互评作业1: 数据探索性分析与数据预处理

选取的数据集：

1. Wine Reviews
2. Trending YouTube Video Statistics

> 导入数据集

```python
import numpy as np
import pandas as pd
from scipy import stats
import matplotlib.pyplot as plt
import operator

# Wine Reviews
wine_1 = pd.read_csv('./wine-reviews/winemag-data-130k-v2.csv', index_col = 0)
wine_2 = pd.read_csv('./wine-reviews/winemag-data_first150k.csv', index_col = 0)
wine_data = pd.concat([wine_1, wine_2], ignore_index=True, verify_integrity=True, sort=False)

# Trending YouTube Video Statistics
ytb_01 = pd.read_csv('./youtube-new/CAvideos.csv', index_col = 0)
ytb_02 = pd.read_csv('./youtube-new/DEvideos.csv', index_col = 0)
ytb_03 = pd.read_csv('./youtube-new/FRvideos.csv', index_col = 0)
ytb_04 = pd.read_csv('./youtube-new/GBvideos.csv', index_col = 0)
ytb_05 = pd.read_csv('./youtube-new/INvideos.csv', index_col = 0)
ytb_06 = pd.read_csv('./youtube-new/JPvideos.csv', index_col = 0, engine = 'python')
ytb_07 = pd.read_csv('./youtube-new/KRvideos.csv', index_col = 0, engine = 'python')
ytb_08 = pd.read_csv('./youtube-new/MXvideos.csv', index_col = 0, engine = 'python')
ytb_09 = pd.read_csv('./youtube-new/RUvideos.csv', index_col = 0, engine = 'python')
ytb_10 = pd.read_csv('./youtube-new/USvideos.csv', index_col = 0)
ytb_data = pd.concat([ytb_01, ytb_02, ytb_03, ytb_04, ytb_05, ytb_06, ytb_07, ytb_08, ytb_09, ytb_10], ignore_index=True, verify_integrity=True, sort=False)
```

1. 数据可视化和摘要

1.1 数据摘要

```
# 频数
def freq(data):
    res = dict()
    for i in data:
        if i in res:
            res[i] += 1
        else:
            res[i] = 1
    return res

## 1. Wine Reviews 的相关频数
# 1.1 country
country = {k: v for k, v in sorted(freq(wine_data.country).items(), key=lambda item: item[1], reverse=True)}
pairs = {k: country[k] for k in list(country)[:20]}
print("country 的频数统计展示\ncountry:\t frequency")
for c, f in pairs.items():
    print("%s:\t %i" % (c, f))

# 1.2 province
province = {k: v for k, v in sorted(freq(wine_data.province).items(), key=lambda item: item[1], reverse = True)}
pairs = {k: province[k] for k in list(province)[:20]}
print("\n\nprovince 的频数统计展示\nprovince:\t\t frequency")
for p, f in pairs.items():
    print("%s:\t\t %i" % (p, f))
```

```
country 的频数统计展示
country:   frequency
US:  116901
France:   43191
Italy:   43018
Spain:   14913
Portugal:  11013
Chile:   10288
Argentina:   9431
Australia:   7286
Austria:   6402
New Zealand:   4739
Germany:   4617
South Africa:  3659
Greece:  1350
Israel:  1135
Canada:  453
Hungary:   377
Romania:   259
Bulgaria:  218
Uruguay:   201
```

```
Slovenia:  181
```

```
province 的频数统计展示
province:    frequency
California:    80755
Washington:    18389
Tuscany:      13178
Bordeaux:     12052
Oregon:    9962
Northern Spain:    8743
Burgundy:    8288
Mendoza Province:    8006
Piedmont:    7822
Veneto:    6678
New York:    5116
South Australia:     4353
Sicily & Sardinia:     4342
Alsace:    4120
Northeastern Italy:    4120
Loire Valley:    3642
Southwest France:    3104
Champagne:      2983
Southern Italy:    2788
Central Italy:     2763
```

```
## 2. Trending YouTube Video Statistics 的相关频数
# 2.1 channel_title
channel_title = {k: v for k, v in
sorted(freq(ytb_data.channel_title).items(),key=lambda item: item[1],
reverse=True)}
pairs = {k: channel_title[k] for k in list(channel_title)[:20]}
print("\n\nchannel_title 的频数统计展示\nchannel_title:\t\t\t\t frequency")
for c, f in pairs.items():
    print("%s:\t\t\t\t %i" % (c, f))

# 2.2 tags
tags = {k: v for k, v in sorted(freq(ytb_data.tags).items(),key=lambda item:
item[1], reverse=True)}
pairs = {k: tags[k] for k in list(tags)[:20]}
print("\n\ntags 的频数统计展示\ntags:\t\t\t\t frequency")
for c, f in pairs.items():
    print("%s:\t\t\t\t %i" % (c, f))
```

```
channel_title 的频数统计展示
channel_title:         frequency
The Late Show with Stephen Colbert:        984
WWE:         804
Late Night with Seth Meyers:         773
VikatanTV:         763
TheEllenShow:        743
Jimmy Kimmel Live:         707
The Tonight Show Starring Jimmy Fallon:        705
PewDiePie:         652
RadaanMedia:         651
The Late Late Show with James Corden:        583
CNN:         579
Netflix:         566
FBE:         555
MLG Highlights:        549
SET India:         528
Screen Junkies:        494
ESPN:        486
Marvel Entertainment:        482
BuzzFeedVideo:         481
Warner Bros. Pictures:         470
```

```
tags 的频数统计展示
tags:        frequency
[none]:        37698
шарий|"шарий блог"|"новое видео шарий"|"шарий новое"|"анатолий шарий"|"шарий
анатолий"|"ifhbq"|"видео шария"|"толя шарий":         353
The Late Show|"Stephen Colbert"|"Colbert"|"Late Show"|"celebrities"|"late
night"|"talk show"|"skits"|"bit"|"monologue"|"The Late Late Show"|"Late Late
Show"|"letterman"|"david
letterman"|"comedian"|"impressions"|"CBS"|"joke"|"jokes"|"funny"|"funny
video"|"funny videos"|"humor"|"celebrity"|"celeb"|"hollywood"|"famous"|"James
Corden"|"Corden"|"Comedy":         341
Vaani rani|"rani"|"Radhika in funny character"|"venu
aravind"|"SunTV"|"VaniRani"|"vani"|"vaani"|"Radhika's dual role
serial"|"Ranimma veetu kuripu"|"Radhika as lawyer in
serial"|"radikaa"|"rathika"|"Radhika's new":         313
flowers tv|"uppum mulakum"|"uppum"|"biju
sopanam"|"Balanchandran"|"Neelima"|"juhi rustagi"|"flower tv comedy"|"flower
tv malayalam"|"balanchandran"|"entertainment"|"best comedy serial
malayalam"|"s p sreekumar"|"college campus comedy"|"marimayam"|"sneha
sreekumar"|"programme"|"moosa"|"m80 moosa"|"funny"|"flower tv comedy
night"|"malayalam comedy"|"+uppum mulakum":         299
```

```
etv Plus|"etv comedy show"|"3 Idiots"|"anchor ravi"|"Chinnadana
Neekosam"|"express raja"|"hungama"|"Kick"|"Nandini Vs
Nandini"|"Pataas"|"jabardasth"|"extra jabardasth"|"naga babu"|"roja"|"anchor
anasuya"|"pove pora"|"comedy short films"|"yadamma raju"|"chalaki
chanti"|"sudigali sudeer"|"anchor suma"|"comedy show"|"anchor
sreemukhi"|"comedy skits in telugu"|"telugu comedy tracks"|"racha
ravi"|"allare allari"|"sardaga kasepu"|"ejunction"|"anchor pradeep"|"pataas
punches"|"anchor vishnupriya"|"getup srinu":        252
best vines 2018|"funny vines"|"funny videos"|"funniest videos 2018":
247
James Corden|"The Late Late Show"|"Colbert"|"late night"|"late night
show"|"Stephen
Colbert"|"Comedy"|"monologue"|"comedian"|"impressions"|"celebrities"|"carpool"
|"karaoke"|"CBS"|"Late Late Show"|"Corden"|"joke"|"jokes"|"funny"|"funny
video"|"funny videos"|"humor"|"celebrity"|"celeb"|"hollywood"|"famous":
245
etv daily serials|"etv daily soaps"|"etv fictions"|"bharyamani"|"etv
chandramukhi"|"etv manasu mamata"|"swathi
chinukulu"|"sikharam"|"anthapuram"|"adade aadaram"|"cash"|"jabardasth"|"extra
jabardasth"|"nagababu"|"latest telugu serials"|"Krish"|"savithri"|"manasu
mamatha"|"naperu meenakshi"|"gokulamlo seetha"|"antahpuram"|"seetamma
vakitlo"|"champion"|"dhee jodi":        229
Vaani rani|"rani"|"Radhika in funny character"|"venu
aravind"|"SunTV"|"VaniRani"|"vani"|"vaani"|"Radhika's dual role
serial"|"Ranimma veetu kuripu"|"Radhika as lawyer in
serial"|"radikaa"|"Radhika's new":          226
ABC|"americanidol"|"idol"|"american idol"|"ryan"|"seacrest"|"ryan
seacrest"|"katy"|"perry"|"katy perry"|"luke"|"bryan"|"luke
bryan"|"lionel"|"richie"|"lionel richie"|"season 16"|"american idol
XVI"|"television"|"ad"|"spring"|"2018"|"music"|"reality"|"competition"|"song"|
"sing"|"audition"|"auditions"|"performance"|"live"|"fox"|"AI"|"hollywood"|"con
testant"|"official"|"american"|"official american idol"|"hollywood
week"|"hometown audition":          225
BIGHIT|"빅히트"|"방탄소년단"|"BTS"|"BANGTAN"|"방탄":          223
etv shows|"eenadu television"|"padutha theeyaga"|"super2"|"dhee
Jodi"|"jabardasth"|"extra jabardsth"|"etv20"|"etv comedy show"|"extra
jabardasth"|"naga babu"|"roja"|"anchor
anasuya"|"rashmi"|"dhanraj"|"chandra"|"chanti"|"comedy short
films"|"raghava"|"rocket raghava"|"roller raghu"|"venu wonders"|"comedy skits
in telugu"|"racha ravi"|"adhire abhi"|"fata fut fun"|"shaking
sheshu"|"sudigaali"|"Rocking rakesh"|"Adhire abhi"|"kiraak rp"|"hyper
aadi"|"raising raju"|"venkey monkeys"|"durga rao":          208
the real|"daytime"|"talk show"|"women"|"tamera mowry"|"adrienne bailon"|"loni
love"|"jeannie mai":          197
The Late Show|"Late Show"|"Stephen Colbert"|"Steven
Colbert"|"Colbert"|"celebrity"|"celeb"|"celebrities"|"late night"|"talk
show"|"comedian"|"comedy"|"CBS"|"joke"|"jokes"|"funny"|"funny video"|"funny
videos"|"humor"|"hollywood"|"famous":        189
```

```
철구|"BJ철구"|"아프리카철구"|"afreecaTV"|"아프리카TV"|"BJ"|"비제이"|"인터넷방송"|"인터넷방송
BJ유머방송"|"개그방송"|"유머영상"|"개그영상"|"게임영상"|"게임방송"|"꿀잼"|"웃긴영상"|"웃긴방송":
167
tarang|"tarang tv"|"tarang tv online"|"tarang tv serial"|"odia tarang tv
serial"|"tarang tv show"|"taranga channel"|"tarang tv channel"|"odia tarang
channel"|"odia serial"|"odia serial video"|"odia channel"|"odia tv
channel"|"odia tv show"|"odia tv":          163
Trailer|"Deadpool"|"20th Century Fox (Production Company)"|"Deadpool
Movie"|"Ryan Reynolds (Celebrity)"|"Ed Skrein (Musical Artist)"|"T. J. Miller
(TV Writer)"|"Gina Carano (Martial Artist)"|"Red band"|"Red band
deadpool"|"Marvel"|"Marvel Comics"|"Comic Book (Comic Book Genre)"|"Dead
pool"|"Deadpool green band"|"Deadpool red band"|"Action"|"Comedy"|"Action
Comedy"|"X-Men (Award-Winning Work)"|"deadpool movie"|"deadpool
sequel"|"deadpool 2"|"2nd deadpool movie":        158
Sri Lanka|"Sinhala"|"TV
Derana"|"Derana"|"DTV"|"Lanka"|"Premium"|"Entertainment"|"Deweni
Inima"|"Dewana Inima"|"Deveni Inima"|"Devana Inima"|"Cricket"|"Sri Lanka
Cricket"|"Cricket Match"|"Dawana Inima"|"Deweni Enima"|"Deveni
Enima"|"Deweni"|"02nd Innings"|"Innings"|"Second Inning"|"Cricket
Team"|"Saranga Mendis"|"Janaka Siriwardana"|"Saman Edirimuni"|"Best
Teledrama"|"Sri Lankan Teledrama"|"Top Teledrama"|"Sri Lanka's Best"|"Play
Cricket"|"Love"|"Romantic"|"School"|"School Love"|"Adventure"|"Fight":
157
след:        155
```

```python
# 5 数概括
def nums(nums):
    # 排序
    sorted_nums = sorted(nums)
    # 平均数
    mean = np.mean(sorted_nums)
    # 最小值
    minimum = sorted_nums[0]
    # 最大值
    maximum = sorted_nums[-1]
    # 分位数
    q1, median, q3 = np.percentile(sorted_nums, [25, 50, 75])
    # 中位数
    median = np.median(sorted_nums)
    # 众数
    mode = stats.mode(sorted_nums)[0][0]
    variance = np.var(sorted_nums)
    return len(nums), minimum, maximum, mean, variance, mode, median, q1, q3

## 1. Wine Reviews 的相关概括
# 1.1 points
```

```
n11, n12, n13, n14, n15, n16, n17, n18, n19 =
nums(np.array(wine_data.points.dropna()))
print("points 五数概括")
print('最小值：\t%g' % n12)
print('q1：\t%g' % n18)
print('中位数：\t%g' % n17)
print('q3：\t%g' % n19)
print('最大值：\t%g' % n13)
print("points 缺失值个数：%g" % wine_data.points.isna().sum())

# 1.2 price
n21, n22, n23, n24, n25, n26, n27, n28, n29 =
nums(np.array(wine_data.price.dropna()))
print("\n\nprice 五数概括")
print('最小值：\t%g' % n22)
print('q1：\t%g' % n28)
print('中位数：\t%g' % n27)
print('q3：\t%g' % n29)
print('最大值：\t%g' % n23)
print("price 缺失值个数：%g" % wine_data.price.isna().sum())
```

```
points 五数概括
最小值：	80
q1：	86
中位数：	88
q3：	90
最大值：	100
points 缺失值个数：0
```

```
price 五数概括
最小值：	4
q1：	16
中位数：	25
q3：	40
最大值：	3300
price 缺失值个数：22691
```

```
## 2. Trending YouTube Video Statistics 的相关概括
# 2.1 views
n31, n32, n33, n34, n35, n36, n37, n38, n39 =
nums(np.array(ytb_data.views.dropna()))
print("views 五数概括")
print('最小值：\t%g' % n32)
print('q1：\t%g' % n38)
print('中位数：\t%g' % n37)
print('q3：\t%g' % n39)
print('最大值：\t%g' % n33)
print("views 缺失值个数：%g" % ytb_data.views.isna().sum())

# 2.2 dislikes
n41, n42, n43, n44, n45, n46, n47, n48, n49 =
nums(np.array(ytb_data.dislikes.dropna()))
print("\n\ndislikes 五数概括")
print('最小值：\t%g' % n42)
print('q1：\t%g' % n48)
print('中位数：\t%g' % n47)
print('q3：\t%g' % n49)
print('最大值：\t%g' % n43)
print("dislikes 缺失值个数：%g" % ytb_data.dislikes.isna().sum())
```

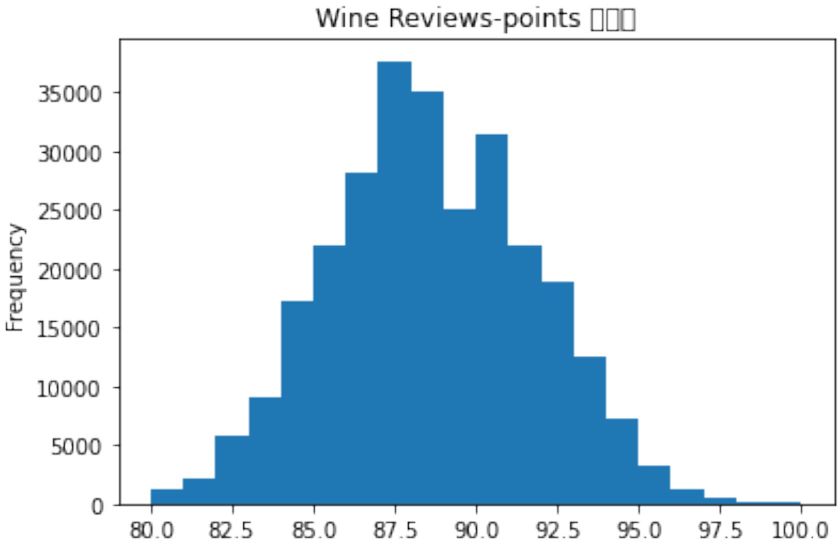
```
views 五数概括
最小值：	117
q1：	46978
中位数：	177370
q3：	647679
最大值：	4.24539e+08
views 缺失值个数：0
```

```
dislikes 五数概括
最小值：	0
q1：	41
中位数：	179
q3：	749
最大值：	1.94497e+06
dislikes 缺失值个数：0
```

1.2 数据可视化

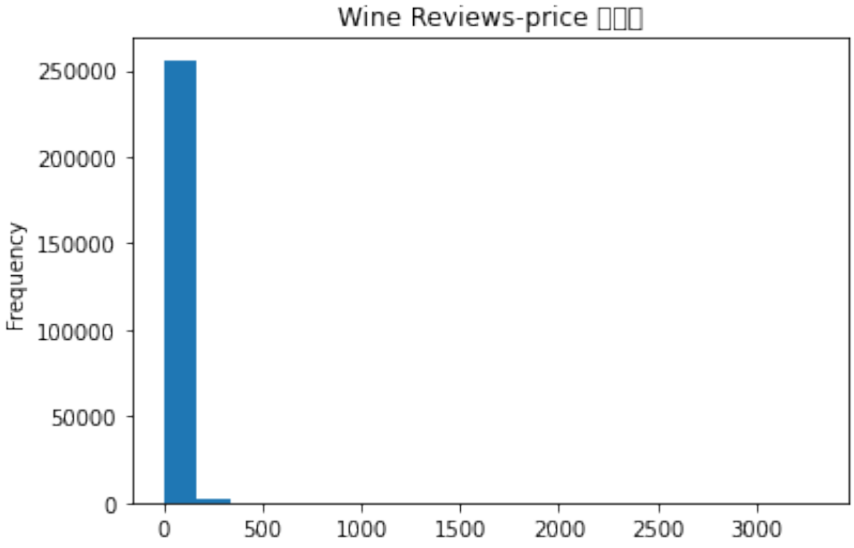
```
## 1. Wine Reviews 的相关数据可视化

# 1.1 直方图
# 1.1.1 points
wine_data.points.dropna().plot.hist(bins = 20, title = 'Wine Reviews-points 直
方图')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x141dcd490>
```



```
# 1.1.2 price
wine_data.price.dropna().plot.hist(bins = 20, title = 'Wine Reviews-price 直方图')
```

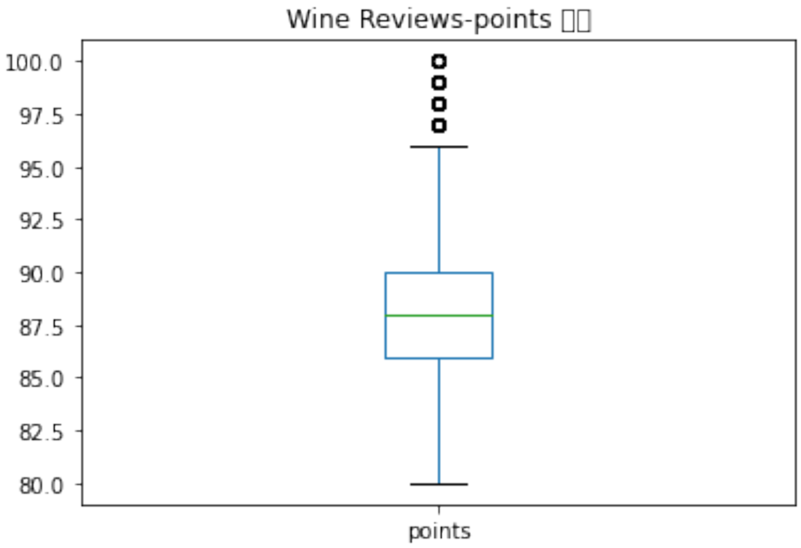
```
<matplotlib.axes._subplots.AxesSubplot at 0x14306f610>
```



```
# 1.2 盒图
# 1.2.1 points
wine_data.points.dropna().plot.box(title = 'Wine Reviews-points 盒图')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x140335250>
```

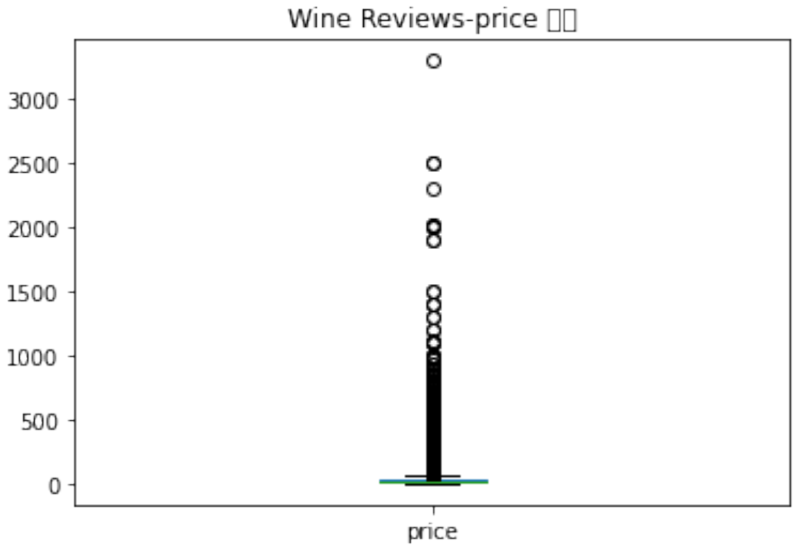
```
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0, flags=flags)
```



```
# 1.2.2 price
wine_data.price.dropna().plot.box(title = 'Wine Reviews-price 盒图')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x12fa736d0>
```

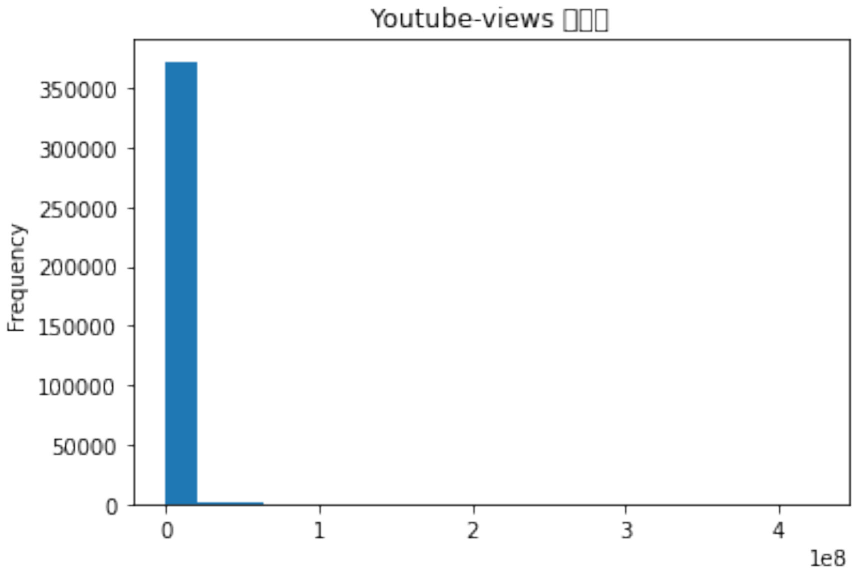
```
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0, flags=flags)
```



```
## 2. Trending YouTube Video Statistics 的相关数据可视化

# 2.1 直方图
# 2.1.1 views
ytb_data.views.dropna().plot.hist(bins = 20, title = 'Youtube-views 直方图')
```

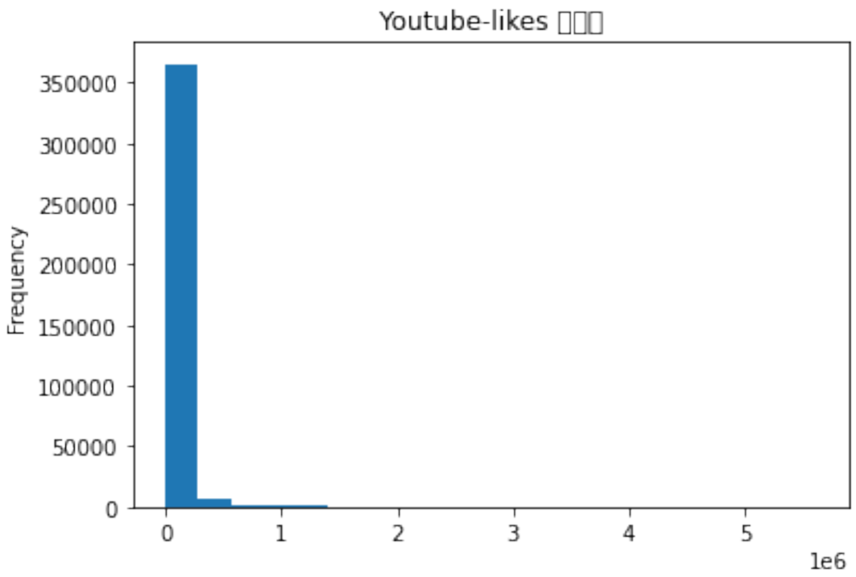
```
<matplotlib.axes._subplots.AxesSubplot at 0x1404860d0>
```

```
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 30452 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 26041 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 30452 missing from current font.
  font.set_text(s, 0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 26041 missing from current font.
  font.set_text(s, 0, flags=flags)
```



```
# 2.1.2 likes
ytb_data.likes.dropna().plot.hist(bins = 20, title = 'Youtube-likes 直方图')
```

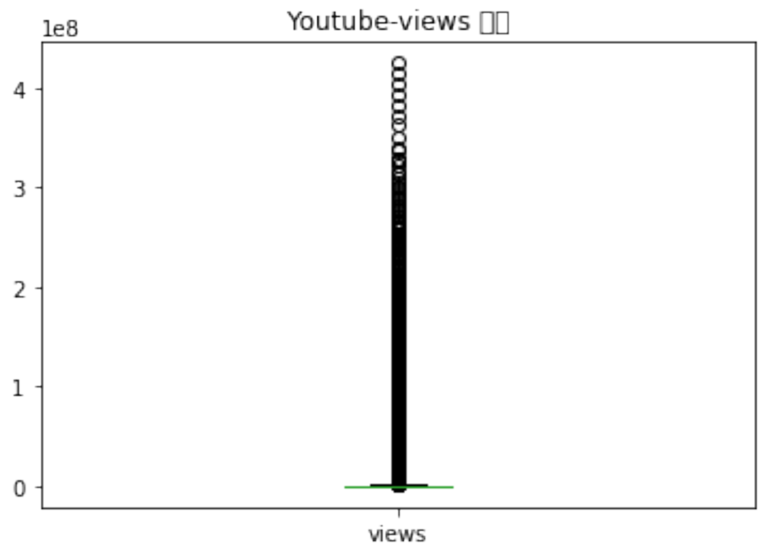
```
<matplotlib.axes._subplots.AxesSubplot at 0x1404caed0>
```



```
# 2.2 盒图
# 2.2.1 views
ytb_data.views.dropna().plot.box(title = 'Youtube-views 盒图')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x140635950>
```

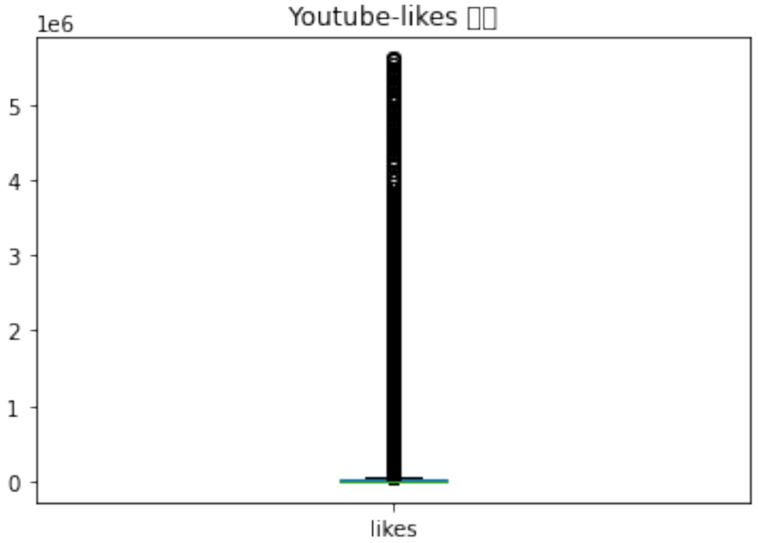
```
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0, flags=flags)
```



```
# 2.2.1 likes
ytb_data.likes.dropna().plot.box(title = 'Youtube-likes 盒图')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x14065b190>
```

```
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:214:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0.0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 30418 missing from current font.
  font.set_text(s, 0, flags=flags)
/usr/local/lib/python3.7/site-packages/matplotlib/backends/backend_agg.py:183:
RuntimeWarning: Glyph 22270 missing from current font.
  font.set_text(s, 0, flags=flags)
```



2. 数据缺失处理

2.1 填充值计算

```
# 1. Wine Reviews 相关计算
price_mode = stats.mode(wine_data.price.dropna())
points_mode = stats.mode(wine_data.points.dropna())
print('price 众数个数：%i，值为 %g。' % (len(price_mode[0]), n26))
print('points 众数个数：%i，值为 %g。' % (len(points_mode[0]), n16))
```

```
price 众数个数：1，值为 20。
points 众数个数：1，值为 87。
```

```
# 相似性计算
def similarity(v1, v2):
    dot_product = np.dot(v1, v2)
    vec_1_norm = np.linalg.norm(v1)
    vec_2_norm = np.linalg.norm(v2)
    return dot_product / (vec_1_norm * vec_2_norm)

cosine_price = similarity(wine_data[['points', 'price']].dropna().points,
wine_data[['points', 'price']].dropna().price)
pearson_price = wine_data[['points', 'price']].dropna().corr().points.price
print('points 与 price 的余弦相似度：%g。' % cosine_price)
print('points 与 price 的 Pearson 相关系数：%g。' % pearson_price)
```

```
points 与 price 的余弦相似度：0.674102。
points 与 price 的 Pearson 相关系数：0.437456。
```

```
## 2. Trending YouTube Video Statistics 相关计算
views_mode = stats.mode(ytb_data.views.dropna())
dislikes_mode = stats.mode(ytb_data.dislikes.dropna())
print('views 众数个数：%i，值为 %g。' % (len(views_mode[0]), n36))
print('likes 众数个数：%i，值为 %g。' % (len(dislikes_mode[0]), n46))

# 相似性计算
cosine_price = similarity(ytb_data[['views', 'dislikes']].dropna().views,
ytb_data[['views', 'dislikes']].dropna().dislikes)
pearson_price = ytb_data[['views', 'dislikes']].dropna().corr().views.dislikes
print('views 与 dislikes 的余弦相似度：%g。' % cosine_price)
print('views 与 dislikes 的 Pearson 相关系数：%g。' % pearson_price)
```

```
views 众数个数：1，值为 3680。
likes 众数个数：1，值为 0。
views 与 dislikes 的余弦相似度：0.42993。
views 与 dislikes 的 Pearson 相关系数：0.421653。
```