May 31, 2022

```
[3]: #
import requests
import pandas as pd
from lxml import etree

html='https://ncov.dxy.cn/ncovh5/view/pneumonia'
html_data=requests.get(html)
html_data.encoding='utf-8'
html_data = etree.HTML(html_data.text,etree.HTMLParser())
html_data = html_data.xpath('//*[@id="getListByCountryTypeService2true"]/
 ↪text()')

ncov_world=html_data[0][49:-12]
ncov_world=ncov_world.replace('true','True')
ncov_world=ncov_world.replace('false','False')
ncov_world=eval(ncov_world)

country=[]
confirmed=[]
lived=[]
dead=[]

for i in ncov_world:
     #              dataframe
    country.append(i['provinceName'])
    confirmed.append(i['confirmedCount'])
    lived.append(i['curedCount'])
    dead.append(i['deadCount'])

data_world=pd.DataFrame()
data_world['  ']=country
data_world['  ']=confirmed
data_world['  ']=lived
data_world['  ']=dead
data_world.head(5)
```

[3]:

```
0      29583616   368023  149044
1      26244107  4328400  138864
2      18086462   336548   24167
3      22455392  6491069  178880
4     12326264    150376  106341
```

[4]:

```
#      GDP
data_economy = pd.read_csv("https://labfile.oss.aliyuncs.com/courses/2791/
 ↪gpd_2016_2020.csv", index_col=0)
time_index = pd.date_range(start='2016', periods=18, freq='Q')
data_economy.index = time_index
data_economy
```

[4]:

```
                                                                 \
2016-03-31  162410.0   8312.7   61106.8   92990.5    8665.5  53666.4  45784.0
2016-06-30  181408.2  12555.9   73416.5   95435.8   13045.5  60839.2  52378.3
2016-09-30  191010.6  17542.4   75400.5   98067.8   18162.2  61902.5  52468.3
2016-12-31  211566.2  21728.2   85504.1  104334.0   22577.8  68998.4  58878.4
2017-03-31  181867.7   8205.9   69315.5  104346.3    8595.8  60909.3  51419.7
2017-06-30  201950.3  12644.9   82323.0  106982.4   13204.2  68099.8  58172.1
2017-09-30  212789.3  18255.8   84574.1  109959.5   18944.2  69327.2  58632.6
2017-12-31  235428.7  22992.9   95368.0  117067.8   23915.8  76782.9  65652.1
2018-03-31  202035.7   8575.7   76598.2  116861.8    9005.8  66905.6  56631.9
2018-06-30  223962.2  13003.8   91100.6  119857.8   13662.2  75122.1  64294.9
2018-09-30  234474.3  18226.9   93112.5  123134.9   18961.8  76239.6  64348.2
2018-12-31  258808.9  24938.7  104023.9  129846.2   25929.0  82822.1  70662.1
2019-03-31  218062.8   8769.4   81806.5  127486.9    9249.4  71064.5  60357.1
2019-06-30  242573.8  14437.6   97315.6  130820.6   15108.7  79820.7  68041.8
2019-09-30  252208.7  19798.0   97790.4  134620.4   20629.0  79501.8  66823.8
2019-12-31  278019.7  27461.6  109252.8  141305.2   28579.9  86721.6  73952.4
2020-03-31  206504.3  10186.2   73638.0  122680.1   10708.4  64642.0  53852.0
2020-06-30  250110.1  15866.8   99120.9  135122.3   16596.4  80402.4  69258.8


                                                            \
2016-03-31   7763.0    16847.5          7180.5    3181.6  15340.4  11283.0
2016-06-30  12943.8    17679.8          8295.0    3112.3  14811.7  12209.7
2016-09-30  13870.6    18513.0          8591.6    3473.2  14945.4  12615.3
2016-12-31  16921.5    20684.1          8961.6    3840.7  14866.4  13861.4
2017-03-31   8725.3    18608.9          8094.5    3536.5  16758.8  13047.0
2017-06-30  14574.4    19473.6          9397.7    3440.9  15856.3  14059.0
2017-09-30  15590.1    20342.9          9688.7    3838.5  16290.4  14054.9
2017-12-31  19015.8    22731.1          9940.9    4240.1  15938.8  15925.1
2018-03-31  10073.8    20485.5          8806.5    3887.8  18050.6  14863.5
2018-06-30  16404.3    21374.2         10174.9    3779.6  17401.0  16176.1
2018-09-30  17294.5    22334.1         10582.3    4212.6  17780.6  15914.0
2018-12-31  21720.4    24710.0         10773.5    4640.6  17378.1  17669.5
```

```
2019-03-31  11143.1    21959.2          9386.6     4234.9  19650.1  15979.2
2019-06-30  17954.2    23097.0         10861.3     4123.0  19064.9  17484.4
2019-09-30  18734.6    23993.6         11310.2     4610.5  19388.3  17369.0
2019-12-31  23072.4    26795.9         11244.0     5071.2  18973.8  18798.9
2020-03-31   9377.8    18749.6          7865.1     2820.9  21346.8  15268.3
2020-06-30  19156.8    23696.1         10650.0     3481.3  20954.7  18593.6


2016-03-31              5128.8       4985.3  28368.1
2016-06-30              5130.7       5075.1  28265.4
2016-09-30              4662.3       5452.4  28822.1
2016-12-31              5202.3       6015.8  29636.1
2017-03-31              5915.2       5811.9  31864.3
2017-06-30              5977.9       5868.4  31998.1
2017-09-30              5539.8       6464.6  32708.0
2017-12-31              6376.0       7128.4  33433.7
2018-03-31              7212.2       6879.5  35864.9
2018-06-30              7309.6       6885.3  35673.1
2018-09-30              6690.9       7533.3  36930.6
2018-12-31              7520.8       8170.4  37474.6
2019-03-31              8424.8       7665.1  39306.0
2019-06-30              8395.6       7596.7  39067.3
2019-09-30              7528.1       8409.1  40734.5
2019-12-31              8341.3       9262.5  41158.2
2020-03-31              8928.0       7137.9  39659.6
2020-06-30              9573.0       7174.4  39831.4
```

[5]:
```
#
data_area = pd.read_csv('https://labfile.oss.aliyuncs.com/courses/2791/DXYArea.
 ↪csv')
data_news = pd.read_csv('https://labfile.oss.aliyuncs.com/courses/2791/DXYNews.
 ↪csv')
```

[6]:
```
data_area=data_area.loc[data_area['countryName']==data_area['provinceName']]
data_area_times=data_area[['countryName','province_confirmedCount','province_curedCount','prov

time=pd.DatetimeIndex(data_area_times['updateTime'])#
data_area_times.index=time #
data_area_times=data_area_times.drop('updateTime',axis=1)
data_area_times.head(5)

data_area_times.isnull().any()#
```

[6]:
```
countryName                False
province_confirmedCount    False
```

```
province_curedCount        False
province_deadCount         False
dtype: bool
```

[7]:
```
data_news_times = data_news[['pubDate', 'title', 'summary']]
time = pd.DatetimeIndex(data_news_times['pubDate'])
data_news_times.index = time  #
data_news_times = data_news_times.drop('pubDate', axis=1)
data_news_times.head(5)
```

[7]:
```
                                              title  \
pubDate
2020-07-17 05:40:08     71434        354
2020-07-17 06:06:49        201
2020-07-16 22:31:00      493        26165
2020-07-16 22:29:48     791        57668
2020-07-16 21:26:54      777        35003


                                                                  summary
pubDate
2020-07-17 05:40:08      ·          7 16 17:33    17 0…
2020-07-17 06:06:49      7 16 18       45403    2012151 …
2020-07-16 22:31:00     7 16               24        …
2020-07-16 22:29:48        16       24    791       …
2020-07-16 21:26:54      7 16      24  19097       777 …
```

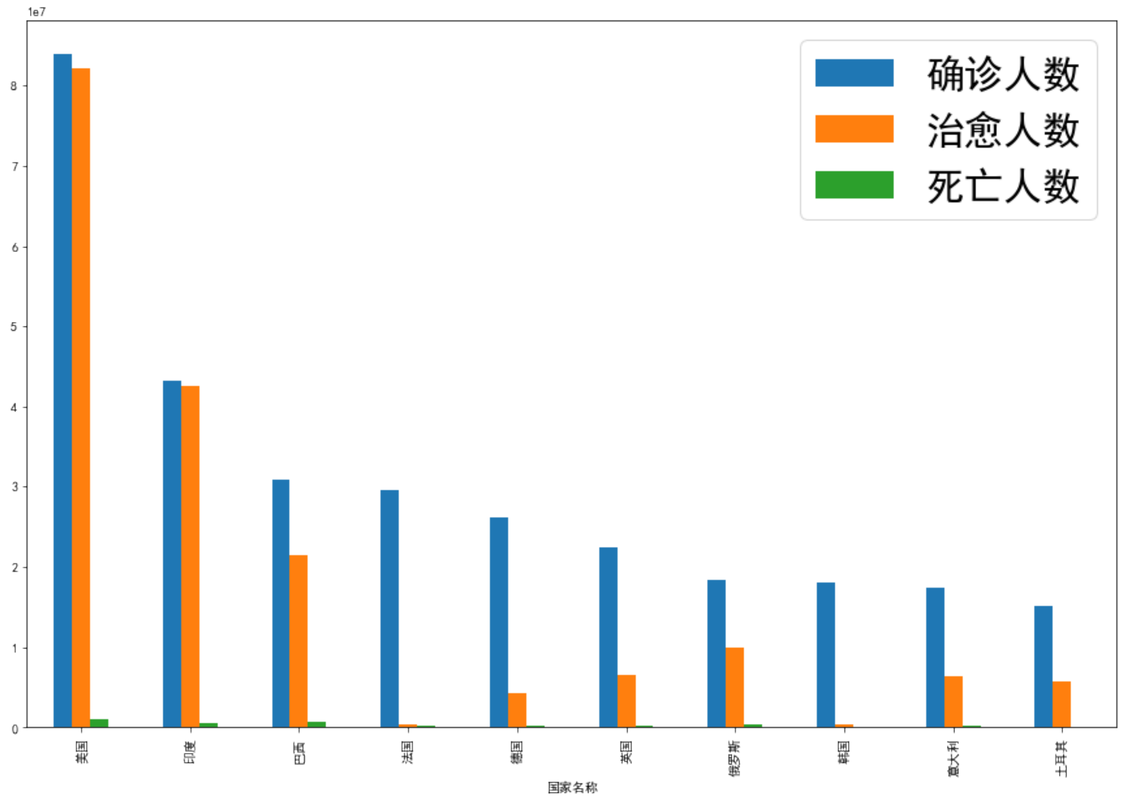
[8]:
```
#
print(data_world.isnull().any())
print(data_economy.isnull().any())
print(data_area_times.isnull().any())
print(data_news_times.isnull().any())
```

```
      False
      False
      False
      False
dtype: bool
                          False
                         False
                         False
                         False
                        False
                           False
                          False
                          False
                        False
                    False
```

```
                     False
                       False
                      False
               False
                    False
                       False
dtype: bool
countryName                  False
province_confirmedCount      False
province_curedCount          False
province_deadCount           False
dtype: bool
title       False
summary     False
dtype: bool
```

[9]:
```python
import matplotlib.pyplot as plt
import matplotlib
import os

%matplotlib inline
#
data_world=data_world.sort_values(by='   ',ascending=False)#
data_world_set=data_world[['   ','   ','   ']]
data_world_set.index=data_world['   ']
data_world_set.head(10).plot(kind='bar',figsize=(15,10))#

plt.rcParams['font.sans-serif']=['SimHei']#
plt.xlabel('   ')
plt.xticks()
plt.legend(fontsize=30)#
```

[9]:
```
<matplotlib.legend.Legend at 0x1f9694d50a0>
```



```
[9]: import pyecharts
     print(pyecharts.__version__)
```

```
1.7.1
```

```
[16]: !pip install pyecharts==1.7.1
```

```
Collecting pyecharts==1.7.1
  Downloading pyecharts-1.7.1-py3-none-any.whl (128 kB)
Requirement already satisfied: simplejson in c:\programdata\anaconda3\lib\site-
packages (from pyecharts==1.7.1) (3.17.6)
Requirement already satisfied: prettytable in c:\programdata\anaconda3\lib\site-
packages (from pyecharts==1.7.1) (3.2.0)
Requirement already satisfied: jinja2 in c:\programdata\anaconda3\lib\site-
packages (from pyecharts==1.7.1) (2.11.3)
Requirement already satisfied: MarkupSafe>=0.23 in
c:\programdata\anaconda3\lib\site-packages (from jinja2->pyecharts==1.7.1)
(1.1.1)
Requirement already satisfied: wcwidth in c:\programdata\anaconda3\lib\site-
packages (from prettytable->pyecharts==1.7.1) (0.2.5)
Installing collected packages: pyecharts
  Attempting uninstall: pyecharts
```

```
    Found existing installation: pyecharts 0.5.11
    Uninstalling pyecharts-0.5.11:
      Successfully uninstalled pyecharts-0.5.11
Successfully installed pyecharts-1.7.1
```

[10]:
```
from pyecharts.charts import Map
from pyecharts import options as opts
from pyecharts.globals import CurrentConfig, NotebookType

CurrentConfig.NOTEBOOK_TYPE = NotebookType.JUPYTER_NOTEBOOK
name_map = {  #
    'Singapore Rep.': '  ',
    'Dominican Rep.': '   ',
    'Palestine': '   ',
    'Bahamas': '  ',
    'Timor-Leste': '  ',
    'Afghanistan': '  ',
    'Guinea-Bissau': '   ',
    "Côte d'Ivoire": '   ',
    'Siachen Glacier': '   ',
    "Br. Indian Ocean Ter.": '    ',
    'Angola': '  ',
    'Albania': '   ',
    'United Arab Emirates': '  ',
    'Argentina': '  ',
    'Armenia': '   ',
    'French Southern and Antarctic Lands': '      ',
    'Australia': '   ',
    'Austria': '  ',
    'Azerbaijan': '   ',
    'Burundi': '  ',
    'Belgium': '  ',
    'Benin': ' ',
    'Burkina Faso': '   ',
    'Bangladesh': '   ',
    'Bulgaria': '   ',
    'The Bahamas': '  ',
    'Bosnia and Herz.': '      ',
    'Belarus': '   ',
    'Belize': '  ',
    'Bermuda': '  ',
    'Bolivia': '   ',
    'Brazil': ' ',
    'Brunei': ' ',
    'Bhutan': ' ',
    'Botswana': '   ',
    'Central African Rep.': ' ',
    'Canada': '  ',
    'Switzerland': ' ',
    'Chile': ' ',
    'China': ' ',
    'Ivory Coast': '  ',
    'Cameroon': '  ',
    'Dem. Rep. Congo': '    ',
    'Congo': ' ',
    'Colombia': '  ',
    'Costa Rica': '   ',
    'Cuba': ' ',
    'N. Cyprus': '   ',
    'Cyprus': '  ',
    'Czech Rep.': ' ',
    'Germany': ' ',
    'Djibouti': '  ',
    'Denmark': ' ',
    'Algeria': '   ',
    'Ecuador': '  ',
    'Egypt': ' ',
    'Eritrea': '   ',
    'Spain': '  ',
    'Estonia': '  ',
    'Ethiopia': '   ',
    'Finland': ' ',
    'Fiji': ' ',
    'Falkland Islands': '   ',
    'France': ' ',
    'Gabon': ' ',
    'United Kingdom': ' ',
    'Georgia': '  ',
    'Ghana': ' ',
    'Guinea': '  ',
    'Gambia': '  ',
    'Guinea Bissau': '   ',
    'Eq. Guinea': '   ',
    'Greece': ' ',
    'Greenland': '  ',
    'Guatemala': '  ',
    'French Guiana': '   ',
    'Guyana': '  ',
    'Honduras': '  ',
    'Croatia': '  ',
    'Haiti': ' ',
    'Hungary': '  ',
    'Indonesia': '   ',
    'India': ' ',
    'Ireland': '  ',
    'Iran': ' ',
    'Iraq': '  ',
    'Iceland': ' ',
    'Israel': '  ',
    'Italy': '  ',
    'Jamaica': '  ',
    'Jordan': ' ',
    'Japan': ' ',
    'Kazakhstan': '   ',
    'Kenya': '  ',
    'Kyrgyzstan': '    ',
    'Cambodia': '  ',
    'Korea': ' ',
    'Kosovo': '  ',
    'Kuwait': '  ',
    'Lao PDR': ' ',
    'Lebanon': '  ',
    'Liberia': '   ',
    'Libya': '  ',
    'Sri Lanka': '   ',
    'Lesotho': '  ',
    'Lithuania': '  ',
    'Luxembourg': '  ',
    'Latvia': '   ',
    'Morocco': '  ',
    'Moldova': '   ',
    'Madagascar': '   ',
    'Mexico': '  ',
    'Macedonia': '  ',
    'Mali': ' ',
    'Myanmar': ' ',
    'Montenegro': ' ',
    'Mongolia': ' ',
    'Mozambique': '  ',
    'Mauritania': '   ',
    'Malawi': '  ',
    'Malaysia': '  ',
    'Namibia': '   ',
    'New Caledonia': '   ',
    'Niger': '  ',
    'Nigeria': '   ',
    'Nicaragua': '  ',
    'Netherlands': ' ',
    'Norway': ' ',
    'Nepal': '  ',
    'New Zealand': '  ',
    'Oman': ' ',
    'Pakistan': '  ',
    'Panama': '  ',
    'Peru': ' ',
    'Philippines': '  ',
    'Papua New Guinea': '    ',
    'Poland': ' ',
    'Puerto Rico': '  ',
    'Dem. Rep. Korea': ' ',
    'Portugal': '  ',
    'Paraguay': '  ',
    'Qatar': '  ',
    'Romania': '  ',
    'Russia': '  ',
    'Rwanda': '  ',
    'W. Sahara': '  ',
    'Saudi Arabia': '   ',
    'Sudan': ' ',
    'S. Sudan': '  ',
    'Senegal': '  ',
    'Solomon Is.': '   ',
    'Sierra Leone': '  ',
    'El Salvador': '  ',
    'Somaliland': '  ',
    'Somalia': '  ',
    'Serbia': '  ',
    'Suriname': '  ',
    'Slovakia': '  ',
    'Slovenia': '   ',
    'Sweden': ' ',
    'Swaziland': '  ',
    'Syria': '  ',
    'Chad': ' ',
    'Togo': ' ',
    'Thailand': ' ',
    'Tajikistan': '   ',
    'Turkmenistan': '   ',
    'East Timor': '  ',
    'Trinidad and Tobago': '    ',
    'Tunisia': '  ',
    'Turkey': '  ',
    'Tanzania': '  ',
    'Uganda': '  ',
    'Ukraine': '  ',
    'Uruguay': '  ',
    'United States': ' ',
    'Uzbekistan': '   ',
    'Venezuela': '   ',
    'Vietnam': ' ',
    'Vanuatu': '   ',
    'West Bank': ' ',
    'Yemen': ' ',
    'South Africa': ' ',
    'Zambia': '  ',
    'Zimbabwe': '   ',
    'Comoros': '  '
}

map = Map(init_opts=opts.InitOpts(width="1900px", height="900px",
                                  bg_color="#ADD8E6",
                                  page_title="    "))  #
map.add("  ", [list(z) for z in zip(data_world['  '], data_world['  '])],
        is_map_symbol_show=False,  #
        #  name_map
        maptype="world", label_opts=opts.LabelOpts(is_show=False),␣
 ↪name_map=name_map,
        itemstyle_opts=opts.ItemStyleOpts(color="rgb(49,60,72)"),
        ).set_global_opts(
    visualmap_opts=opts.VisualMapOpts(max_=1000000),  #
)
map.render_notebook()  # notebook
```

[10]:
```
<pyecharts.render.display.HTML at 0x1f9698f7c40>
```

[11]:
```
country=data_area_times.sort_values('province_confirmedCount',
                                   ascending=False).
 ↪drop_duplicates(subset='countryName',                                    ␣

 ↪keep='first').head(6)['countryName']

#
country=list(country)
country
```

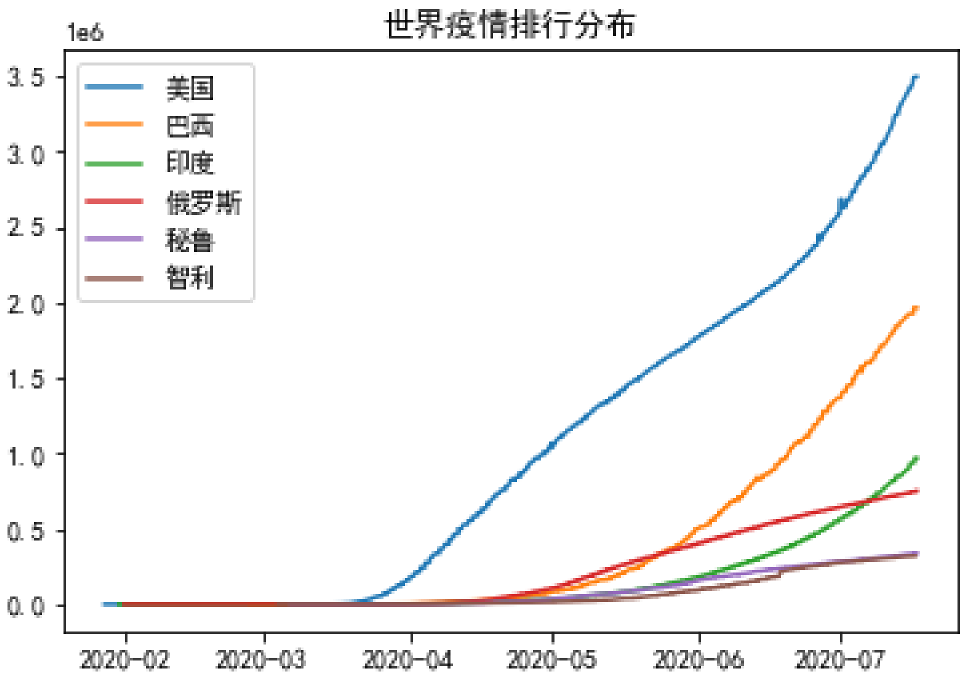
[11]:
```
[' ', ' ', ' ', '  ', ' ', ' ']
```

[12]:
```
#
data_America=data_area_times[data_area_times['countryName']==' ']
data_Brazil=data_area_times[data_area_times['countryName']==' ']
data_India=data_area_times[data_area_times['countryName']==' ']
data_Russia=data_area_times[data_area_times['countryName']=='  ']
data_Peru=data_area_times[data_area_times['countryName']==' ']
```

```
data_Chile=data_area_times[data_area_times['countryName']==' ']


timeindex=data_area_times.index
timeindex=timeindex.floor('D')#
data_area_times.index=timeindex

#
timeseries=pd.DataFrame(data_America.index)
timeseries.index=data_America.index
data_America=pd.concat([timeseries,data_America],axis=1)
#
data_America.drop_duplicates(subset='updateTime',
                             keep='first',
                             inplace=True)
data_America.drop('updateTime',axis=1,inplace=True)

#
timeseries=pd.DataFrame(data_Brazil.index)
timeseries.index=data_Brazil.index
data_Brazil=pd.concat([timeseries,data_Brazil],axis=1)
#
data_Brazil.drop_duplicates(subset='updateTime',
                             keep='first',
                             inplace=True)
data_Brazil.drop('updateTime',axis=1,inplace=True)

#
timeseries=pd.DataFrame(data_India.index)
timeseries.index=data_India.index
data_India=pd.concat([timeseries,data_India],axis=1)
#
data_India.drop_duplicates(subset='updateTime',
                             keep='first',
                             inplace=True)
data_India.drop('updateTime',axis=1,inplace=True)

#
timeseries=pd.DataFrame(data_Russia.index)
timeseries.index=data_Russia.index
data_Russia=pd.concat([timeseries,data_Russia],axis=1)
#
data_Russia.drop_duplicates(subset='updateTime',
                             keep='first',
                             inplace=True)
data_Russia.drop('updateTime',axis=1,inplace=True)
```

```
#
timeseries=pd.DataFrame(data_Peru.index)
timeseries.index=data_Peru.index
data_Peru=pd.concat([timeseries,data_Peru],axis=1)
#
data_Peru.drop_duplicates(subset='updateTime',
                            keep='first',
                            inplace=True)
data_Peru.drop('updateTime',axis=1,inplace=True)

#
timeseries=pd.DataFrame(data_Chile.index)
timeseries.index=data_Chile.index
data_Chile=pd.concat([timeseries,data_Chile],axis=1)
#
data_Chile.drop_duplicates(subset='updateTime',
                            keep='first',
                            inplace=True)
data_Chile.drop('updateTime',axis=1,inplace=True)

#
plt.title("    ")
plt.rcParams['font.sans-serif']=['SimHei']#
plt.plot(data_America['province_confirmedCount'])
plt.plot(data_Brazil['province_confirmedCount'])
plt.plot(data_India['province_confirmedCount'])
plt.plot(data_Russia['province_confirmedCount'])
plt.plot(data_Peru['province_confirmedCount'])
plt.plot(data_Chile['province_confirmedCount'])
plt.legend(country)
```

```
[12]: <matplotlib.legend.Legend at 0x1f969cca430>
```



```
[13]: !pip install wordcloud==1.8.0
```

```
Requirement already satisfied: wordcloud==1.8.0 in
c:\programdata\anaconda3\lib\site-packages (1.8.0)
Requirement already satisfied: pillow in c:\programdata\anaconda3\lib\site-
packages (from wordcloud==1.8.0) (8.2.0)
Requirement already satisfied: numpy>=1.6.1 in
c:\programdata\anaconda3\lib\site-packages (from wordcloud==1.8.0) (1.20.1)
Requirement already satisfied: matplotlib in c:\programdata\anaconda3\lib\site-
packages (from wordcloud==1.8.0) (3.3.4)
Requirement already satisfied: cycler>=0.10 in
c:\programdata\anaconda3\lib\site-packages (from matplotlib->wordcloud==1.8.0)
(0.10.0)
Requirement already satisfied: python-dateutil>=2.1 in
c:\programdata\anaconda3\lib\site-packages (from matplotlib->wordcloud==1.8.0)
(2.8.1)
Requirement already satisfied: kiwisolver>=1.0.1 in
c:\programdata\anaconda3\lib\site-packages (from matplotlib->wordcloud==1.8.0)
(1.3.1)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in
c:\programdata\anaconda3\lib\site-packages (from matplotlib->wordcloud==1.8.0)
(2.4.7)
Requirement already satisfied: six in c:\programdata\anaconda3\lib\site-packages
```

```
(from cycler>=0.10->matplotlib->wordcloud==1.8.0) (1.15.0)

WARNING: Ignoring invalid distribution -ertifi
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
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```
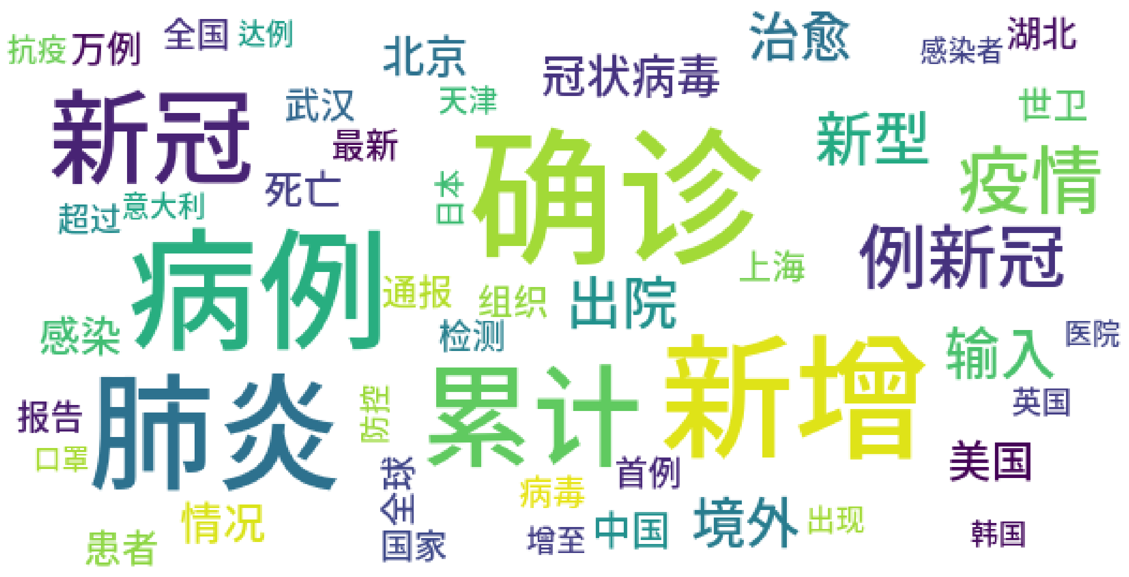

[13]:
```python
import jieba
import re
from wordcloud import WordCloud

def word_cut(x): return jieba.lcut(x)  #

news = []
reg = "[^\u4e00-\u9fa5]"
for i in data_news['title']:
    if re.sub(reg, '', i) != '':  #
        news.append(re.sub(reg, '', i))  # news

words = []
counts = {}
for i in news:
    words.append(word_cut(i))  #
for word in words:
    for a_word in word:
        if len(a_word) == 1:
            continue
        else:
            counts[a_word] = counts.get(a_word, 0)+1  #
words_sort = list(counts.items())
words_sort.sort(key=lambda x: x[1], reverse=True)

newcloud = WordCloud(font_path="C:/Users/21616/NotoSansCJK.otf",
                     background_color="white", width=600, height=300,␣
 ↪max_words=50)  #
newcloud.generate_from_frequencies(counts)
```

```
image = newcloud.to_image()  #
image
```

```
Building prefix dict from the default dictionary …
Loading model from cache C:\Users\21616\AppData\Local\Temp\jieba.cache
Loading model cost 0.593 seconds.
Prefix dict has been built successfully.
```

[13]:

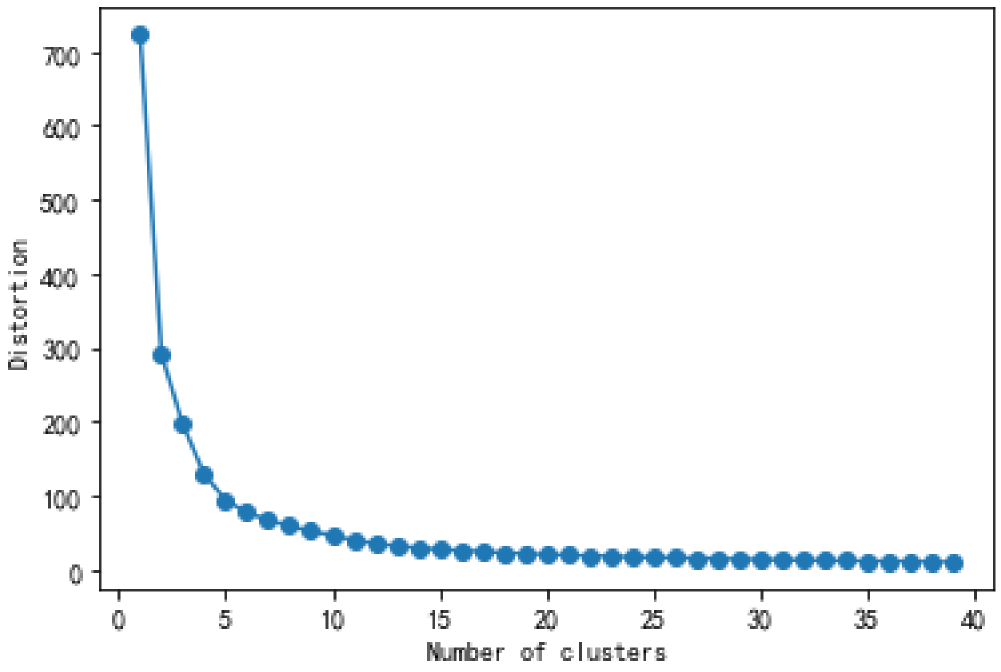


[15]:

```
#K-Means
from gensim.models import Word2Vec
from sklearn.cluster import KMeans
import warnings
warnings.filterwarnings('ignore')

words=[]

for i in news:
    words.append(word_cut(i))
model = Word2Vec(words,sg=0 ,size=300, window=5, min_count=5)  #
keys = model.wv.vocab.keys()  #
wordvector = []
for key in keys:
    wordvector.append(model[key])  #

distortions = []
for i in range(1, 40):
    word_kmeans = KMeans(n_clusters=i,
                         init='k-means++',
                         n_init=10,
                           max_iter=300,
                           random_state=0)  #   1-40
    word_kmeans.fit(wordvector)
    distortions.append(word_kmeans.inertia_)  #

plt.plot(range(1, 40), distortions, marker='o')  #
plt.xlabel('Number of clusters')
plt.ylabel('Distortion')
```

```
C:\Users\21616\AppData\Roaming\Python\Python38\site-
packages\gensim\utils.py:860: UserWarning: detected Windows; aliasing chunkize
to chunkize_serial
  warnings.warn("detected Windows; aliasing chunkize to chunkize_serial")
Slow version of gensim.models.doc2vec is being used
Slow version of Fasttext is being used
```

[15]:
```
Text(0, 0.5, 'Distortion')
```



[16]:
```
word_kmeans=KMeans(n_clusters=10)# 10
word_kmeans.fit(wordvector)

labels=word_kmeans.labels_

for num in range(0,10):
```

```python
    text=[]
    for i in range(len(keys)):
        if labels[i] ==num:
            text.append(list(keys)[i])
    print(text)
```

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```

[17]:
```
#
sum_GDP = ['    ', '    ', '    ', '    ']
industry_GDP = ['    ', '   ', '   ', '   ']
industry2_GDP = ['     ', '        ', '     ', '    ']
industry3_GDP = ['    ', '          ','       ', '    ']

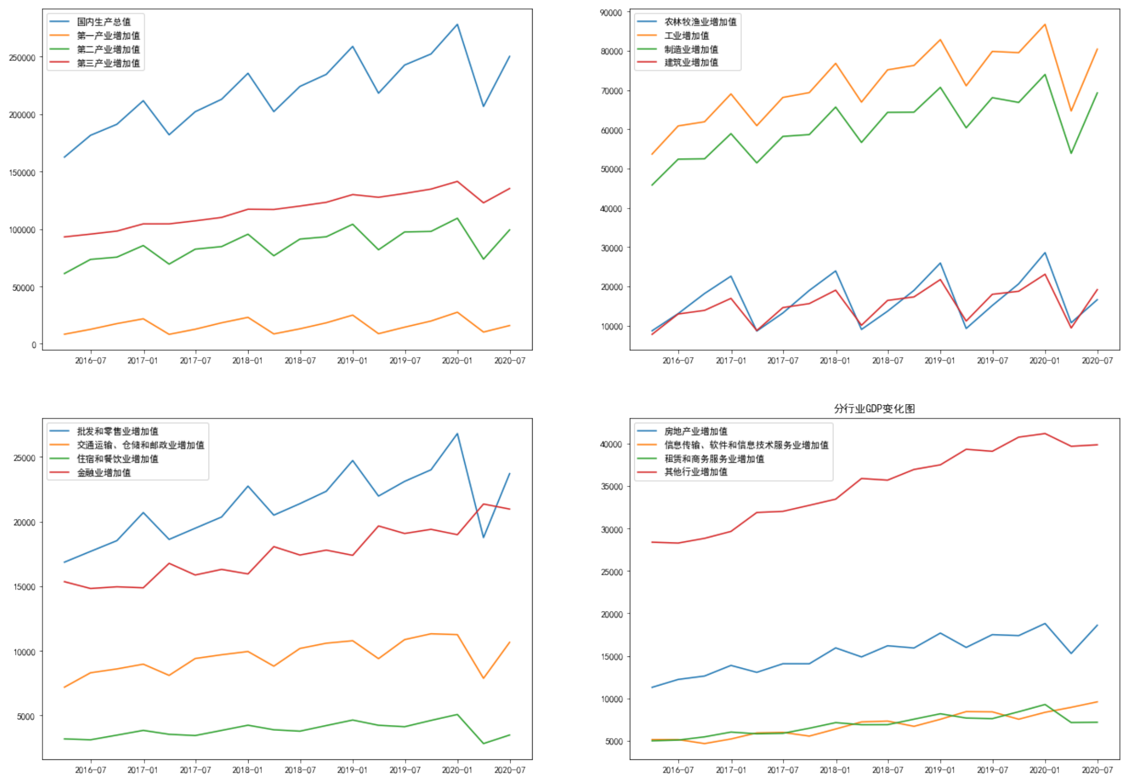
#
fig=plt.figure()
fig,axes=plt.subplots(2,2,figsize=(21,15))

axes[0][0].plot(data_economy[sum_GDP])
axes[0][0].legend(sum_GDP)
axes[0][1].plot(data_economy[industry_GDP])
axes[0][1].legend(industry_GDP)
axes[1][0].plot(data_economy[industry2_GDP])
axes[1][0].legend(industry2_GDP)
axes[1][1].plot(data_economy[industry3_GDP])
axes[1][1].legend(industry3_GDP)

plt.title('  GDP  ')
```

[17]:
```
Text(0.5, 1.0, '  GDP  ')

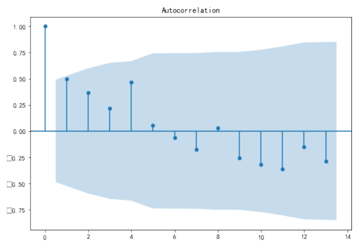
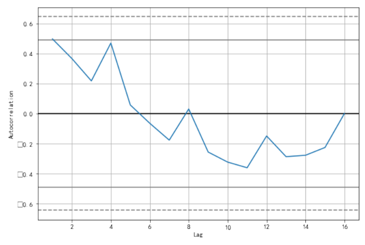
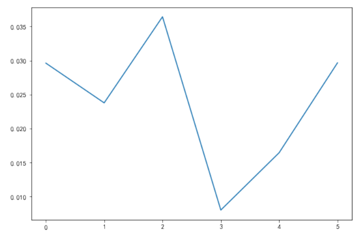
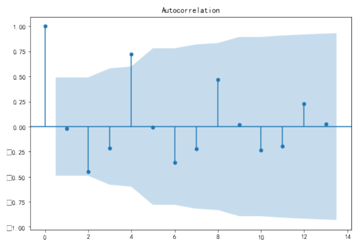
<Figure size 432x288 with 0 Axes>
```



[21]:
```
#      16         2020
from statsmodels.graphics.tsaplots import plot_acf
from pandas.plotting import autocorrelation_plot
from statsmodels.sandbox.stats.diagnostic import acorr_ljungbox

GDP_type=['    ', '     ', '     ', '     ',
            '     ', '    ', '     ', '     ', '      ',
            '        ', '        ', '    ',
            '     ', '            ', '         ', '     ']

for i in GDP_type:
    each_data=data_economy[i][:-2]
    plt.figure(figsize=(30,6))
    ax1=plt.subplot(1,3,1)
    ax2=plt.subplot(1,3,2)
    ax3=plt.subplot(1,3,3)
    LB2,P2=acorr_ljungbox(each_data)#
    plot_acf(each_data,ax=ax1)
    autocorrelation_plot(each_data,ax=ax2)#
    ax3.plot(P2)
```


Autocorrelation

Autocorrelation
Lag


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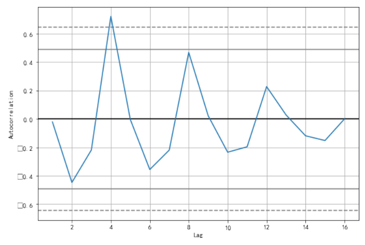
Autocorrelation
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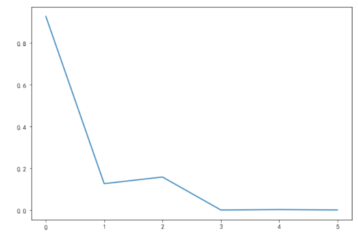
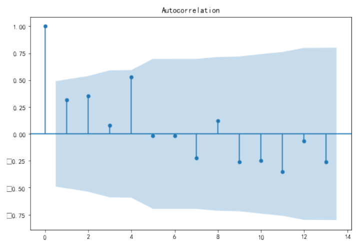
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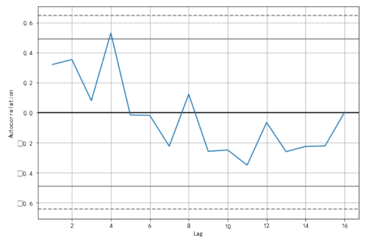
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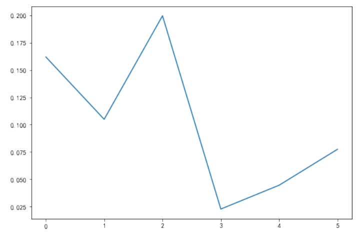
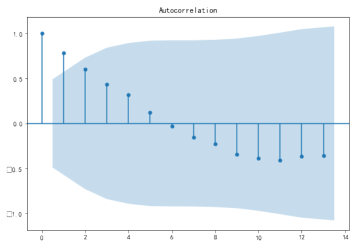
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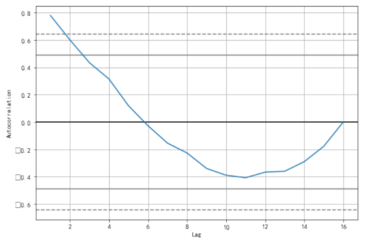
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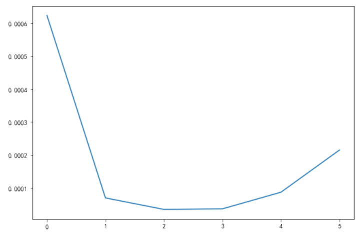
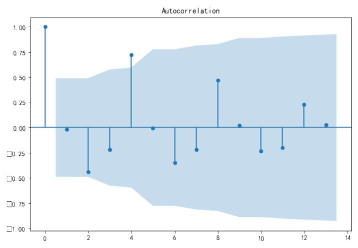
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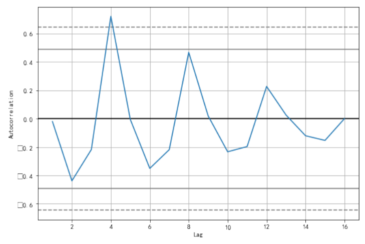
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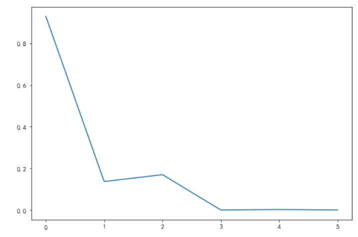

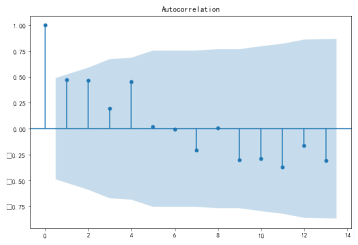
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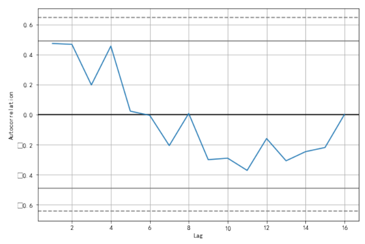
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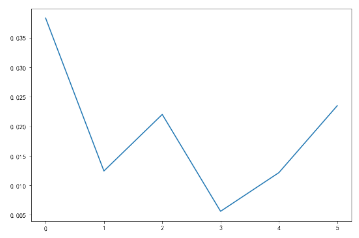
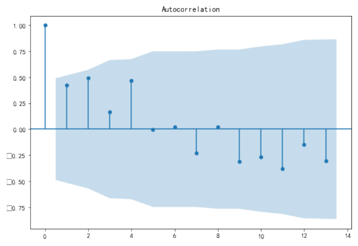
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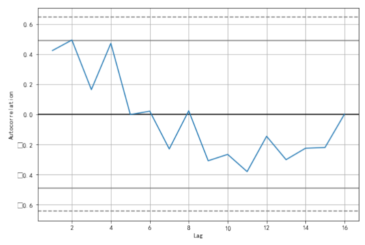
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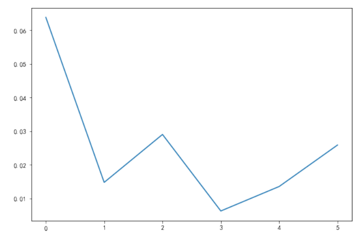
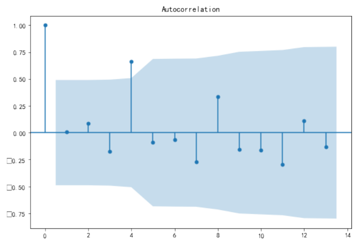
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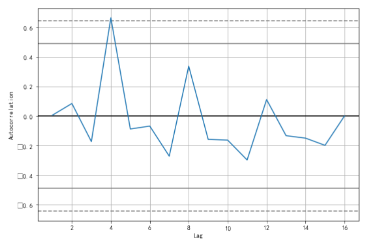
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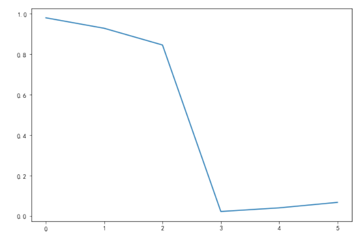
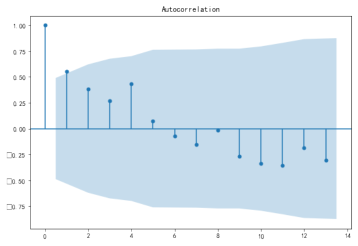
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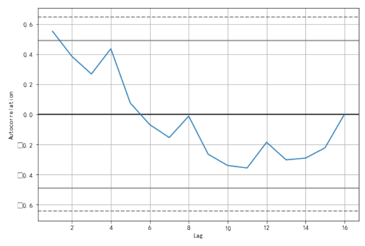
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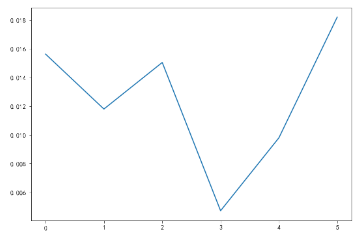
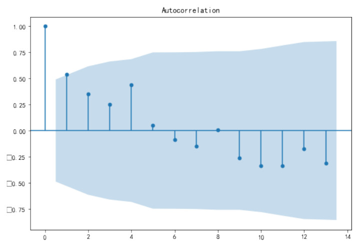
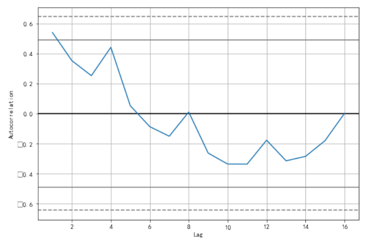



Autocorrelation

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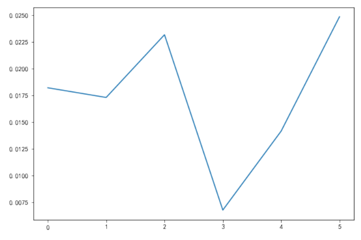
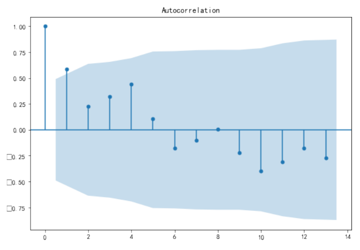
Lag
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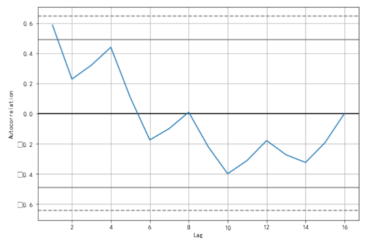
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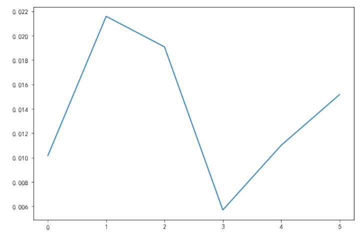

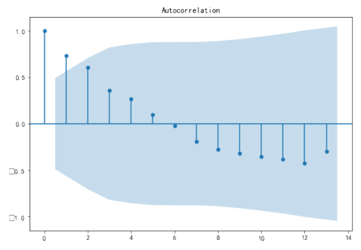
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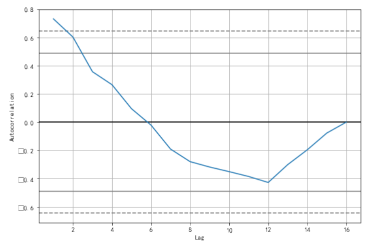
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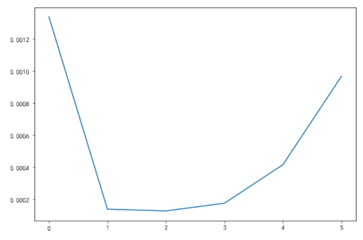

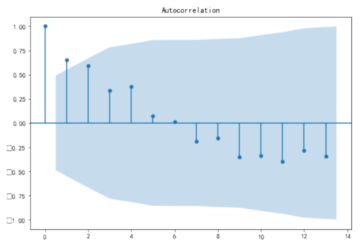
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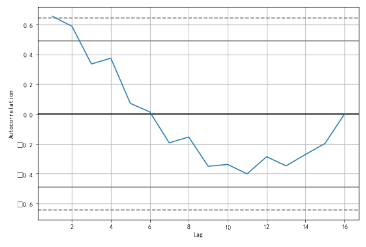
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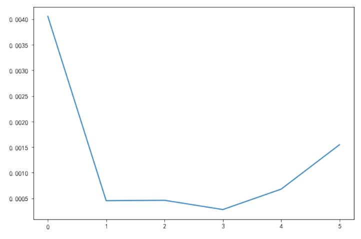

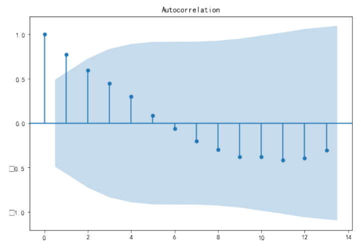
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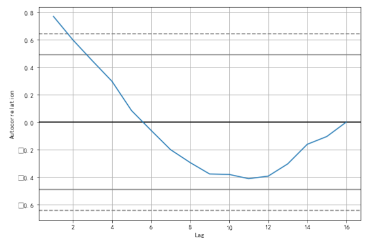
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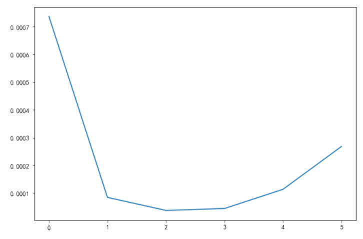

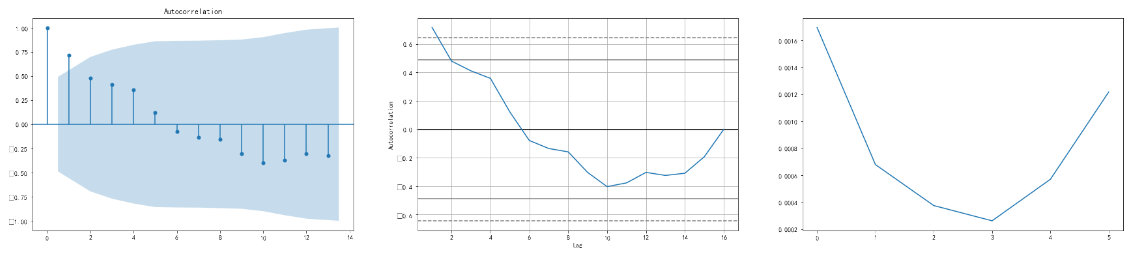

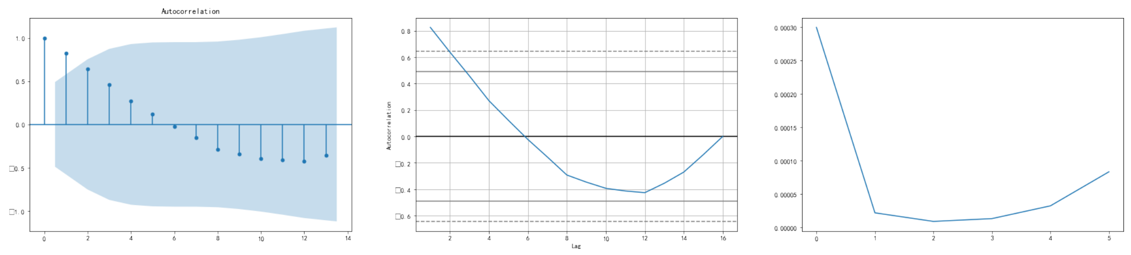

```
[18]: from statsmodels.tsa.arima_model import ARMA
      from statsmodels.tsa.stattools import arma_order_select_ic

      warnings.filterwarnings('ignore')
      data_arma = pd.DataFrame(data_economy['    '][:-2])  #     16
      a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
      arma = ARMA(data_arma, order=(a, b)).fit()  #  ARMA
      rate1 = list(data_economy['    '][-2] /
                   arma.forecast(steps=1)[0])  #
      rate1  #
```

```
[18]: [0.82735395145072571]
```

```
[19]: #  pyecharts
      from pyecharts import options as opts
      from pyecharts.charts import Liquid

      c = (
          Liquid()
          .add("  /  ", rate1, is_outline_show=False)
          .set_global_opts(title_opts=opts.TitleOpts(title="          ",
                                                      pos_left="center"))
      )
      c.render_notebook()
```

[19]: <pyecharts.render.display.HTML at 0x1f973703100>

[20]:
```
#
warnings.filterwarnings('ignore')
data_arma = pd.DataFrame(data_economy['    '][:-2])
a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
arma = ARMA(data_arma, order=(a, b)).fit()
rate2 = list(data_economy['    '][-2]/arma.forecast(steps=1)[0])
c = (
    Liquid()
    .add("  /  ", rate2, is_outline_show=False)
    .set_global_opts(title_opts=opts.TitleOpts(title="    ", pos_left="center"))
)
c.render_notebook()
```

[20]: <pyecharts.render.display.HTML at 0x1f97343adc0>

[21]:
```
warnings.filterwarnings('ignore')
data_arma = pd.DataFrame(data_economy['    '][:-2])
a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
arma = ARMA(data_arma, order=(a, b)).fit()
rate3 = list(data_economy['    '][-2]/arma.forecast(steps=1)[0])
c = (
    Liquid()
    .add("  /  ", rate3, is_outline_show=False)
    .set_global_opts(title_opts=opts.TitleOpts(title="   ", pos_left="center"))
)
c.render_notebook()
```

[21]: <pyecharts.render.display.HTML at 0x1f9733ff520>

[22]:
```
data_arma = pd.DataFrame(data_economy['     '][:-2])
a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
arma = ARMA(data_arma, order=(a, b)).fit()
rate4 = list(data_economy['     '][-2]/arma.forecast(steps=1)[0])
c = (
    Liquid()
    .add("  /  ", rate4, is_outline_show=False)
    .set_global_opts(title_opts=opts.TitleOpts(title="     ",␣
 ↪pos_left="center"))
)
c.render_notebook()
```

[22]: <pyecharts.render.display.HTML at 0x1f973049be0>

[23]:
```
data_arma = pd.DataFrame(data_economy['    '][:-2])
a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
```

```
arma = ARMA(data_arma, order=(a, b)).fit()
rate = list(data_economy['    '][-2]/arma.forecast(steps=1)[0])
c = (
    Liquid()
    .add("  /  ", rate, is_outline_show=False)
    .set_global_opts(title_opts=opts.TitleOpts(title="    ", pos_left="center"))
)
c.render_notebook()
```

[23]:
```
<pyecharts.render.display.HTML at 0x1f96995bd00>
```

[24]:
```
data_arma = pd.DataFrame(data_economy['          '][:-2])
a, b = arma_order_select_ic(data_arma, ic='hqic')['hqic_min_order']
arma = ARMA(data_arma, order=(a, b)).fit()
rate = list(data_economy['          '][-2]/arma.forecast(steps=1)[0])
c = (
    Liquid()
    .add("  /  ", rate, is_outline_show=False)
    .set_global_opts(title_opts=opts.TitleOpts(title="          ",
                                               pos_left="center"))
)
c.render_notebook()
```

[24]:
```
<pyecharts.render.display.HTML at 0x1f969cb9460>
```

[ ]:
```

```