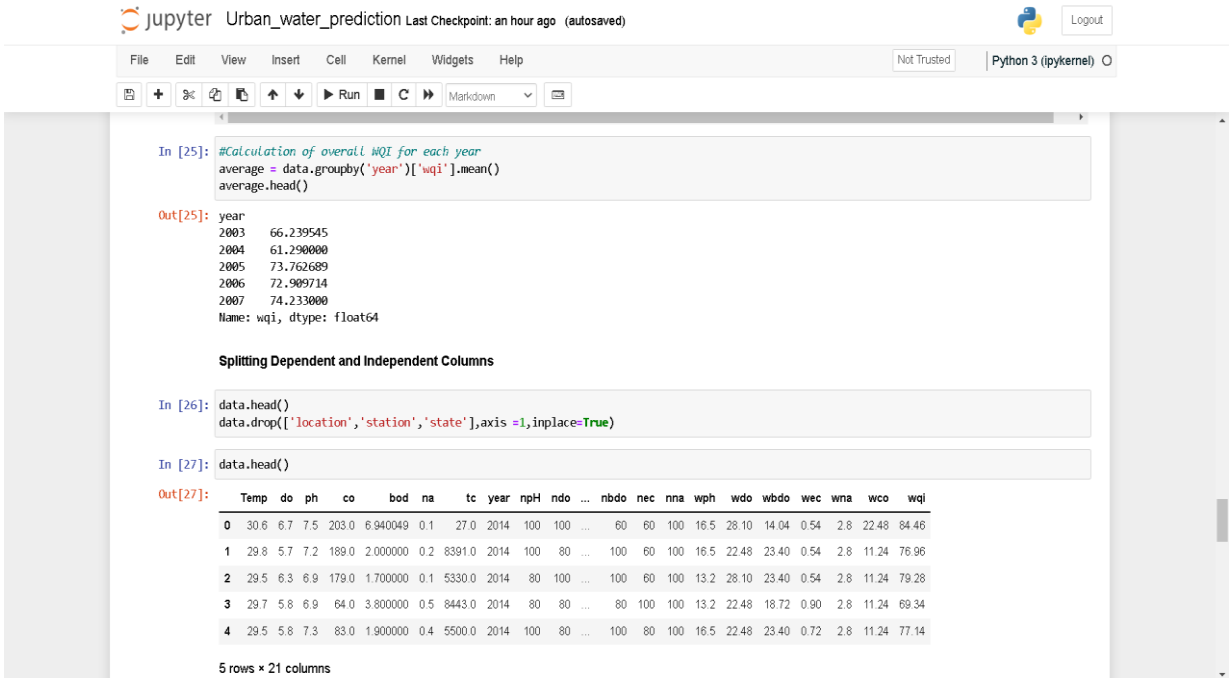
In [23]:
```
#calculation of nitrate
data['nna']=data.na.apply(lambda x:(100 if(20>=x>=0)
                                    else(80 if(50>=x>=20)
                                      else (60 if(100>=x>=50)
                                          else(40 if(200>=x>=100)
                                              else 0)))))
```

In [24]:
```
#Calculation of Water Quality Index WQI
data['wph']=data.nph*0.165
data['wdo']=data.ndo*0.281
data['wbdo']=data.nbdo*0.234
data['wec']=data.nec*0.009
data['wna']=data.nna*0.028
data['wco']=data.nco*0.281
data['wqi']=data.wph+data.wdo+data.wbdo+data.wec+data.wna+data.wco
data
```

Out[24]:

	station	location	state	Temp	do	ph	co	bod	na	tc	...	nbdo	nec	nna	wph	wdo	wbdo	wec	wna	wco
0	1393	DAMANGANGA AT D/S OF MADHURAN	DAMAN & DIU	30.600000	6.7	7.5	203.0	6.940049	0.100000	27.0	...	60	60	100	16.5	28.10	14.04	0.54	2.8	84

Splitting Dependent and Independent Columns



In [25]:
```
#Calculation of overall WQI for each year
average = data.groupby('year')['wqi'].mean()
average.head()
```

Out[25]:
```
year
2003    66.239545
2004    61.290000
2005    73.762689
2006    72.909714
2007    74.233000
Name: wqi, dtype: float64
```

Splitting Dependent and Independent Columns

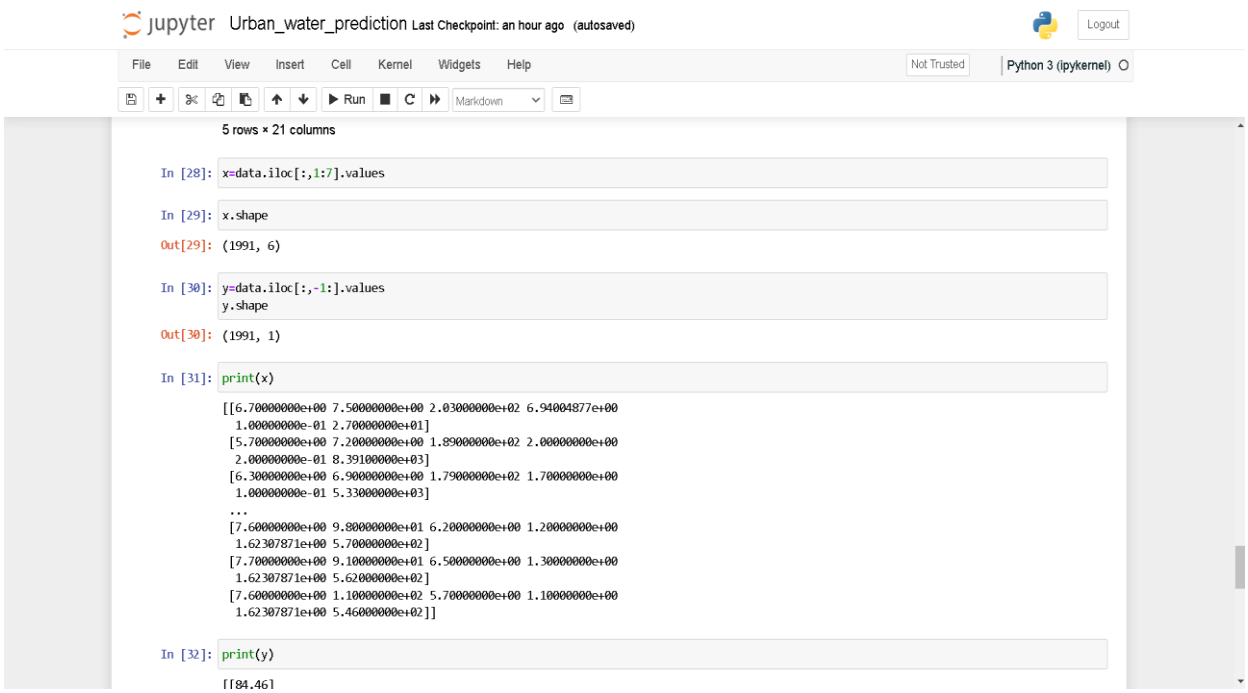
In [26]:
```
data.head()
data.drop(['location','station','state'],axis =1,inplace=True)
```

In [27]:
```
data.head()
```

Out[27]:

	Temp	do	ph	co	bod	na	tc	year	npH	ndo	...	nbdo	nec	nna	wph	wdo	wbdo	wec	wna	wco	wqi
0	30.6	6.7	7.5	203.0	6.940049	0.1	27.0	2014	100	100	...	60	60	100	16.5	28.10	14.04	0.54	2.8	22.48	84.46
1	29.8	5.7	7.2	189.0	2.000000	0.2	8391.0	2014	100	80	...	100	60	100	16.5	22.48	23.40	0.54	2.8	11.24	76.96
2	29.5	6.3	6.9	179.0	1.700000	0.1	5330.0	2014	80	100	...	100	60	100	13.2	28.10	23.40	0.54	2.8	11.24	79.28
3	29.7	5.8	6.9	64.0	3.800000	0.5	8443.0	2014	80	80	...	80	100	100	13.2	22.48	18.72	0.90	2.8	11.24	69.34
4	29.5	5.8	7.3	83.0	1.900000	0.4	5500.0	2014	100	80	...	100	80	100	16.5	22.48	23.40	0.72	2.8	11.24	77.14

5 rows × 21 columns



Splitting The Data Into Train and Test