U.S. Pollution Data

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Description

- Name of our dataset:
  - “US pollution”
- Dealing with four main kinds of pollutions in the US
- Attributes containing following attribute for each pollutants
  - mean
  - 1st max value
  - 1st max hours
  - AQI (Air Quality Index, lower is better)
- From 2000 - 2016

Questions sought to answer

1. What are the main pollutants in the U.S.?
2. Does the overall level of environmental pollution in the United States show an upward trend or a downward trend?
3. Colorado compares to other developed states(New York, Florida, and California), the pollution is more serious or lighter?
4. What causes the increase or decrease of pollutants?
5. How to solve air pollution?

Data Preparation work

U.S. Pollution Data, Pollution in the U.S. since 2000

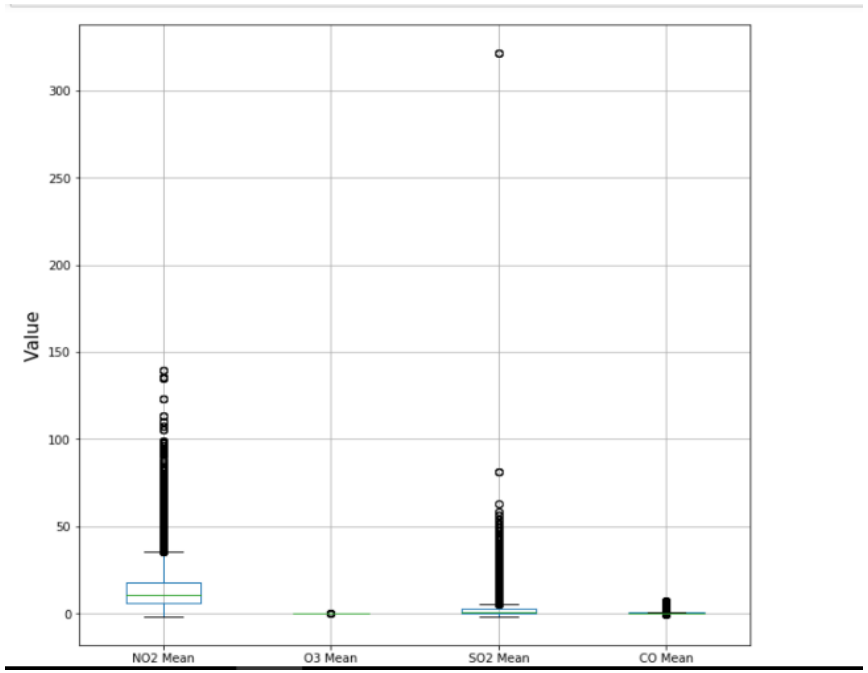
https://www.kaggle.com/sogun3/uspollution

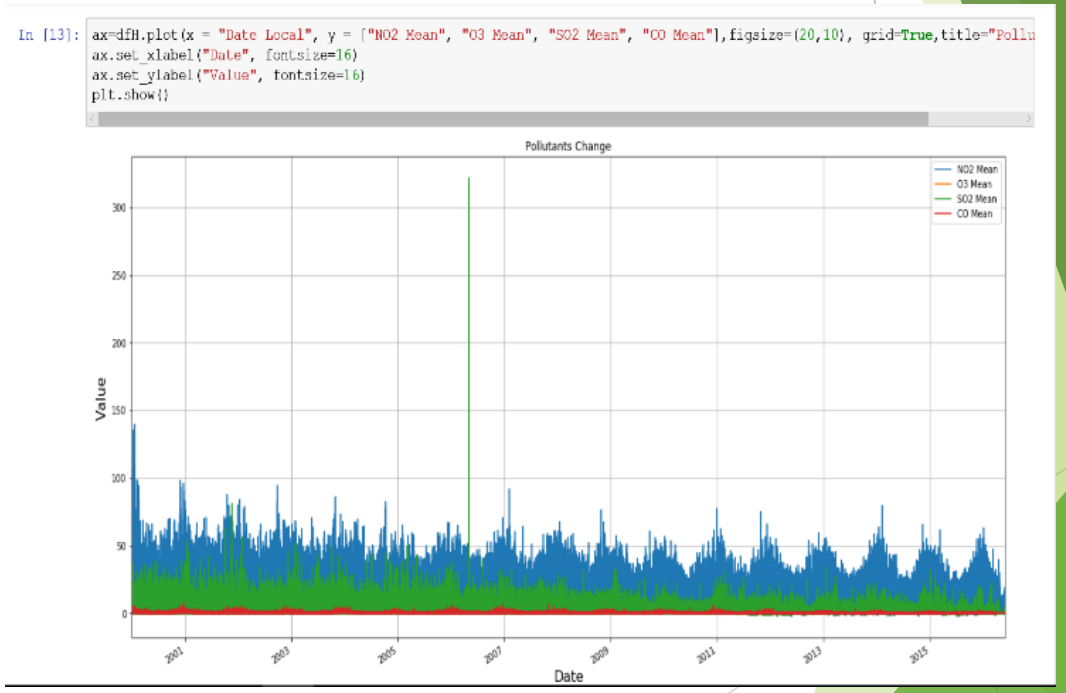
Tools used

- Pyhon3
  - Pandas
  - Numpy
  - Matplotlib
- D3
- Excel

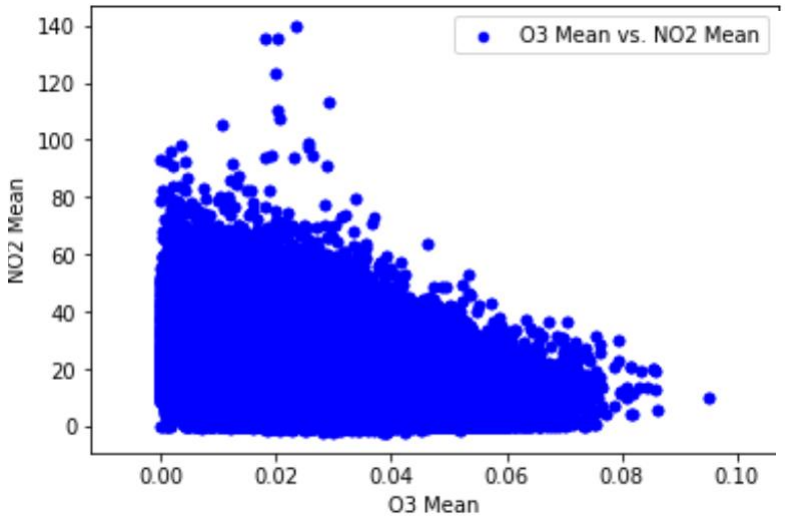
MAIN TECHNIQUES APPLIED

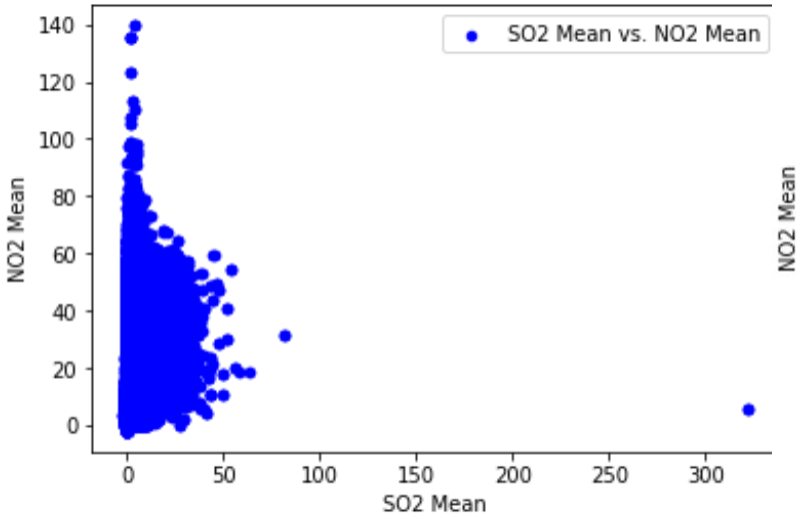
Data Cleaning and Preprocessing

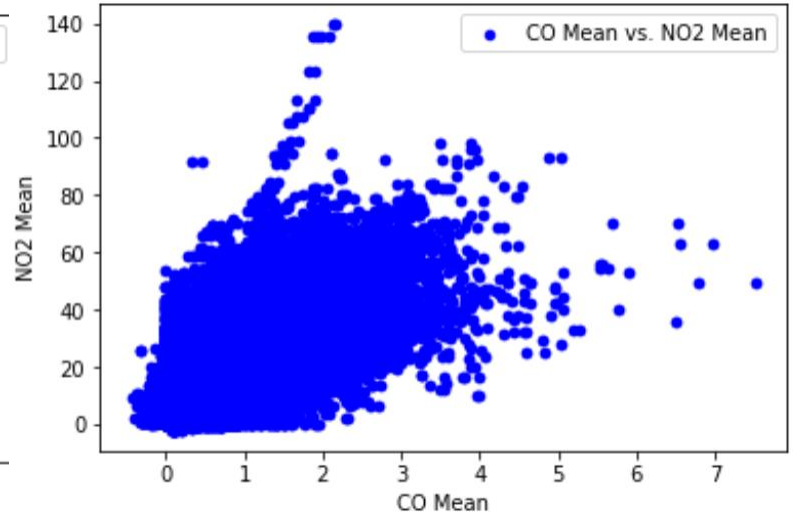


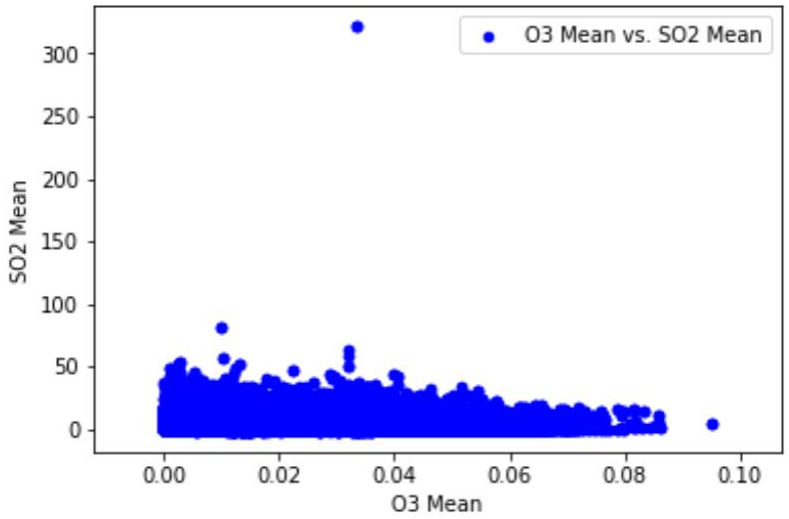


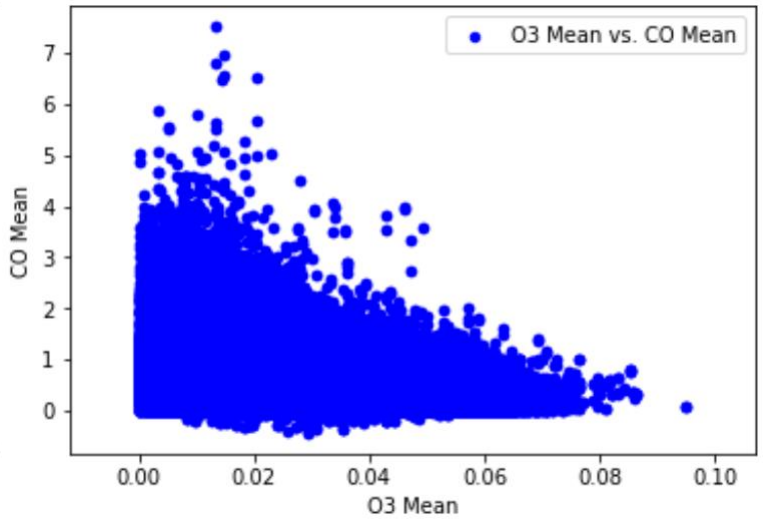
Correlation

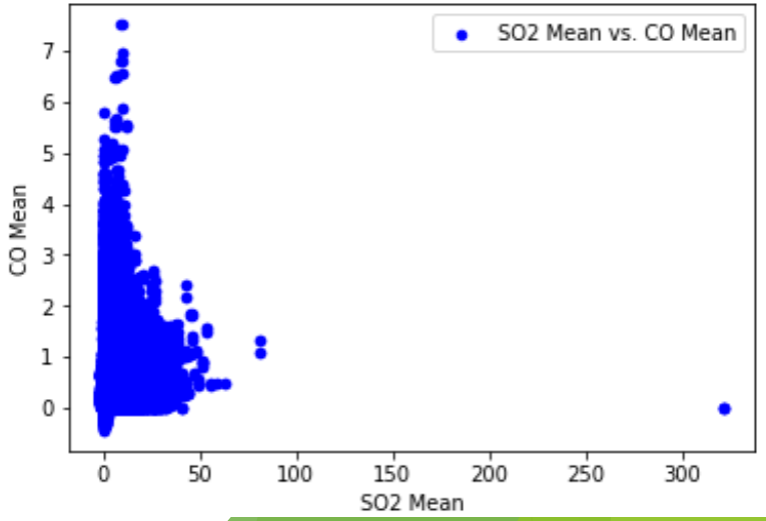












Data Transformation

- Min-max Normalization

Max value:

```
State                          Arizona
Date Local       2000-01-19 00:00:00
NO2 Mean                      139.542
Name: 1468, dtype: object
State                          Arizona
Date Local       2000-01-10 00:00:00
NO2 1st Max Value                 267
Name: 1432, dtype: object
State                          Arizona
Date Local       2000-01-10 00:00:00
NO2 AQI                           132
Name: 1432, dtype: object
```

```
State                     Pennsylvania
Date Local       2000-06-10 00:00:00
O3 Mean                     0.095083
Name: 77152, dtype: object
State                  Country Of Mexico
Date Local       2007-07-04 00:00:00
O3 1st Max Value                0.141
Name: 744381, dtype: object
State                       California
Date Local       2013-06-29 00:00:00
O3 AQI                           218
Name: 1364788, dtype: object
```

```
State                       California
Date Local       2000-12-20 00:00:00
CO Mean                      7.50833
Name: 10505, dtype: object
State                       California
Date Local       2000-12-20 00:00:00
CO 1st Max Value                19.9
Name: 10504, dtype: object
State                       California
Date Local       2000-12-20 00:00:00
CO AQI                           201
Name: 10505, dtype: object
```

```
State                       Oklahoma
Date Local       2006-05-04 00:00:00
SO2 Mean                     321.625
Name: 596159, dtype: object
State                       Oklahoma
Date Local       2006-05-04 00:00:00
SO2 1st Max Value                351
Name: 596159, dtype: object
State                       Illinois
Date Local       2002-02-14 00:00:00
SO2 AQI                          200
Name: 229463, dtype: object
```

Min value:

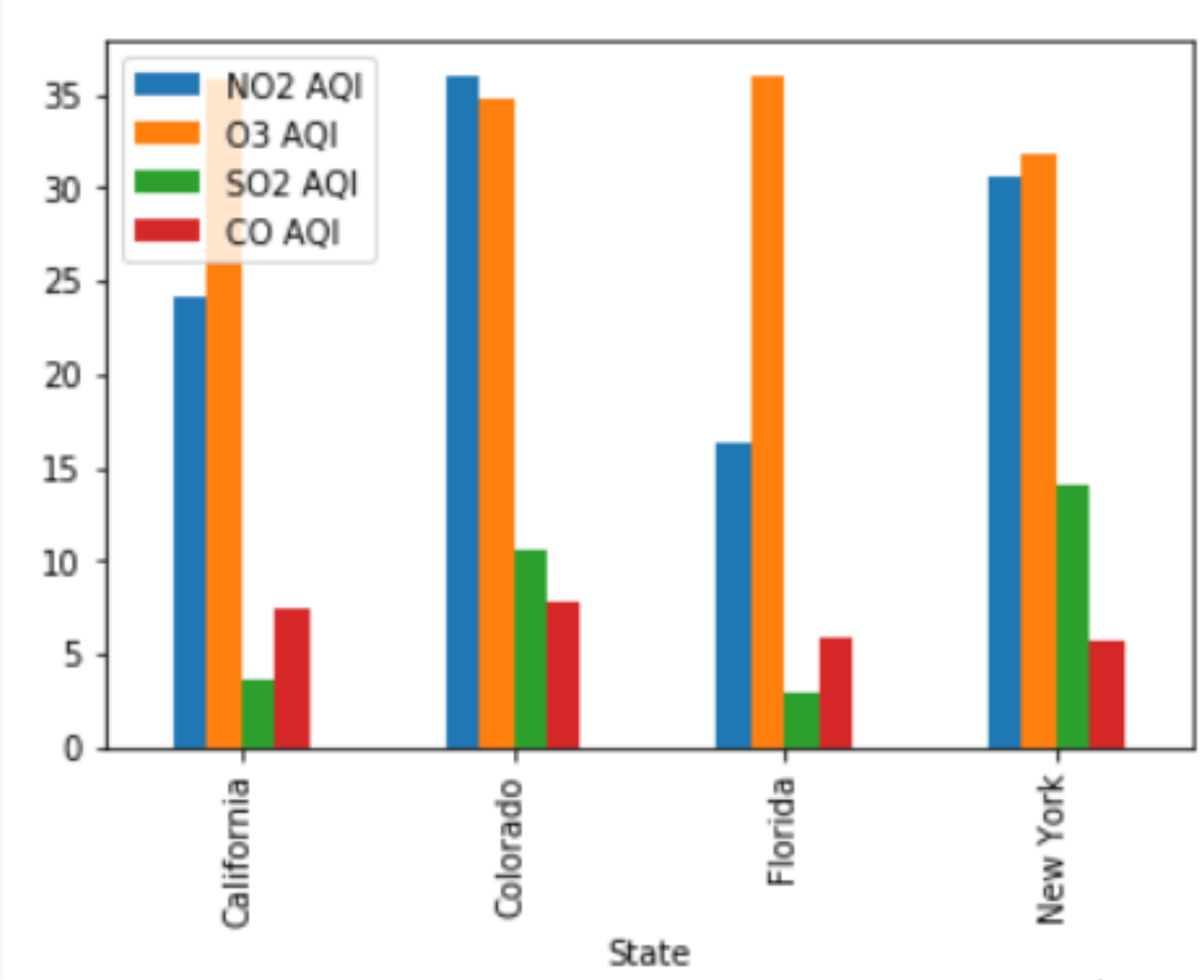
```
State                     Pennsylvania
Date Local       2012-12-11 00:00:00
NO2 Mean                      9.1375
Name: 1299522, dtype: object
State                          Arizona
Date Local       2000-05-16 00:00:00
NO2 AQI                             1
Name: 528, dtype: object
```

```
State                       California
Date Local       2007-02-05 00:00:00
O3 Mean                     0.013792
Name: 636115, dtype: object
State                       California
Date Local       2000-12-07 00:00:00
O3 AQI                              8
Name: 12030, dtype: object
```

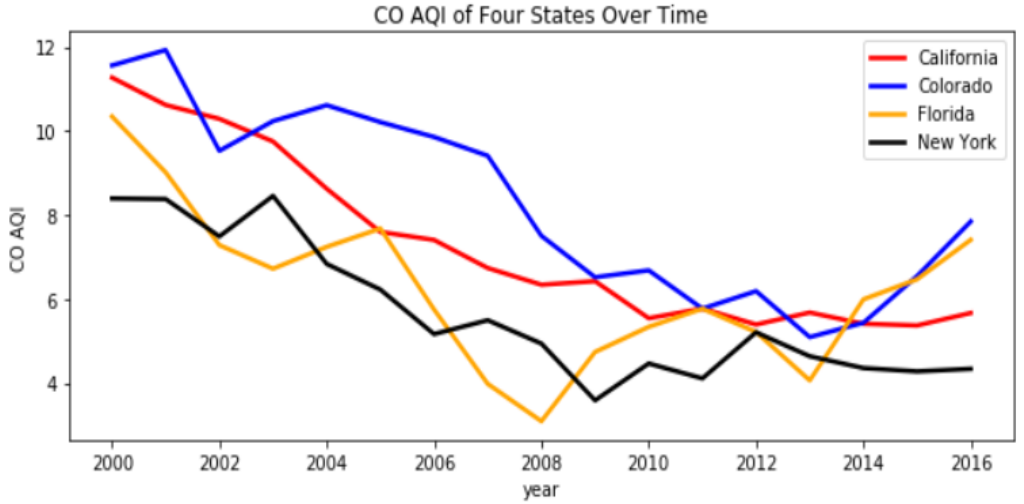
```
State                          Kansas
Date Local       2015-11-02 00:00:00
SO2 Mean                     0.591667
Name: 1663965, dtype: object
State                          Arizona
Date Local       2000-03-17 00:00:00
SO2 AQI                          NaN
Name: 306, dtype: object
```

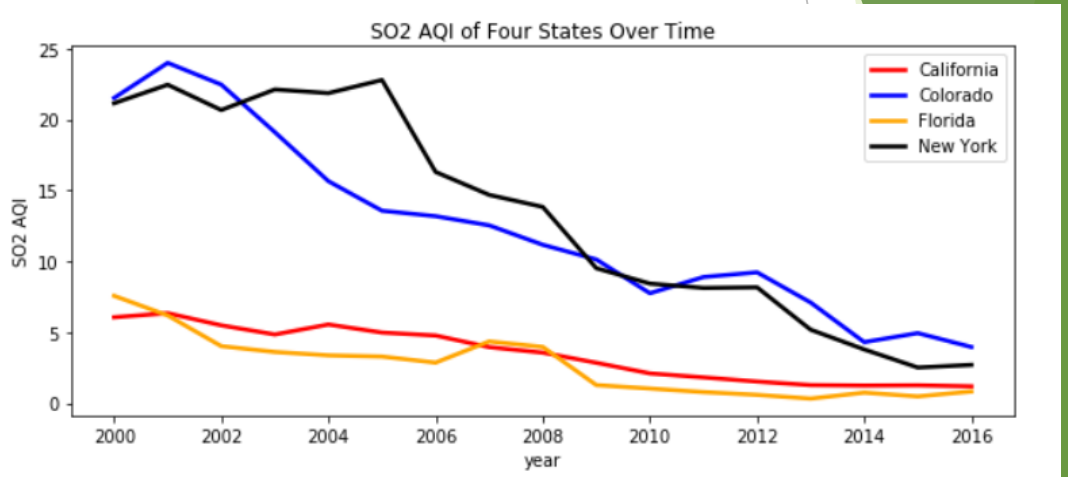
```
State                       Colorado
Date Local       2014-03-06 00:00:00
CO Mean                     0.145833
Name: 1513982, dtype: object
State                          Arizona
Date Local       2000-10-09 00:00:00
CO AQI                              1
Name: 1081, dtype: object
```

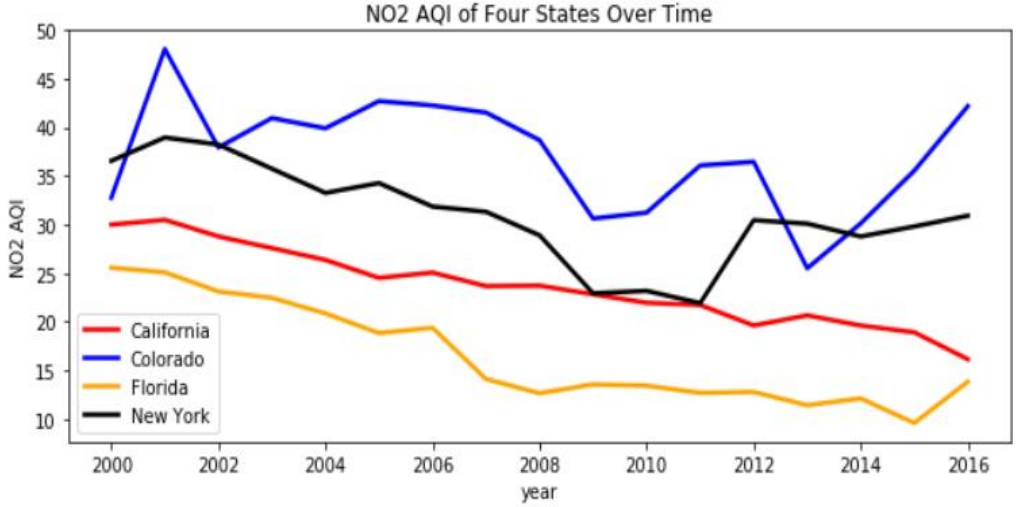
Key result (Comparing AQI of 4 States)

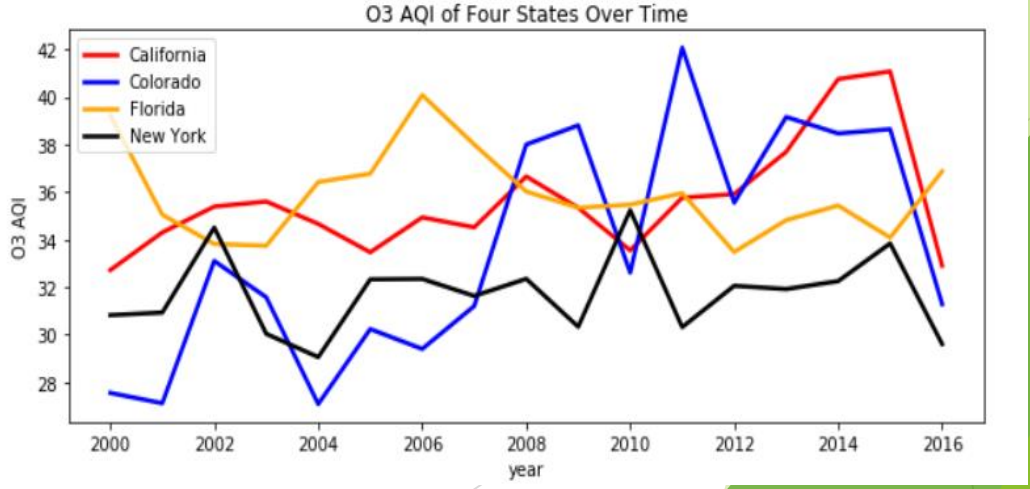


Key result (4 pollutants AQI of Four States Over Time)

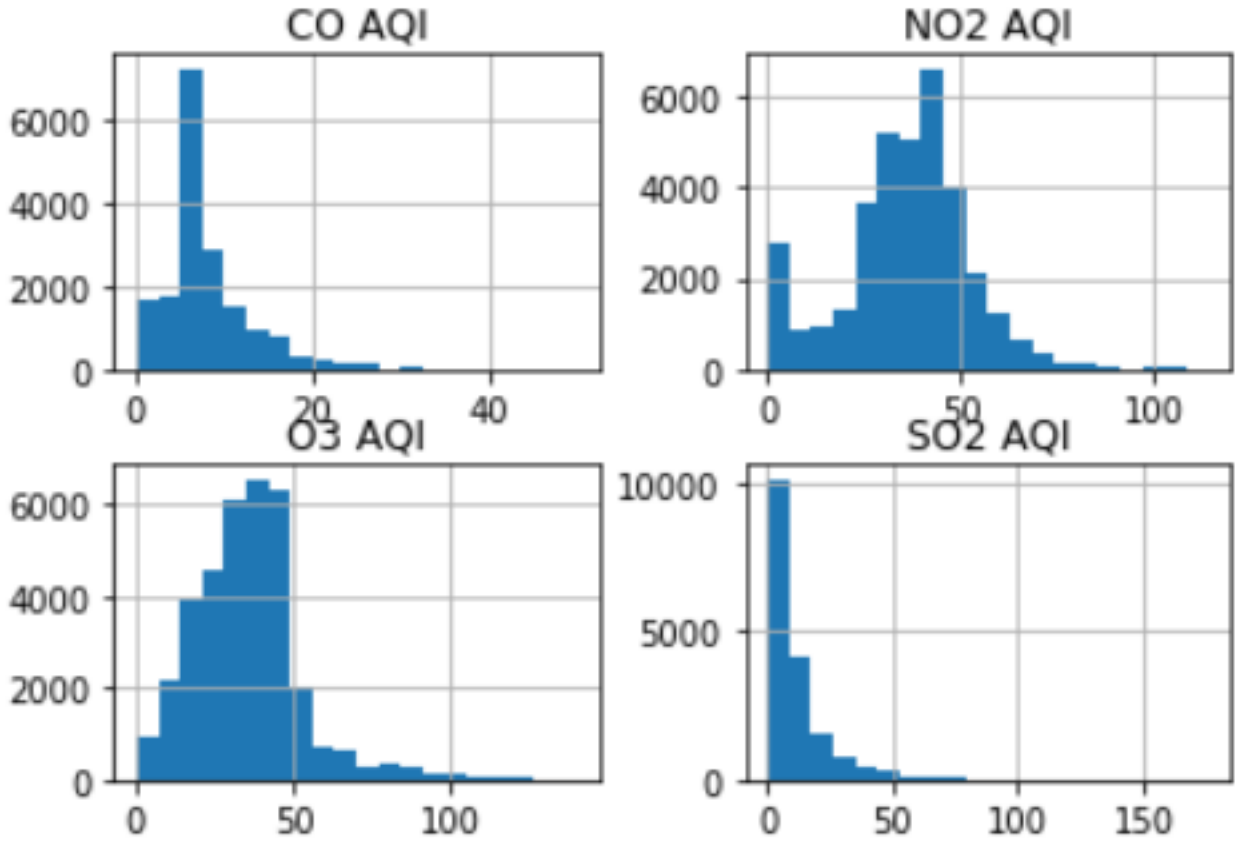








Key result (Frequency of AQI all over the US)



Knowledge gained

1. U.S. air quality is better than before
2. NO_2 and O_3 are the main pollutants for us
    a. According to the example four states:
        i. California
        ii. New York
        iii. Colorado
        iv. Florida

How that knowledge can be applied

- Awareness of environmental pollution problem and its impact on people's lives.
- Focus on controlling the main pollutants(CO, SO2, O3, NO2)
  - Government can make policy to reduce pollution
  - People can have a daily life plan to reduce pollution
- Results of AQI for different pollutant in different states
  - Help future pollution detection
  - Prevent from producing more pollution
- Reuse of O3

Reference

https://airnow.gov/index.cfm?action=aqibasics.aqi

https://www.opendatasoft.com/2017/03/14/open-data-air-pollution-a-powerful-tool-in-the-struggle-for-cleaner-air/

http://www.ipc.cas.cn/kxcb/kpwz/201503/t20150304_4317094.html