数据探索性分析与数据预处理(自选2个数据集)

分析报告一

1.数据集选择

wine reviews: winemag-data_first150k.csv
wine reviews: winemag-data-130k-v2.csv (用于对比数据缺失处理的原始数据集使用)

2.数据分析要求

2.1 数据可视化和摘要

2.1.1 数据摘要

标称属性，给出每个可能取值的频数
该数据集中标称属性有：country、disignation、province、region_1、region_2、variety、winery
由于属性值较多，以country为例展示（其他属性分析见.py代码）

Name: country, dtype: int64

In [2]:

```
#导入第三方库
import pandas as pd
import numpy as np
from scipy import stats
import matplotlib.pyplot as plt
from sklearn.ensemble import RandomForestClassifier
#读取数据
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
#展示country属性的所有取值
print(wine['country'].value_counts())
```

```
US                          62397
Italy                       23478
France                      21098
Spain                        8268
Chile                        5816
Argentina                    5631
Portugal                     5322
Australia                    4957
New Zealand                  3320
Austria                      3057
Germany                      2452
South Africa                 2258
Greece                        884
Israel                        630
Hungary                       231
Canada                        196
Romania                       139
Slovenia                       94
Uruguay                        92
Croatia                        89
Bulgaria                       77
Moldova                        71
Mexico                         63
Turkey                         52
Georgia                        43
Lebanon                        37
Cyprus                         31
Brazil                         25
Macedonia                      16
Serbia                         14
Morocco                        12
Luxembourg                      9
England                         9
India                           8
Lithuania                       8
Czech Republic                  6
Ukraine                         5
Bosnia and Herzegovina          4
Switzerland                     4
South Korea                     4
Egypt                           3
Slovakia                        3
China                           3
Albania                         2
Japan                           2
Montenegro                      2
Tunisia                         2
```

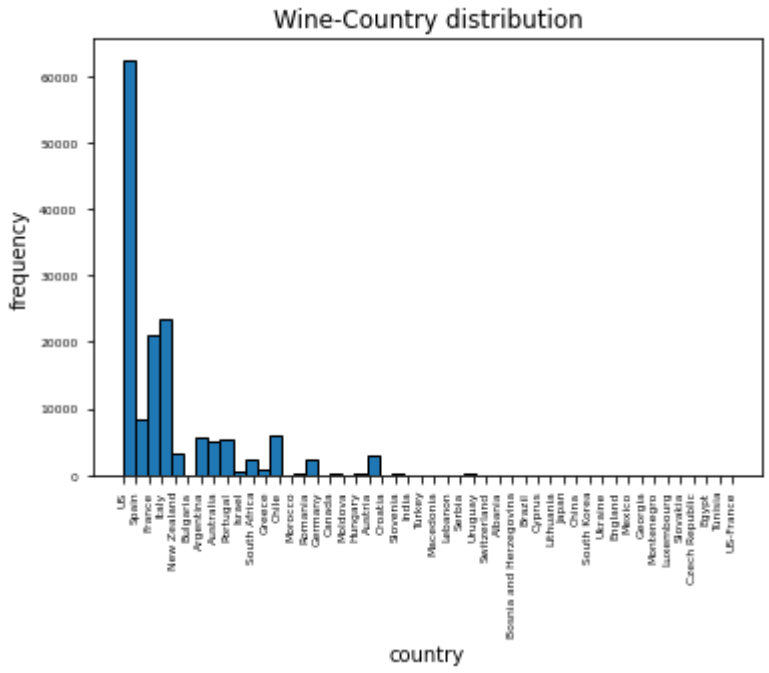
```
US-France                       1
Name: country, dtype: int64
```

country	频数	country	频数
US	62397	Lebanon	37
Italy	23478	Cyprus	31
France	21098	Brazil	25
Spain	8268	Macedonia	16
Chile	5816	Serbia	14
Argentina	5631	Morocco	12
Portugal	5322	England	9
Australia	4957	Luxembourg	9
New Zealand	3320	Lithuania	8
Austria	3057	India	8
Germany	2452	Czech Republic	6
South Africa	2258	Ukraine	5
Greece	884	Switzerland	4
Israel	630	Bosnia and Herzegovina	4
Hungary	231	South Korea	4
Canada	196	Egypt	3
Romania	139	China	3
Slovenia	94	Slovakia	3
Uruguay	92	Albania	2
Croatia	89	Montenegro	2
Bulgaria	77	Tunisia	2
Moldova	71	Japan	2
Mexico	63	US-France	1
Turkey	52		
Georgia	43		

country属性直方图

In [3]:

```
#country属性直方图
plt.hist(x=wine['country'].dropna(), bins=50, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/country_distribution_hist.png')
plt.show()
```



数值属性，给出数值属性的五数概括及缺失值的个数

该数据集中数值属性有：price、points

Name: price, dtype: float64

In [4]:

```
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
print(wine['price'].describe())
```

```
count    137235.000000
mean         33.131482
std          36.322536
min           4.000000
25%          16.000000
50%          24.000000
75%          40.000000
max        2300.000000
Name: price, dtype: float64
```

price	
count	137235.0000
mean	33.1315
std	36.3225
min	4.0000
25%	16.0000
50%	24.0000
75%	40.0000
max	2300.0000

Name: points, dtype: float64

In [5]:

```
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
print(wine['points'].describe())
```

```
count    150930.000000
mean         87.888418
std           3.222392
min          80.000000
25%          86.000000
50%          88.000000
75%          90.000000
max         100.000000
Name: points, dtype: float64
```

points	
count	150930.0000
mean	87.8884
std	3.2224
min	80.0000
25%	86.0000
50%	88.0000

	points
75%	90.0000
max	100.0000

该数据集的缺省值情况为

In [6]:

```
print(wine.isna().sum())
```

```
Unnamed: 0         0
country            5
description        0
designation    45735
points             0
price          13695
province           5
region_1       25060
region_2       89977
variety            0
winery             0
dtype: int64
```

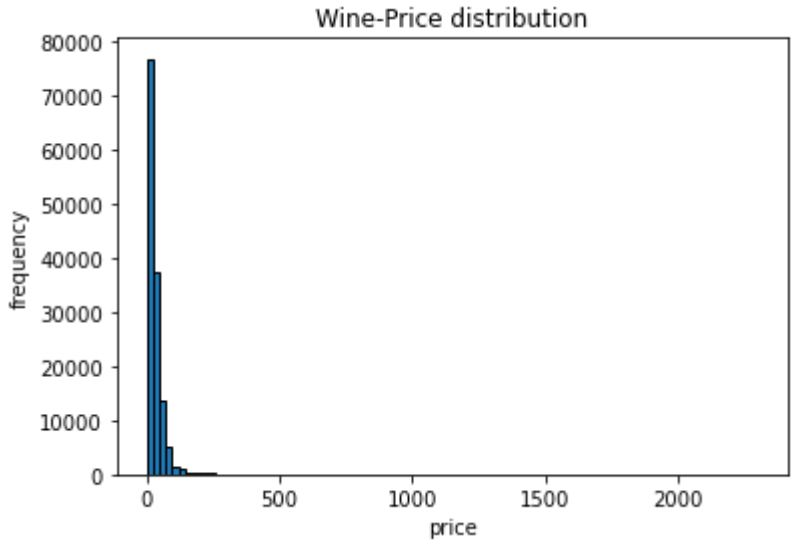
缺失值	
country	5
description	0
designation	45735
points	0
price	13695
province	5
region_1	25060
region_2	89977
variety	0
winery	0

2.1.2 数据可视化

使用直方图、盒图等检查数据分布及离群点，以price和points属性的可视化展示为例
(1)**price属性直方图**

In [11]:

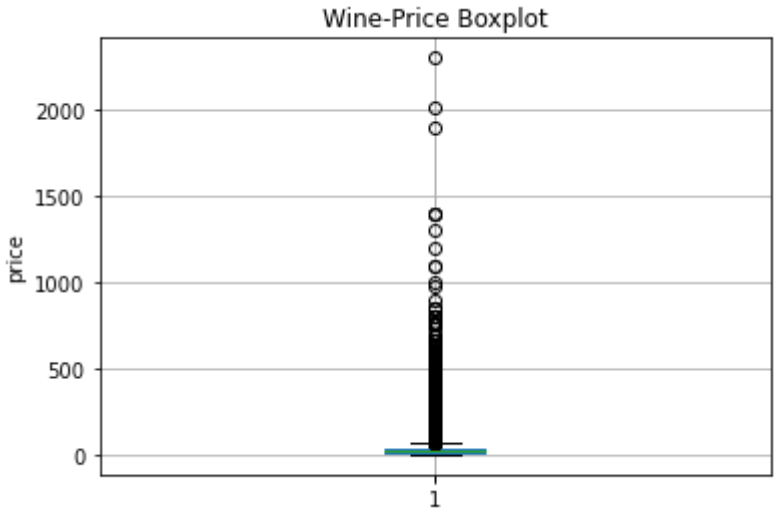
```
#price属性直方图
plt.hist(x=wine['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution')
plt.savefig('./wineResult/price_distribution_hist.png')
plt.show()
```



price属性盒图

In [10]:

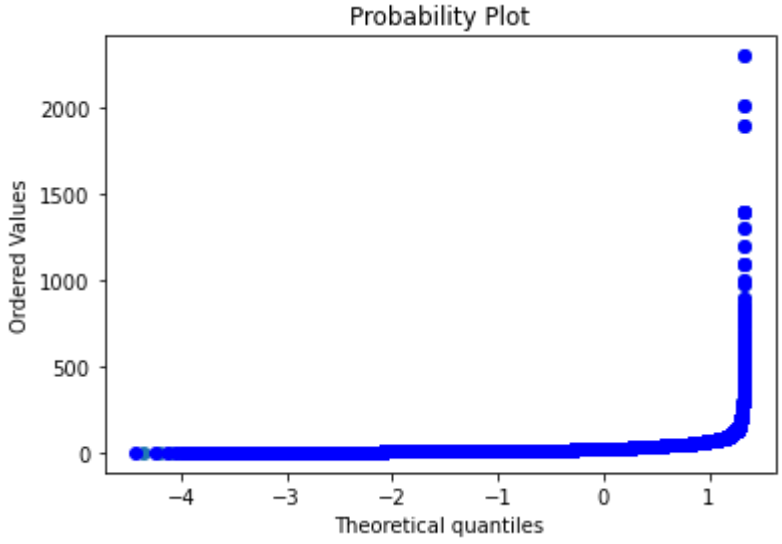
```
#price属性盒图(不丢弃缺失值情况)
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price)
priceNa.boxplot(sym='o')
plt.boxplot(wine['price'], sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot')
#plt.legend()
plt.savefig('./wineResult/price_box.png')
plt.show()
```



price属性Q-Q图

In [11]:

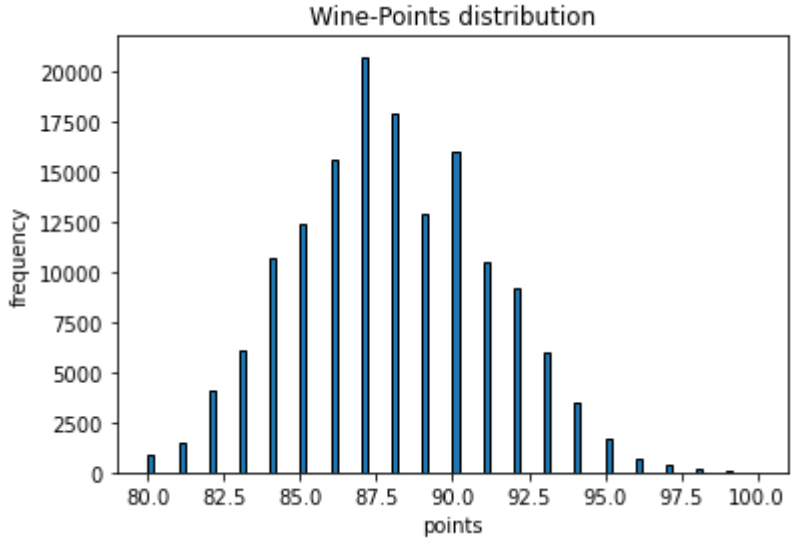
```
#price属性QQ图(不丢弃缺失值)
sorted_ = np.sort(wine['price'])
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['price'], dist="norm", plot=plt)
plt.savefig('./wineResult/price_qq.png')
plt.show()
```



(2)**points属性直方图**

In [12]:

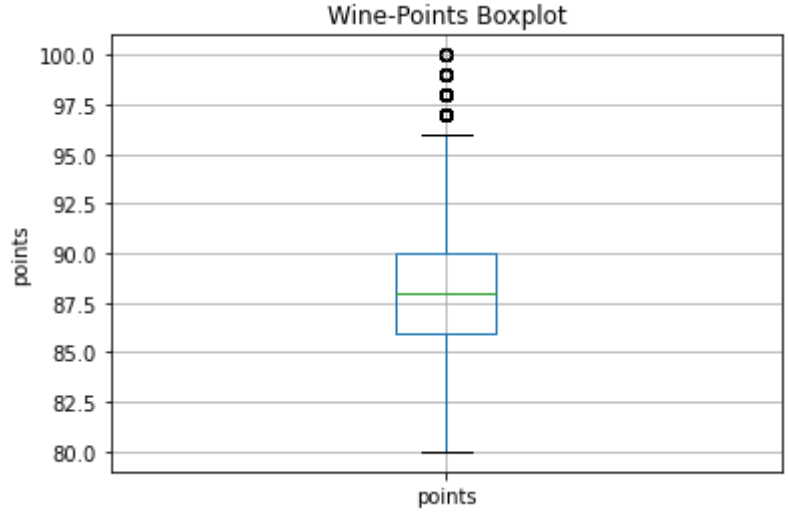
```
#points属性直方图
plt.hist(x=wine['points'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('points')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Points distribution')
plt.savefig('./wineResult/points_distribution_hist.png')
plt.show()
```



points属性盒图

In [14]:

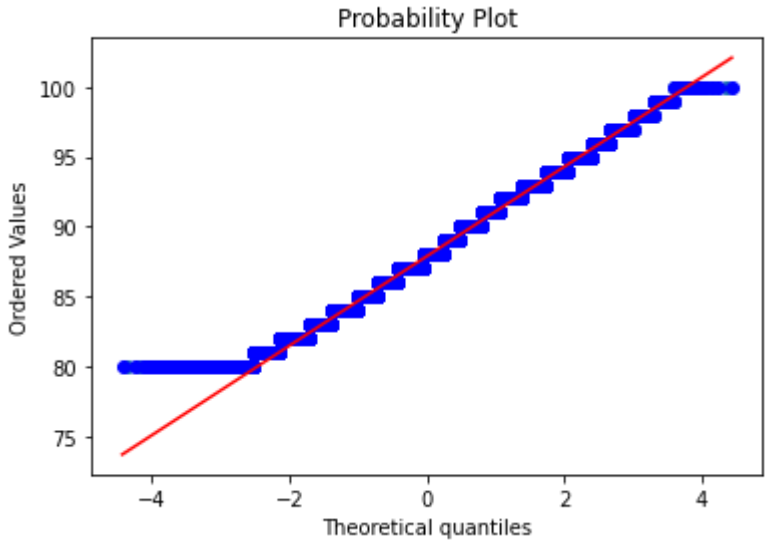
```
#points属性盒图(不丢弃缺失值情况)
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').points)
priceNa.boxplot(sym='o')
plt.ylabel('points')
plt.title('Wine-Points Boxplot')
plt.savefig('./wineResult/points_box.png')
plt.show()
```



points属性Q-Q图

In [15]:

```
#points属性QQ图(不丢弃缺失值)
sorted_ = np.sort(wine['points'])
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['points'], dist="norm", plot=plt)
plt.savefig('./wineResult/points_qq.png')
plt.show()
```



2.2 数据缺失的处理

观察数据集中缺失数据，分析其缺失的原因。分别使用下列四种策略对缺失值进行处理:
由于属性值较多，这里数值属性我们以price数值属性为例，标称属性我们以country为例;

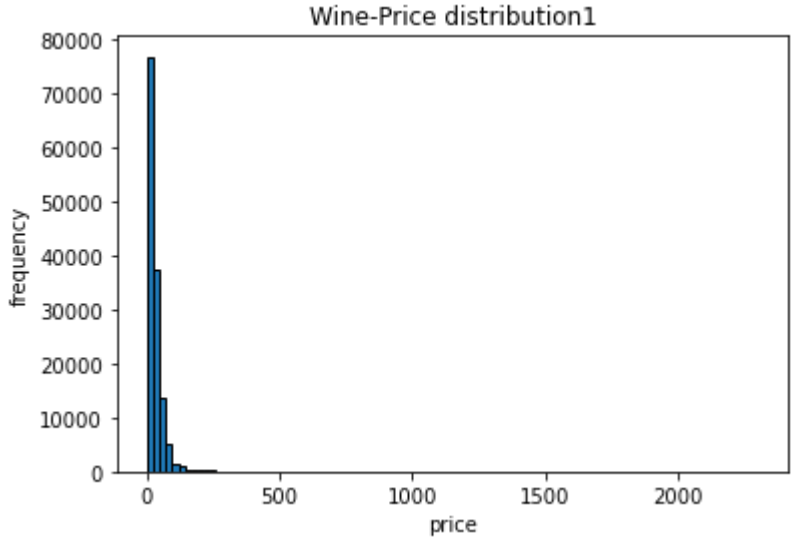
属性值缺失的原因可能为：红酒数据收集是数据缺失

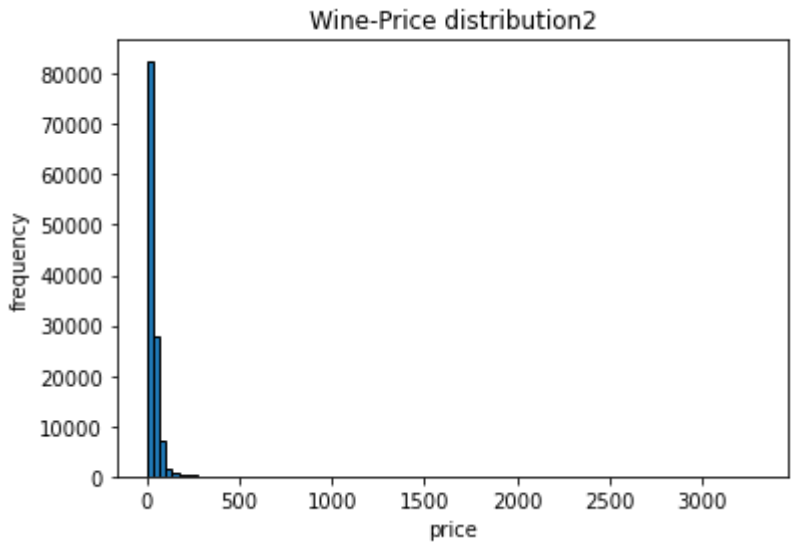
2.2.1 将缺失部分剔除

(这里直接展示剔除缺失值之后与原数据集的对比可视化)
price直方图(前者为丢弃数据后直方图，后者为原始数据直方图)

In [16]:

```
#原始数据集（去重处理后）
wineV2 = pd.DataFrame(pd.read_csv('winemag-data-130k-v2.csv'))

#删除price的缺失值画直方图
plt.hist(wine['price'].dropna(), bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution1')
plt.savefig('./wineResult/price_delete_hist.png')
plt.show()

#原始直方图
plt.hist(wineV2['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution2')
plt.savefig('./wineResult/priceCom_hist.png')
plt.show()
```

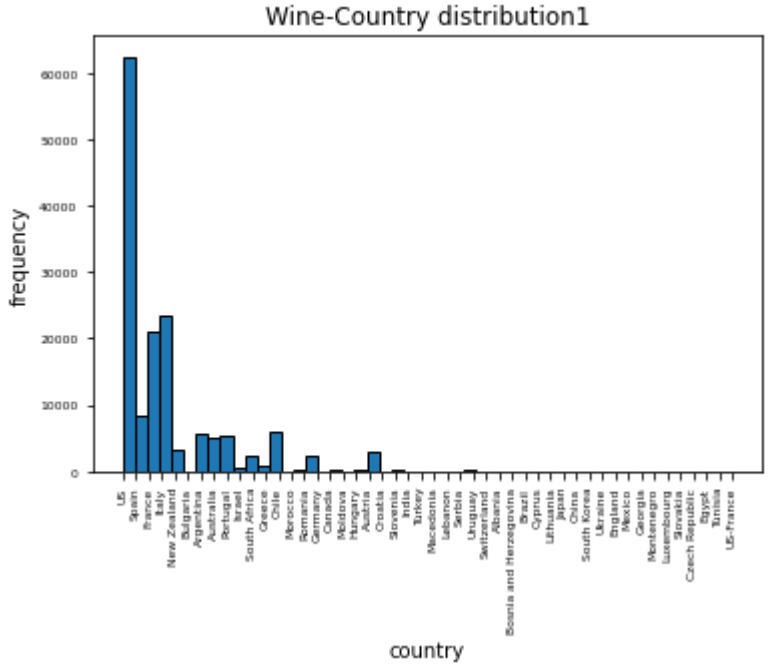


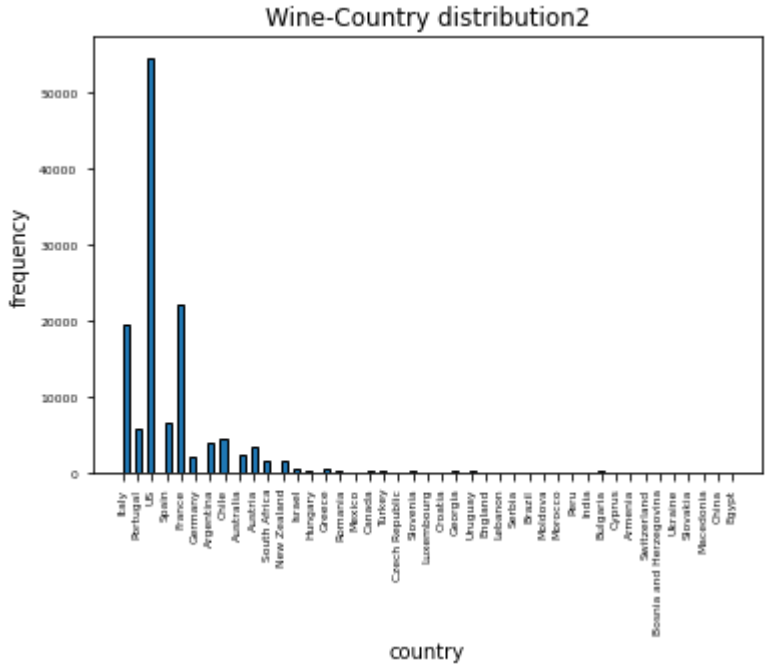


country直方图(前者为丢弃数据后直方图，后者为原始数据直方图)

In [19]:

```
#country属性删除缺失值
#直方图
plt.hist(wine['country'].dropna(), bins=50, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution1')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/country_delete_hist.png')
plt.show()
#原始
plt.hist(wineV2['country'].dropna(), bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution2')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/countryCom_hist.png')
plt.show()
```

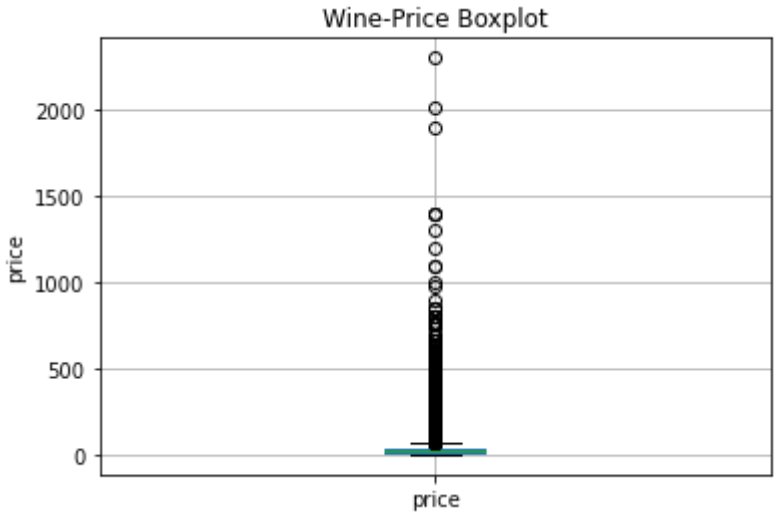


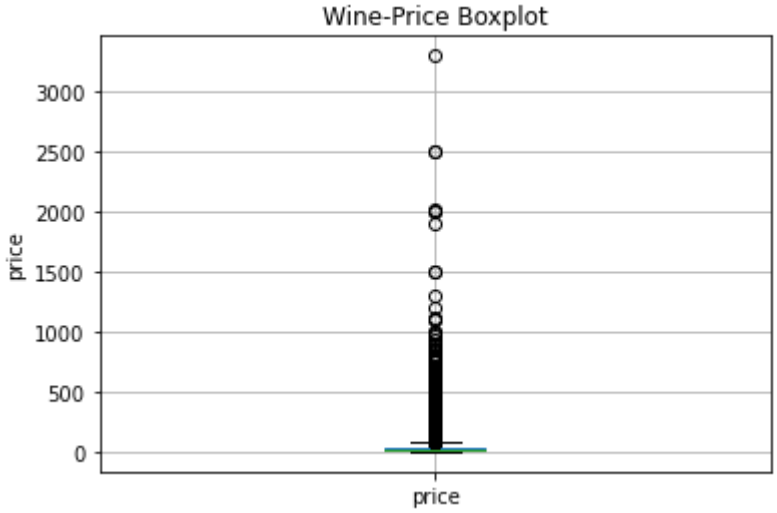


price盒图(前者为丢弃数据后盒图，后者为原始数据盒图)

In [20]:

```
#price属性删除缺失值盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price).dropna()
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot')
plt.savefig('./wineResult/price_delete_box.png')
plt.show()

#原始数据盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data-130k-v2.csv').price)
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot')
plt.savefig('./wineResult/priceCom_box.png')
plt.show()
```

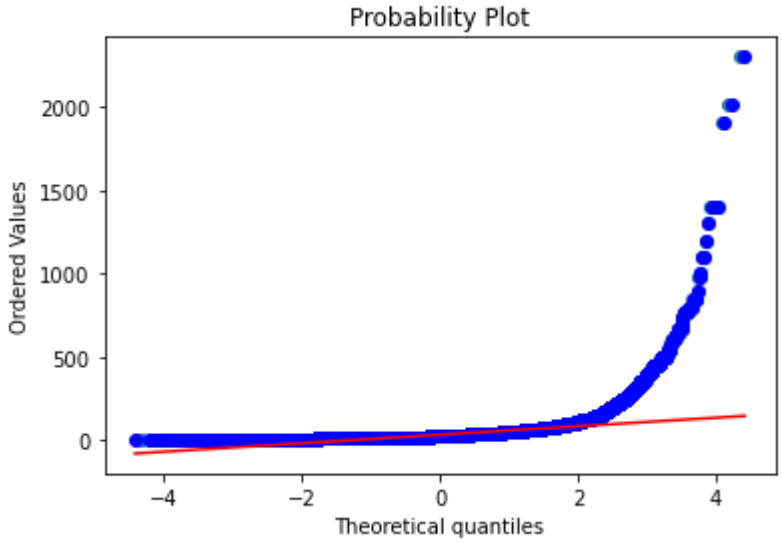


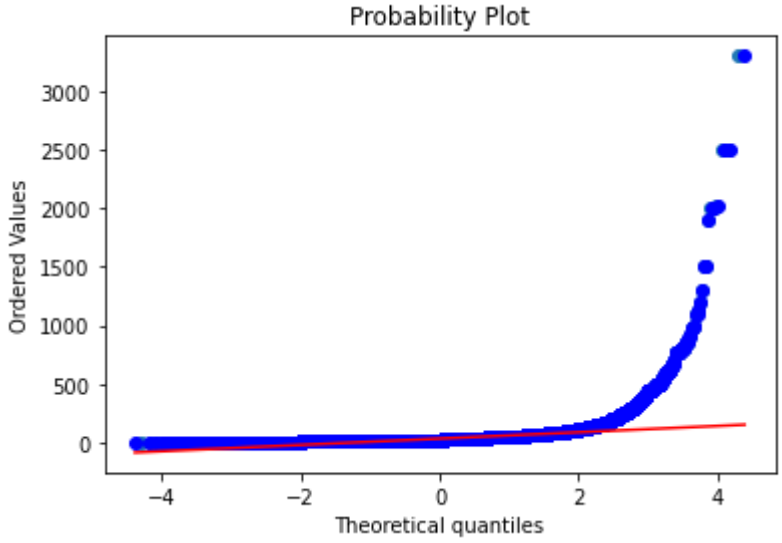


priceQ-Q图(前者为丢弃数据后Q-Q图，后者为原始数据Q-Q图)

In [21]:

```
#price属性删除缺失值Q-Q图
sorted_ = np.sort(wine['price'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['price'].dropna(), dist="norm", plot=plt)
plt.savefig('./wineResult/price_delete_qq.png')
plt.show()
#原始数据Q-Q图
sorted_ = np.sort(wineV2['price'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wineV2['price'].dropna(), dist="norm", plot=plt)
plt.savefig('./wineResult/priceCom_qq.png')
plt.show()
```



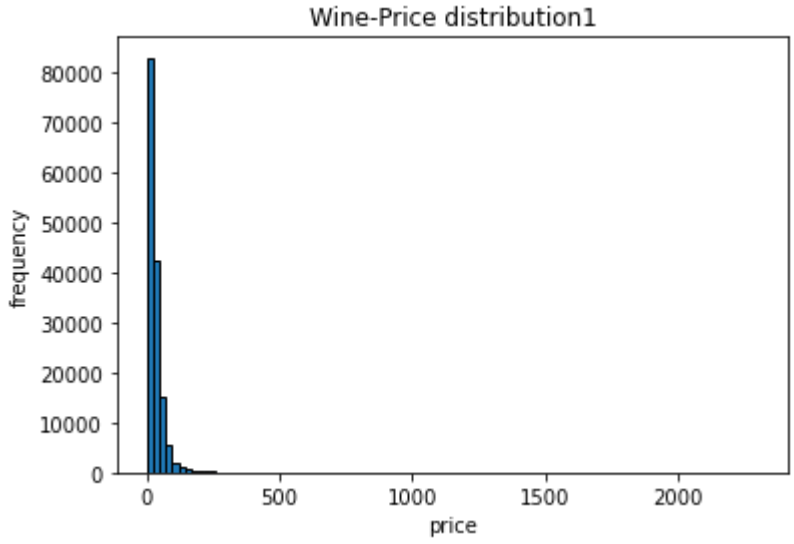


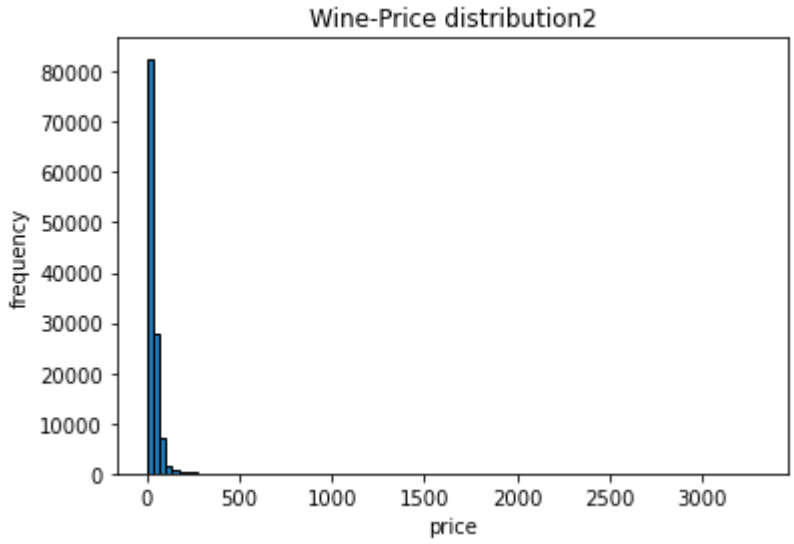
2.2.2 用最高频率值来填补缺失值

price直方图(前者为利用众数填充缺失值后直方图，后者为原始数据直方图)

In [24]:

```
plt.hist(wine['price'].fillna(wine['price'].interpolate(missing_values='NaN', strategy='mode', axis=
         bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution1')
plt.savefig('./wineResult/price_mode_hist.png')
plt.show()

#原始直方图
plt.hist(wineV2['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution2')
#plt.savefig('./wineResult/priceCom_hist.png')
plt.show()
```

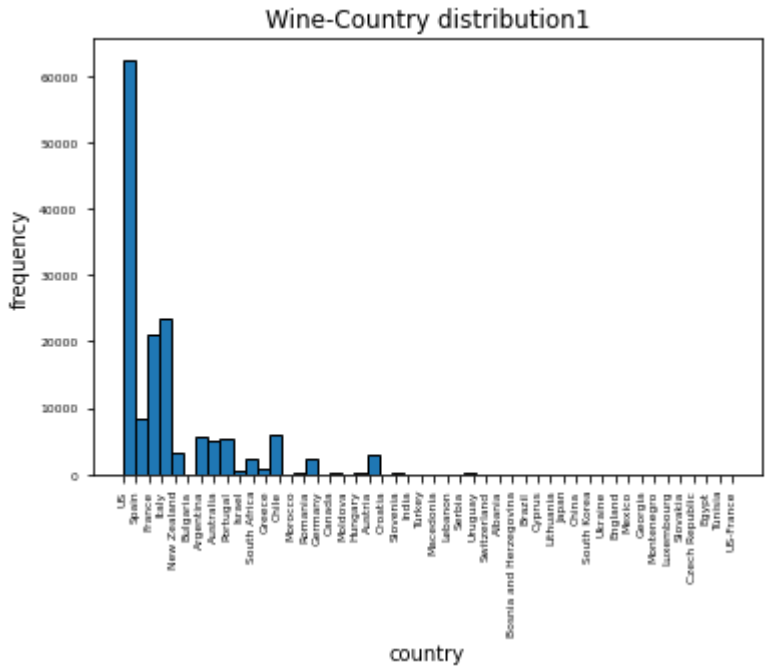


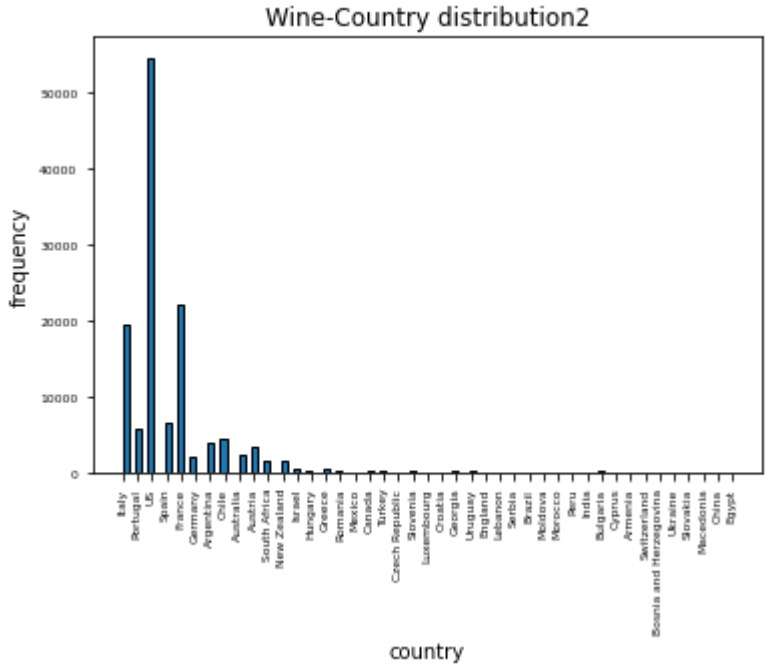


country直方图(前者为利用众数填充缺失值后直方图，后者为原始数据直方图)

In [26]:

```
#country属性最高频率填充缺失值
#直方图
plt.hist(wine['country'].fillna('US'), bins=50, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution1')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/country_mode_hist.png')
plt.show()

plt.hist(wineV2['country'].dropna(), bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution2')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
#plt.savefig('./wineResult/countryCom_hist.png')
plt.show()
```

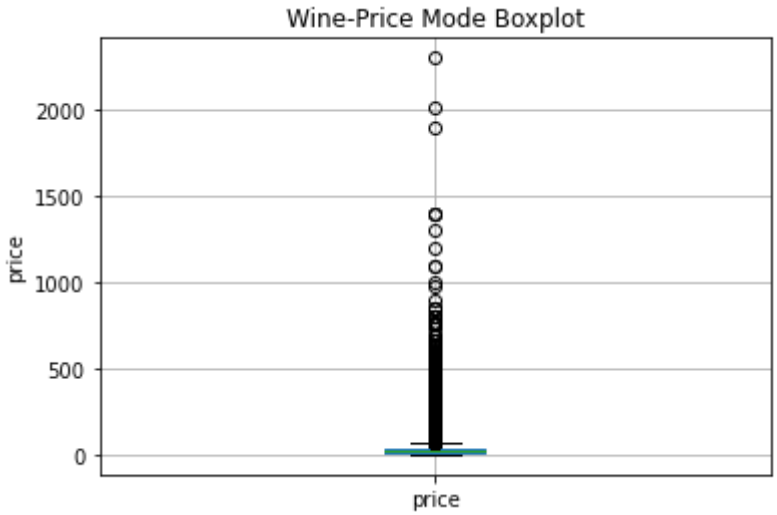


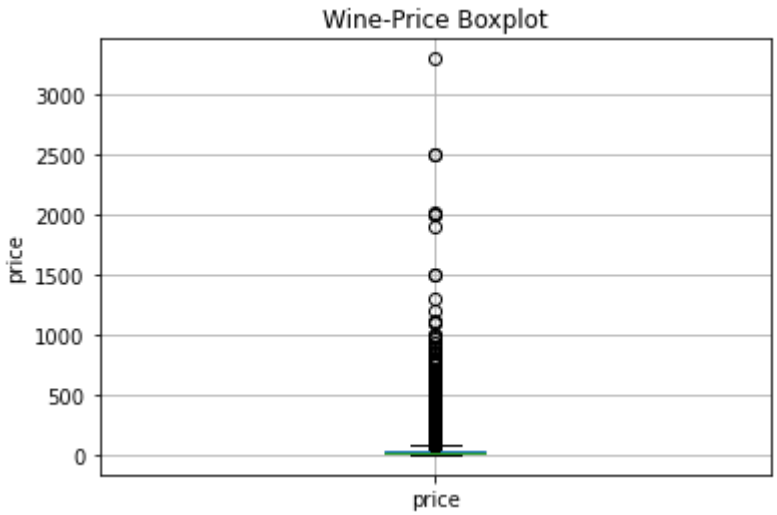


price盒图 (前者为利用众数填充缺失值后盒图，后者为原始数据盒图)

In [28]:

```
#盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price).fillna(wine['price'].interpo
                                                                    axis=0, verbose=0, copy=True))
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Mode Boxplot')
plt.savefig('./wineResult/price_mode_box.png')
plt.show()

#原始数据盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data-130k-v2.csv').price)
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot')
# plt.savefig('./wineResult/priceCom_box.png')
plt.show()
```

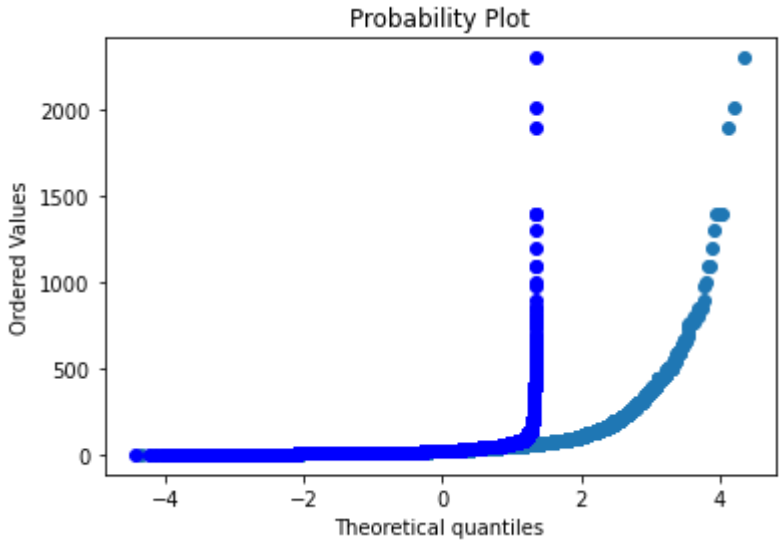


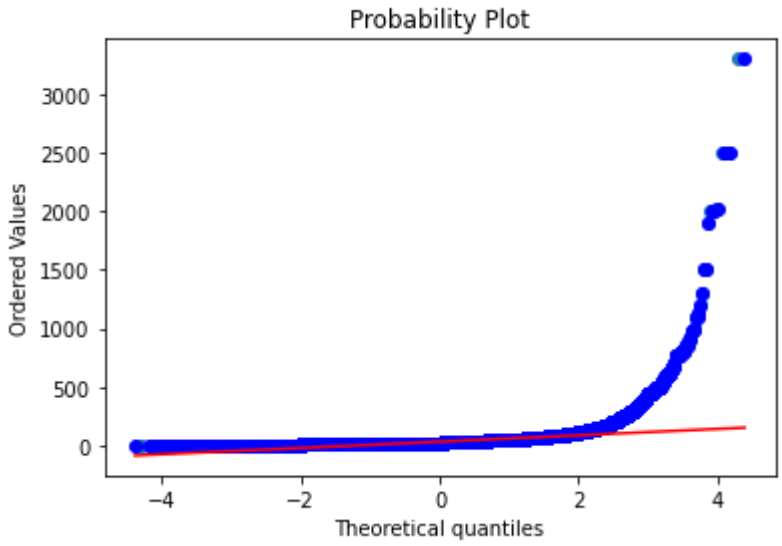


priceQ-Q图 (前者为利用众数填充缺失值后Q-Q图，后者为原始数据Q-Q图)

In [32]:

```
#Q-Q图
sorted_ = np.sort(wine['price'].fillna(wine['price'].interpolate(missing_values='NaN', strategy='moc
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['price'], dist="norm", plot=plt)
plt.savefig('./wineResult/price_mode_qq.png')
plt.show()

#原始数据Q-Q图
sorted_ = np.sort(wineV2['price'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wineV2['price'].dropna(), dist="norm", plot=plt)
#plt.savefig('./wineResult/priceCom_qq.png')
plt.show()
```



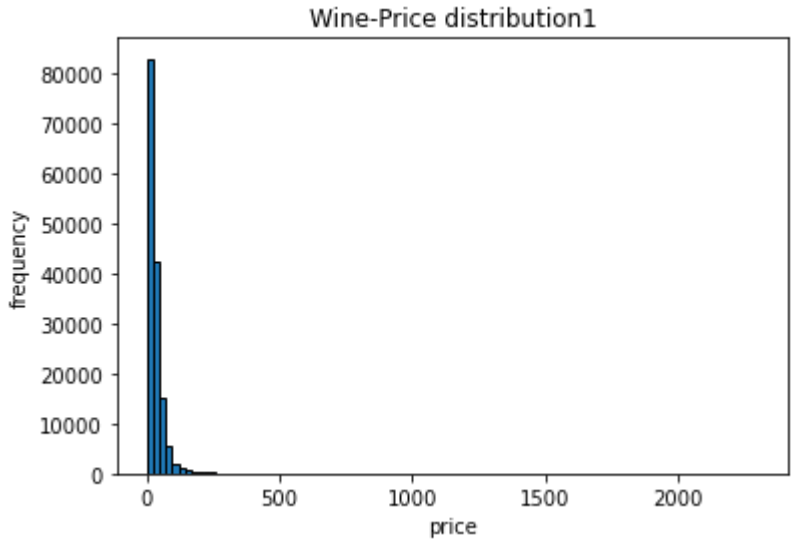


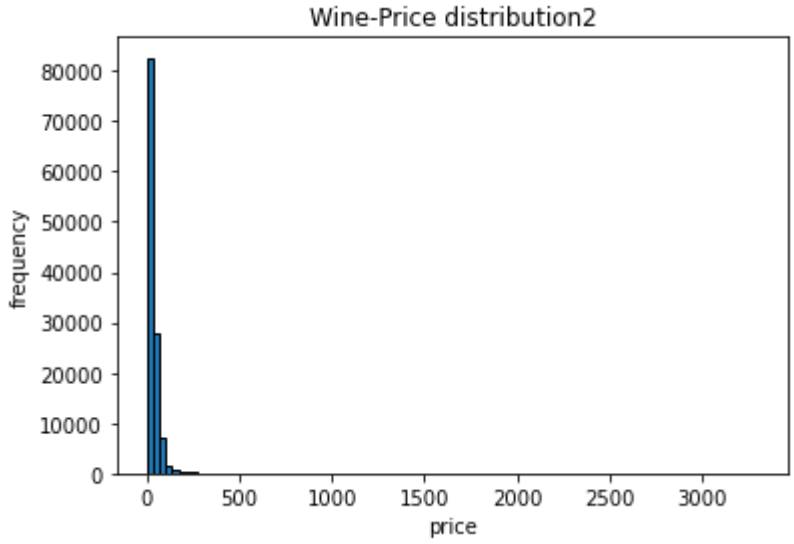
2.2.3 通过属性的相关关系来填补缺失值

使用中位数插值算法填补缺失值
price直方图(前者利用中位数填充缺失值后直方图，后者为原始数据直方图)

In [35]:

```
#通过属性的相关关系来填补缺失值
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
#直方图
plt.hist(wine['price'].interpolate(missing_values='NaN', strategy='median', axis=0, verbose=0, copy=
         bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution1')
plt.savefig('./wineResult/price_means_hist.png')
plt.show()

#原始直方图
plt.hist(wineV2['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution2')
#plt.savefig('./wineResult/priceCom_hist.png')
plt.show()
```

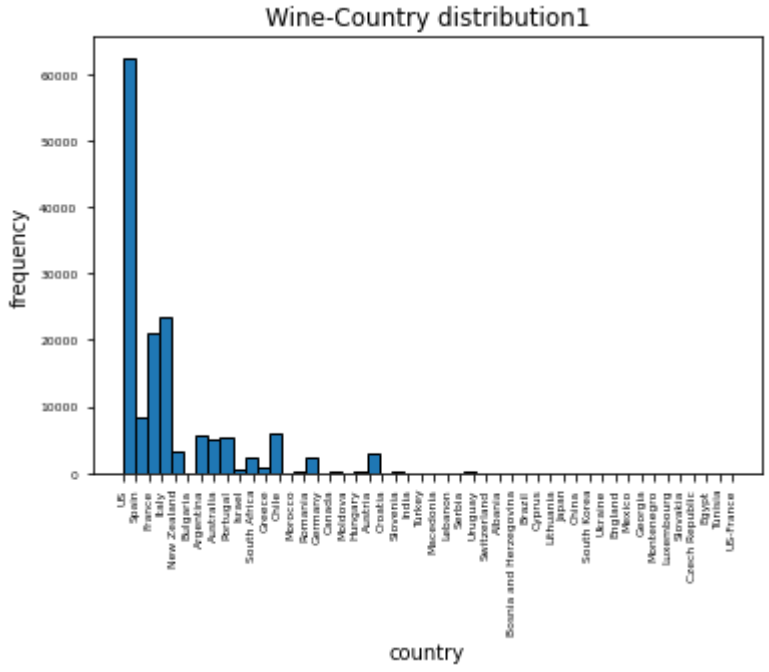


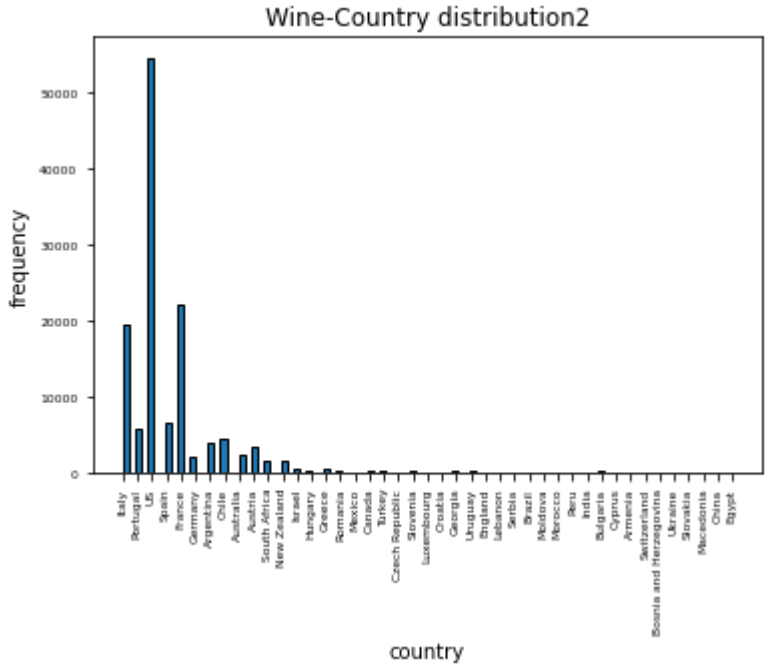


country直方图 (前者为利用随机森林算法填充缺失值后直方图，后者为原始数据直方图)

In [36]:

```
#随进森林实现填充country属性缺失值
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
known_price = wine[wine['country'].notnull()]
unknown_price = wine[wine['country'].isnull()]
x = known_price[['points']]
y = known_price[['country']]
t_x = unknown_price[['points']]
fc = RandomForestClassifier()
fc.fit(x, y.values.ravel())
pr = fc.predict(t_x)
wine.loc[wine.country.isnull(), 'country'] = pr

plt.hist(wine['country'], bins=50, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution1')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/country_relative_hist.png')
plt.show()

plt.hist(wineV2['country'].dropna(), bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('country')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Country distribution2')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
#plt.savefig('./wineResult/countryCom_hist.png')
plt.show()
```





price盒图(前者为利用中位数填充缺失值后盒图，后者为原始数据盒图)

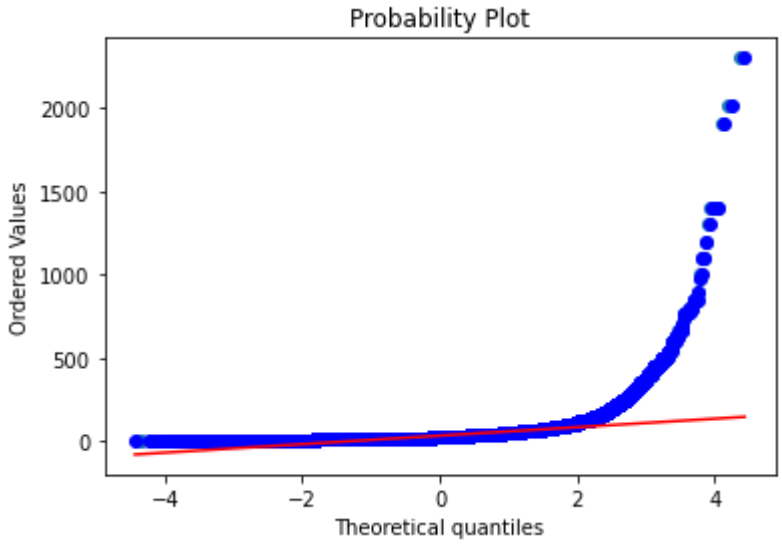
In [37]:

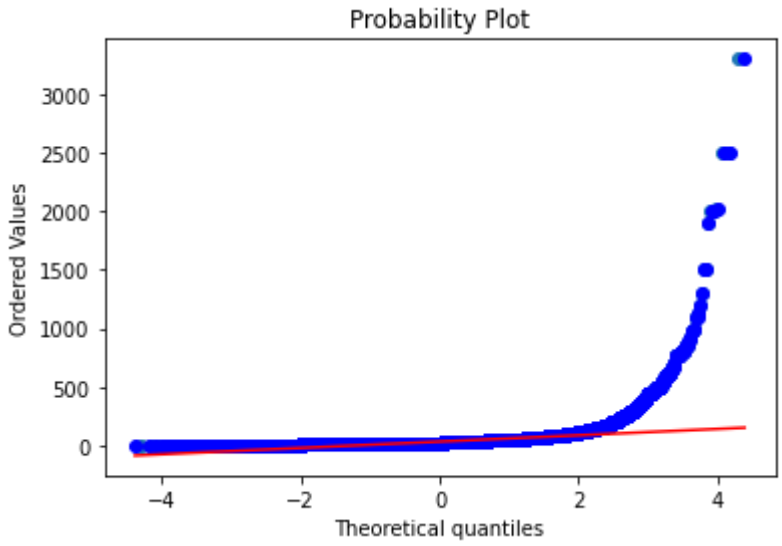
```
#盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price).fillna(wine['price'].interpo

priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot1')
plt.savefig('./wineResult/price_median_box.png')
plt.show()

#原始数据盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data-130k-v2.csv').price)
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot2')
# plt.savefig('./wineResult/priceCom_box.png')
plt.show()
```

priceQ-Q图(前者为利用中位数填充缺失值后Q-Q图，后者为原始数据Q-Q图)

In [38]:

```
#Q-Q图
sorted_ = np.sort(wine['price'].interpolate(missing_values='NaN', strategy='median', axis=0, verbos
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['price'].interpolate(missing_values = 'NaN', strategy='median', axis=0, verbose=
plt.savefig('./wineResult/price_median_qq.png')
plt.show()

#原始数据Q-Q图
sorted_ = np.sort(wineV2['price'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wineV2['price'].dropna(), dist="norm", plot=plt)
#plt.savefig('./wineResult/priceCom_qq.png')
plt.show()
```



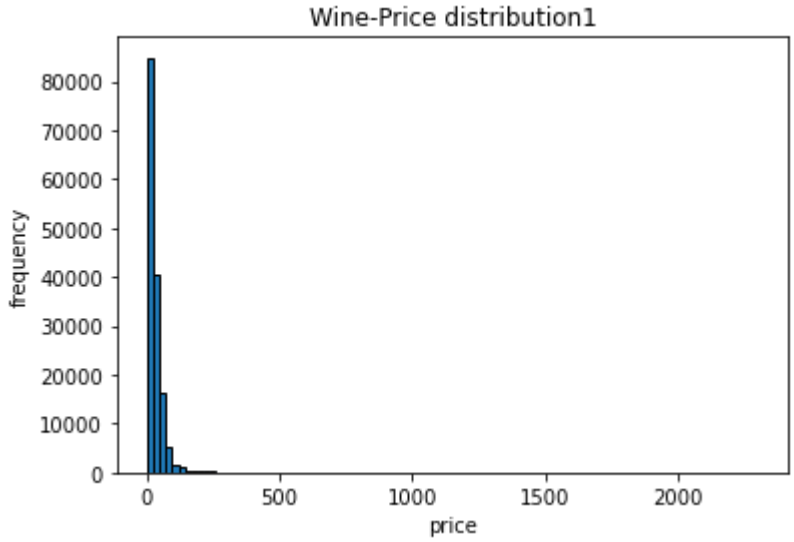


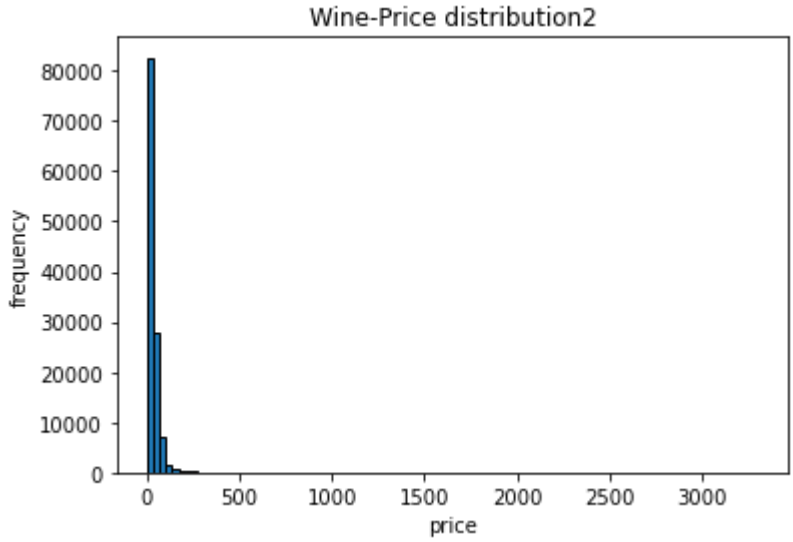
2.2.4 通过数据对象之间的相似性来填补缺失值

利用随机森林预测值来填充缺失值
price直方图(前者为利用随机森林预测值填充缺失值后直方图，后者为原始数据直方图)

In [39]:

```
#通过数据对象之间的相似性来填补缺失值
wine = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv'))
known_price = wine[wine['price'].notnull()]
unknown_price = wine[wine['price'].isnull()]
x = known_price[['points']]
y = known_price[['price']]
t_x = unknown_price[['points']]
fc = RandomForestClassifier()
fc.fit(x, y.values.ravel())
pr = fc.predict(t_x)
wine.loc[wine.price.isnull(), 'price'] = pr

#直方图
plt.hist(wine['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution1')
plt.savefig('./wineResult/price_relative_hist.png')
plt.show()

#原始直方图
plt.hist(wineV2['price'], bins=100, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('price')
plt.ylabel('frequency')
# 添加标题
plt.title('Wine-Price distribution2')
#plt.savefig('./wineResult/priceCom_hist.png')
plt.show()
```





price盒图(前者为利用随机森林预测值填充缺失值后盒图，后者为袁姗姗数据盒图)

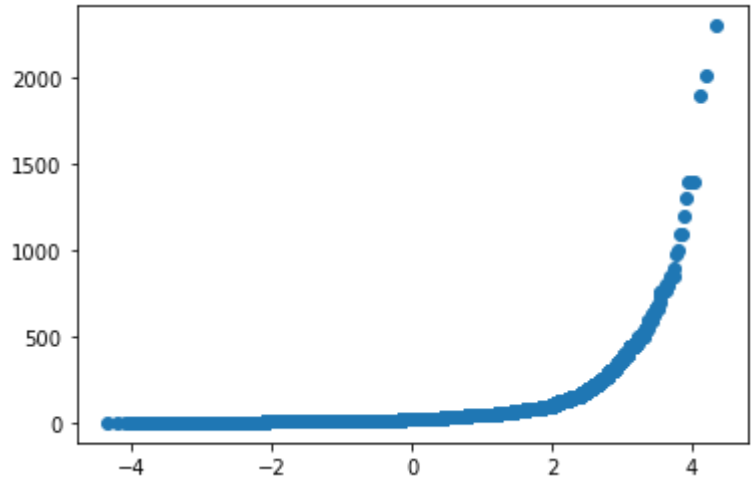
In [40]:

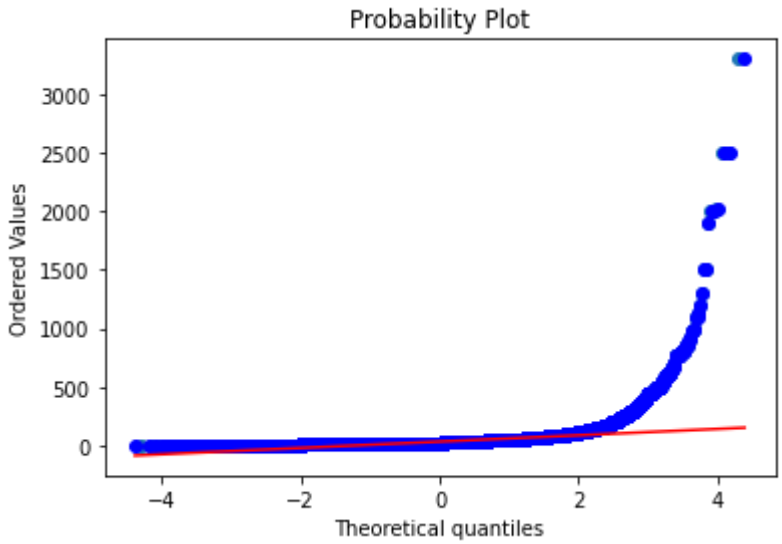
```
#盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price)
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot1')
plt.savefig('./wineResult/price_relative_box.png')
plt.show()

#原始数据盒图
priceNa = pd.DataFrame(pd.read_csv('winemag-data-130k-v2.csv').price)
priceNa.boxplot(sym='o')
plt.ylabel('price')
plt.title('Wine-Price Boxplot2')
# plt.savefig('./wineResult/priceCom_box.png')
plt.show()
```

priceQ-Q图(前者为利用随机森林预测值填充缺失值后Q-Q图，后者为原始数据Q-Q图)

In [41]:

```
#Q-Q图
sorted_ = np.sort(wine['price'])
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['price'])
plt.savefig('./wineResult/price_relative_qq.png')
plt.show()


#原始数据Q-Q图
sorted_ = np.sort(wineV2['price'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wineV2['price'].dropna(), dist="norm", plot=plt)
#plt.savefig('./wineResult/priceCom_qq.png')
plt.show()
```





分析报告二

1.数据集选择

Trending YouTube Video Statistics
该数据集中csv个数较多，选择其中四个做分析：USvideos.csv、CAvideos.csv、INvideos.csv、MXvideos.csv

2.数据分析要求

2.1 数据可视化及摘要

2.1.1 **标称属性**，给出每个可能取值的频数
该数据集中标称属性有：category_id、title、channel_title
此处以category_id为例作展示
Name: category_id, dtype: int64

In [42]:

```
#导入需要的第三方库
import pandas as pd
import numpy as np
from scipy import stats
import matplotlib.pyplot as plt
from sklearn.ensemble import RandomForestClassifier

USvideo = pd.DataFrame(pd.read_csv('./archive/USvideos.csv', low_memory=False))
CAvideo = pd.DataFrame(pd.read_csv('./archive/CAvideos.csv', low_memory=False))
INvideo = pd.DataFrame(pd.read_csv('./archive/INvideos.csv', low_memory=False))
DEvideo = pd.DataFrame(pd.read_csv('./archive/DEvideos.csv', low_memory=False))

#category_id标称属性，每个可能取值的频数
print(USvideo['category_id'].value_counts())
print(CAvideo['category_id'].value_counts())
print(INvideo['category_id'].value_counts())
print(DEvideo['category_id'].value_counts())
```

```
24    9964
10    6472
26    4146
23    3457
22    3210
25    2487
28    2401
1     2345
17    2174
27    1656
15     920
20     817
19     402
2      384
29      57
43      57
Name: category_id, dtype: int64
24    13451
25     4159
22     4105
23     3773
10     3731
17     2787
1      2060
26     2007
20     1344
28     1155
27      991
19      392
15      369
2       353
43      124
29       74
30        6
Name: category_id, dtype: int64
24    16712
25     5241
10     3858
23     3429
22     2624
1      1658
```

```
27      1227
26       845
17       731
28       552
43       205
29       105
2         72
20        66
30        16
19         8
15         3
Name: category_id, dtype: int64
24    15292
22     5988
25     2935
17     2752
23     2534
1      2376
10     2372
26     1745
20     1565
2       873
27      844
28      806
29      256
15      251
19      141
43      107
30        2
44        1
Name: category_id, dtype: int64
```

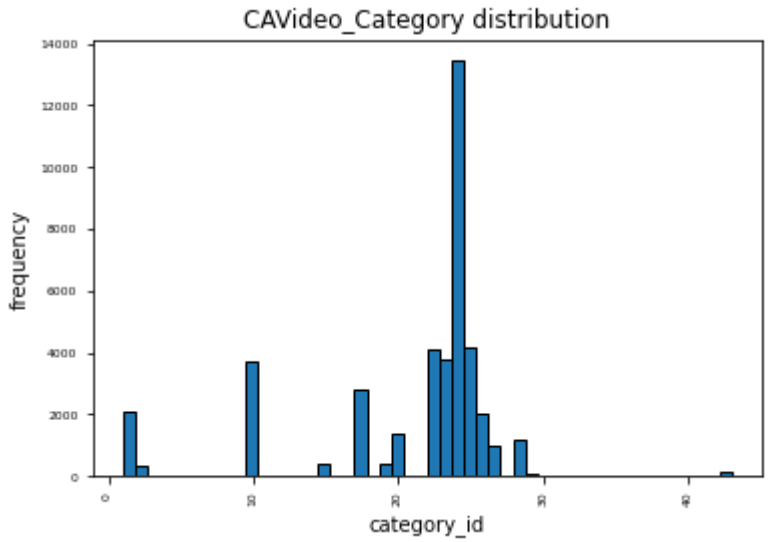
USvideo-category_id	频数	CAvideo-category_id	频数
24	9964	24	13451
10	6472	25	4159
26	4146	22	4105
23	3457	23	3773
22	3210	10	3731
25	2487	17	2787
28	2401	1	2060
1	2345	26	2007
17	2174	20	1344
27	1656	28	1155
15	920	27	991
20	817	19	392
19	402	15	369
2	384	2	353
29	57	43	124
43	57	29	74
30	6		

INvideo-category_id	频数	DEvideo-category_id	频数
24	16712	24	15292
25	5241	22	5988
10	3858	25	2935
23	3429	17	2752
22	2624	23	2534
1	1658	1	2376
27	1227	10	2372
26	845	26	1745
17	731	20	1565
28	552	2	873
43	205	27	844
29	105	28	806
2	72	29	256
20	66	15	251
30	16	19	141
19	8	43	107
15	3	30	2
44	1		

category_id属性直方图

In [43]:

```
#CAcategory_id属性直方图
plt.hist(x=CAvideo['category_id'], bins=50, edgecolor='black')
# 添加x轴和y轴标签
plt.xlabel('category_id')
plt.ylabel('frequency')
# 添加标题
plt.title('CAVideo_Category distribution')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./videoResult/CA/CAcategory_distribution_hist.png')
plt.show()
```



2.1.2 数值属性，给出数值属性的五数概括及缺失值的个数

该数据集中数值属性有：views、likes、dislikes、comment_count
Name: views, dtype: float64

In [54]:

```
#views数值属性五数概括
np.set_printoptions(suppress=True)
print(USvideo['views'].dropna().astype(int).describe())
print(CAvideo['views'].dropna().astype(int).describe())
print(INvideo['views'].dropna().astype(int).describe())
print(DEvideo['views'].dropna().astype(int).describe())
```

```
count    4.094900e+04
mean     2.360785e+06
std      7.394114e+06
min      5.490000e+02
25%      2.423290e+05
50%      6.818610e+05
75%      1.823157e+06
max      2.252119e+08
Name: views, dtype: float64
count    4.088100e+04
mean     1.147036e+06
std      3.390913e+06
min      7.330000e+02
25%      1.439020e+05
50%      3.712040e+05
75%      9.633020e+05
max      1.378431e+08
Name: views, dtype: float64
count    3.735200e+04
mean     1.060478e+06
std      3.184932e+06
min      4.024000e+03
25%      1.239155e+05
50%      3.045860e+05
75%      7.992912e+05
max      1.254322e+08
Name: views, dtype: float64
count    4.084000e+04
mean     6.034553e+05
std      2.348963e+06
min      5.180000e+02
25%      2.706875e+04
50%      1.192770e+05
75%      4.431015e+05
max      1.138762e+08
Name: views, dtype: float64
```

US-views		CA-views		IN-views		DE-views	
count	40949.00	count	40881.00	count	37352.00	count	40840.00
mean	2360785.00	mean	1147036.00	mean	1060478.00	mean	603455.30
std	7394114.00	std	3390913.00	std	3184932.00	std	2348963.00
min	549.00	min	733.00	min	4024.00	min	518.00
25%	242329.00	25%	143902.00	25%	123915.50	25%	27068.75
50%	681861.00	50%	371204.00	50%	304586.00	50%	119277.00
75%	1823157.00	75%	963302.00	75%	799291.20	75%	443101.50
max	182315700.00	max	137843100.00	max	125432200.00	max	113876200.00

Name: likes, dtype: float64

In [44]:

```
#likes数值属性五数概括
np.set_printoptions(suppress=True)
print(USvideo['likes'].dropna().astype(int).describe())
print(CAvideo['likes'].dropna().astype(int).describe())
print(INvideo['likes'].dropna().astype(int).describe())
print(DEvideo['likes'].dropna().astype(int).describe())
```

```
count    4.094900e+04
mean     7.426670e+04
std      2.288853e+05
min      0.000000e+00
25%      5.424000e+03
50%      1.809100e+04
75%      5.541700e+04
max      5.613827e+06
Name: likes, dtype: float64
count    4.088100e+04
mean     3.958269e+04
std      1.326895e+05
min      0.000000e+00
25%      2.191000e+03
50%      8.780000e+03
75%      2.871700e+04
max      5.053338e+06
Name: likes, dtype: float64
count    3.735200e+04
mean     2.708272e+04
std      9.714510e+04
min      0.000000e+00
25%      8.640000e+02
50%      3.069000e+03
75%      1.377425e+04
max      2.912710e+06
Name: likes, dtype: float64
count    4.084000e+04
mean     2.187550e+04
std      1.018000e+05
min      0.000000e+00
25%      5.330000e+02
50%      2.699000e+03
75%      1.179625e+04
max      4.924056e+06
Name: likes, dtype: float64
```

US-views		CA-views		IN-views		DE-views	
count	4.094900e+04	count	4.088100e+04	count	3.735200e+04	count	4.084000e+04
mean	7.426670e+04	mean	3.958269e+04	mean	2.708272e+04	mean	2.187550e+04
std	2.288853e+05	std	1.326895e+05	std	9.714510e+04	std	1.018000e+05
min	0.000000e+00	min	0.000000e+00	min	0.000000e+00	min	0.000000e+00
25%	5.424000e+03	25%	2.191000e+03	25%	8.640000e+02	25%	5.330000e+02
50%	1.809100e+04	50%	8.780000e+03	50%	3.069000e+03	50%	2.699000e+03

US-views		CA-views		IN-views		DE-views	
75%	5.541700e+04	75%	2.871700e+04	75%	1.377425e+04	75%	1.179625e+04
max	5.613827e+06	max	5.053338e+06	max	2.912710e+06	max	4.924056e+06

Name: dislikes, dtype: float64

In [45]:

```
#dislikes数值属性五数概括
np.set_printoptions(suppress=True)
print(USvideo['dislikes'].dropna().astype(int).describe())
print(CAvideo['dislikes'].dropna().astype(int).describe())
print(INvideo['dislikes'].dropna().astype(int).describe())
print(DEvideo['dislikes'].dropna().astype(int).describe())
```

```
count    4.094900e+04
mean     3.711401e+03
std      2.902971e+04
min      0.000000e+00
25%      2.020000e+02
50%      6.310000e+02
75%      1.938000e+03
max      1.674420e+06
Name: dislikes, dtype: float64
count    4.088100e+04
mean     2.009195e+03
std      1.900837e+04
min      0.000000e+00
25%      9.900000e+01
50%      3.030000e+02
75%      9.500000e+02
max      1.602383e+06
Name: dislikes, dtype: float64
count    3.735200e+04
mean     1.665082e+03
std      1.607617e+04
min      0.000000e+00
25%      1.080000e+02
50%      3.260000e+02
75%      1.019250e+03
max      1.545017e+06
Name: dislikes, dtype: float64
count    4.084000e+04
mean     1.397136e+03
std      1.457738e+04
min      0.000000e+00
25%      2.900000e+01
50%      1.340000e+02
75%      5.320000e+02
max      1.470386e+06
Name: dislikes, dtype: float64
```

US-views		CA-views		IN-views		DE-views	
count	4.094900e+04	count	4.088100e+04	count	3.735200e+04	count	4.084000e+04
mean	3.711401e+03	mean	2.009195e+03	mean	1.665082e+03	mean	1.397136e+03
std	2.902971e+04	std	1.900837e+04	std	1.607617e+04	std	1.457738e+04

US-views		CA-views		IN-views		DE-views	
min	0.000000e+00	min	0.000000e+00	min	0.000000e+00	min	0.000000e+00
25%	2.020000e+02	25%	9.900000e+01	25%	1.080000e+02	25%	2.900000e+01
50%	6.310000e+02	50%	3.030000e+02	50%	3.260000e+02	50%	1.340000e+02
75%	1.938000e+03	75%	9.500000e+02	75%	1.019250e+03	75%	5.320000e+02
max	1.674420e+06	max	1.602383e+06	max	1.545017e+06	max	1.470386e+06

Name: comment_count, dtype: float64

In [46]:

```
#comment_count数值属性五数概括
np.set_printoptions(suppress=True)
print(USvideo['comment_count'].dropna().astype(int).describe())
print(CAvideo['comment_count'].dropna().astype(int).describe())
print(INvideo['comment_count'].dropna().astype(int).describe())
print(DEvideo['comment_count'].dropna().astype(int).describe())
```

```
count    4.094900e+04
mean     8.446804e+03
std      3.743049e+04
min      0.000000e+00
25%      6.140000e+02
50%      1.856000e+03
75%      5.755000e+03
max      1.361580e+06
Name: comment_count, dtype: float64
count    4.088100e+04
mean     5.042975e+03
std      2.157902e+04
min      0.000000e+00
25%      4.170000e+02
50%      1.301000e+03
75%      3.713000e+03
max      1.114800e+06
Name: comment_count, dtype: float64
count     37352.00000
mean       2676.99743
std       14868.31713
min           0.00000
25%          81.00000
50%         329.00000
75%        1285.00000
max      827755.00000
Name: comment_count, dtype: float64
count    4.084000e+04
mean     2.785857e+03
std      1.745803e+04
min      0.000000e+00
25%      7.900000e+01
50%      3.760000e+02
75%      1.376000e+03
max      1.084435e+06
Name: comment_count, dtype: float64
```

US-views	CA-views	IN-views	DE-views

US-views		CA-views		IN-views		DE-views	
count	4.094900e+04	count	4.088100e+04	count	37352.00000	count	4.084000e+04
mean	8.446804e+03	mean	5.042975e+03	mean	2676.99743	mean	2.785857e+03
std	3.743049e+04	std	2.157902e+04	std	14868.31713	std	1.745803e+04
min	0.000000e+00	min	0.000000e+00	min	0.00000	min	0.000000e+00
25%	6.140000e+02	25%	4.170000e+02	25%	81.00000	25%	7.900000e+01
50%	1.856000e+03	50%	1.301000e+03	50%	329.00000	50%	3.760000e+02
75%	5.755000e+03	75%	3.713000e+03	75%	1285.00000	75%	1.376000e+03
max	1.361580e+06	max	1.114800e+06	max	827755.00000	max	1.084435e+06

各数据集的缺省值情况为

US-video缺失值		CA-video缺失值		IN-video缺失值		DE-video缺失值
video_id	0	video_id	0	video_id	0	video_id
trending_date	0	trending_date	0	trending_date	0	trending_date
title	0	title	0	title	0	title
channel_title	0	channel_title	0	channel_title	0	channel_title
category_id	0	category_id	0	category_id	0	category_id
publish_time	0	publish_time	0	publish_time	0	publish_time
tags	0	tags	0	tags	0	tags
views	0	views	0	views	0	views
likes	0	likes	0	likes	0	likes
dislikes	0	dislikes	0	dislikes	0	dislikes
comment_count	0	comment_count	0	comment_count	0	comment_count
thumbnail_link	0	thumbnail_link	0	thumbnail_link	0	thumbnail_link
comments_disabled	0	comments_disabled	0	comments_disabled	0	comments_disabled
ratings_disabled	0	ratings_disabled	0	ratings_disabled	0	ratings_disabled
video_error_or_removed	0	video_error_or_removed	0	video_error_or_removed	0	video_error_or_remove
description	570	description	1296	description	561	description

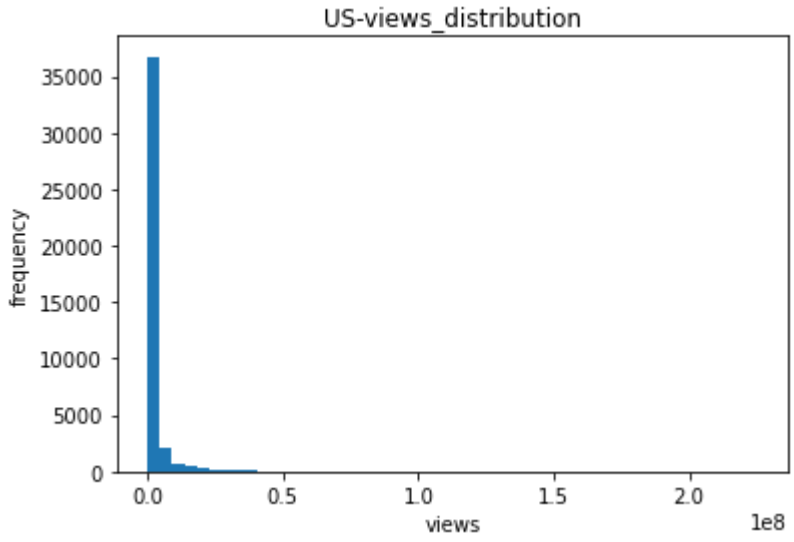
分析可知，均为description属性缺失，根据上述缺省值情况，进行缺失值填写后的数据可视化展示有问题，此处不做展示

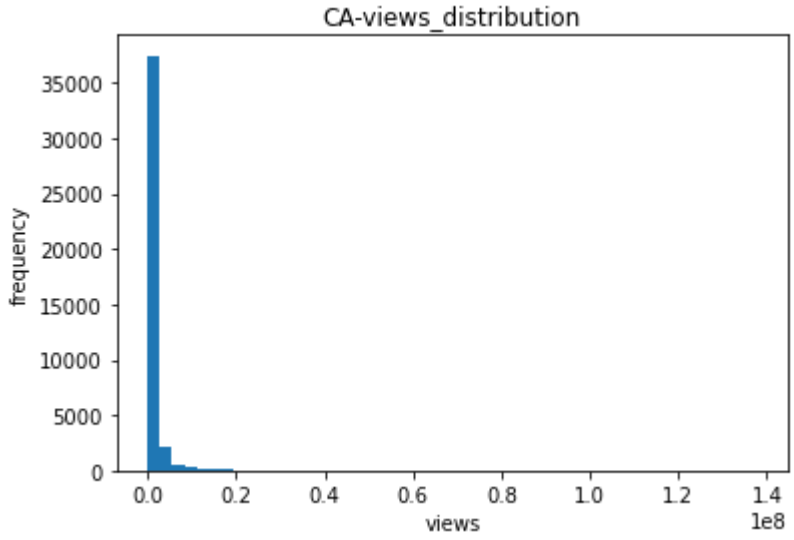
2.1.2 数据可视化

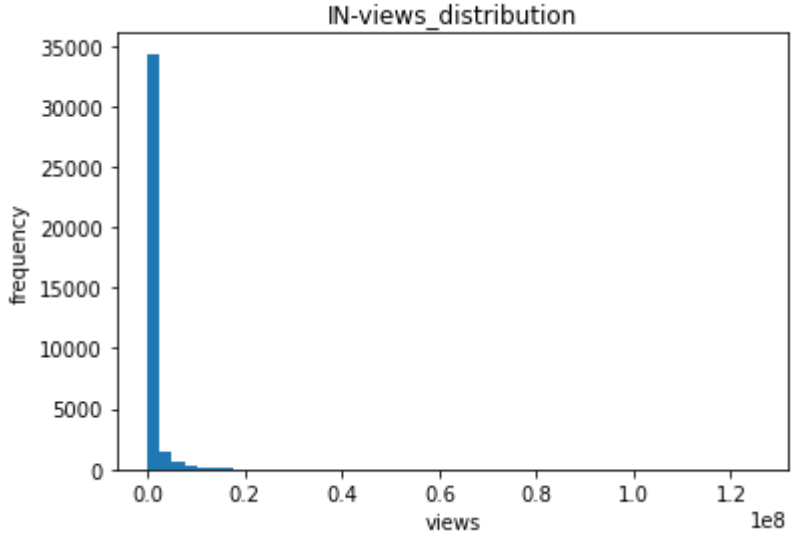
使用直方图、盒图等检查数据分布及离群点
（这里给出views、likes属性的可视化展示）
(1) **views直方图**

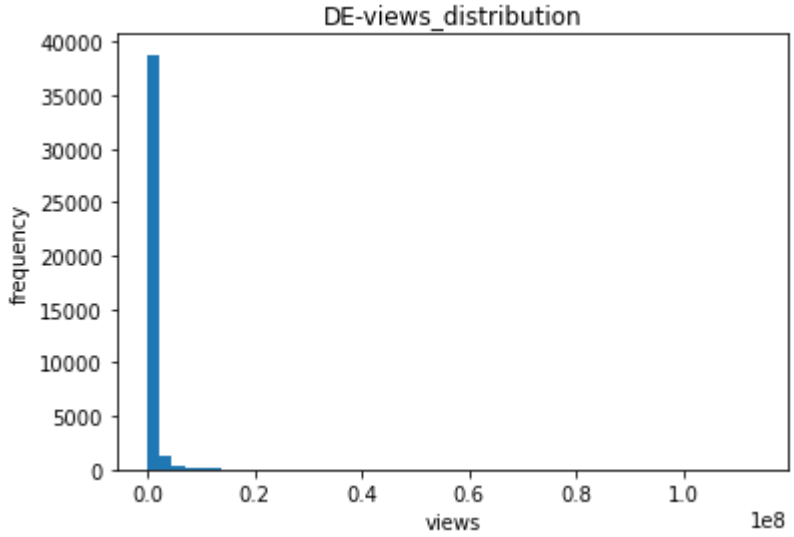
In [47]:

```
#views直方图
plt.hist(USvideo['views'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('views')
plt.ylabel('frequency')
# 添加标题
plt.title('US-views_distribution')
plt.savefig('./videoResult/US/USviews_hist.png')
plt.show()

plt.hist(CAvideo['views'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('views')
plt.ylabel('frequency')
# 添加标题
plt.title('CA-views_distribution')
plt.savefig('./videoResult/CA/CAviews_hist.png')
plt.show()

plt.hist(INvideo['views'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('views')
plt.ylabel('frequency')
# 添加标题
plt.title('IN-views_distribution')
plt.savefig('./videoResult/IN/INviews_hist.png')
plt.show()

plt.hist(DEvideo['views'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('views')
plt.ylabel('frequency')
# 添加标题
plt.title('DE-views_distribution')
plt.savefig('./videoResult/DE/DEviews_hist.png')
plt.show()
```




CA-views_distribution
frequency
views
1e8
0
5000
10000
15000
20000
25000
30000
35000
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

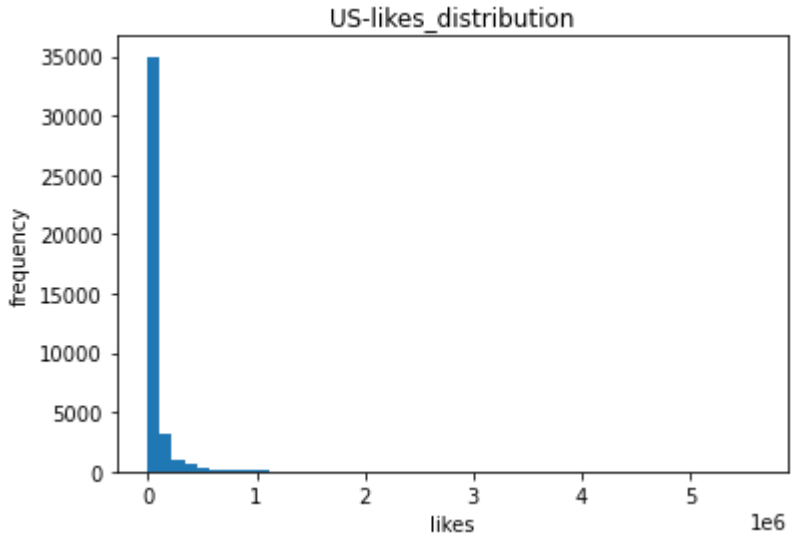

IN-views_distribution
frequency
views
1e8
0
5000
10000
15000
20000
25000
30000
35000
0.0
0.2
0.4
0.6
0.8
1.0
1.2

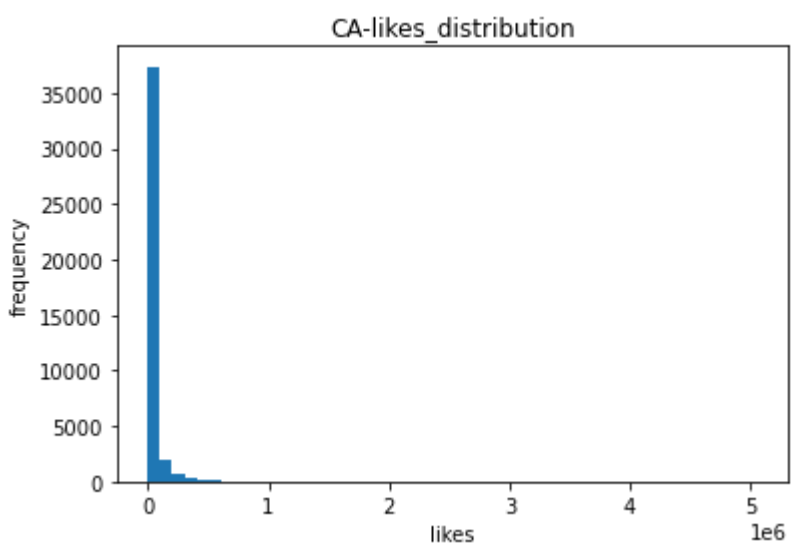

DE-views_distribution
frequency
views
1e8
0
5000
10000
15000
20000
25000
30000
35000
40000
0.0
0.2
0.4
0.6
0.8
1.0

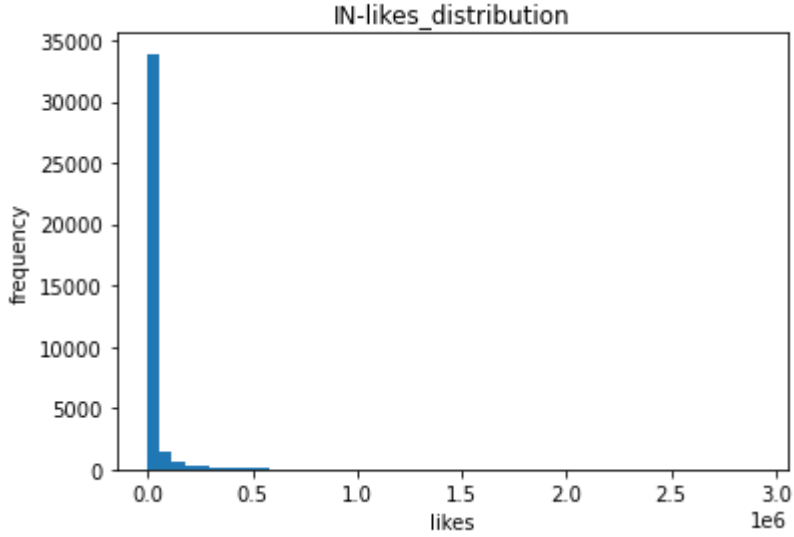
likes直方图

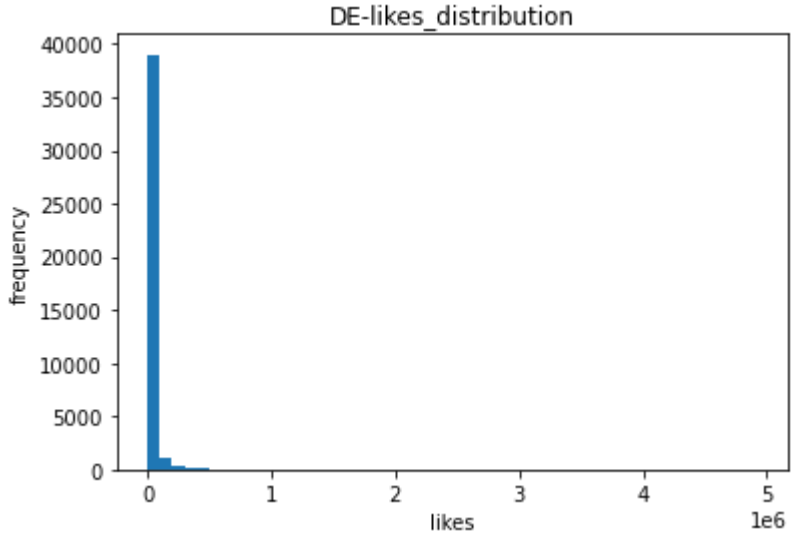
In [48]:

```
#likes直方图
plt.hist(USvideo['likes'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('likes')
plt.ylabel('frequency')
# 添加标题
plt.title('US-likes_distribution')
plt.savefig('./videoResult/US/USlikes_hist.png')
plt.show()

plt.hist(CAvideo['likes'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('likes')
plt.ylabel('frequency')
# 添加标题
plt.title('CA-likes_distribution')
plt.savefig('./videoResult/CA/CAlikes_hist.png')
plt.show()

plt.hist(INvideo['likes'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('likes')
plt.ylabel('frequency')
# 添加标题
plt.title('IN-likes_distribution')
plt.savefig('./videoResult/IN/INlikes_hist.png')
plt.show()

plt.hist(DEvideo['likes'].dropna().astype(int), bins=50)
# 添加x轴和y轴标签
plt.xlabel('likes')
plt.ylabel('frequency')
# 添加标题
plt.title('DE-likes_distribution')
plt.savefig('./videoResult/DE/DElikes_hist.png')
plt.show()
```




CA-likes_distribution
frequency
likes
1e6

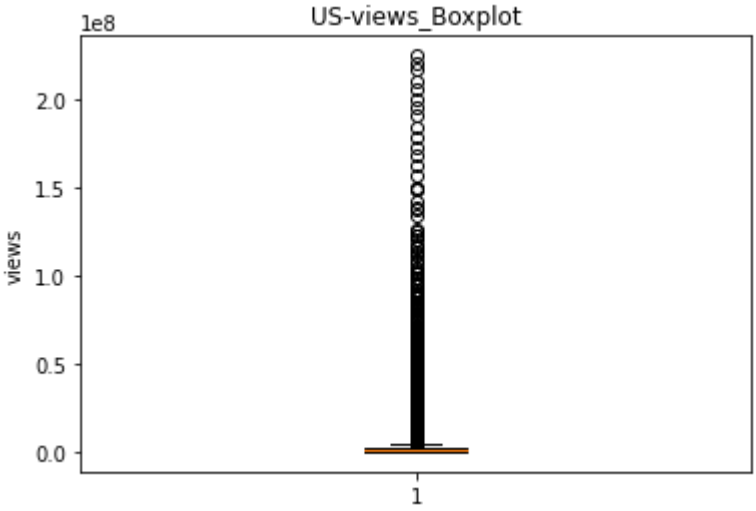

IN-likes_distribution
frequency
likes
1e6

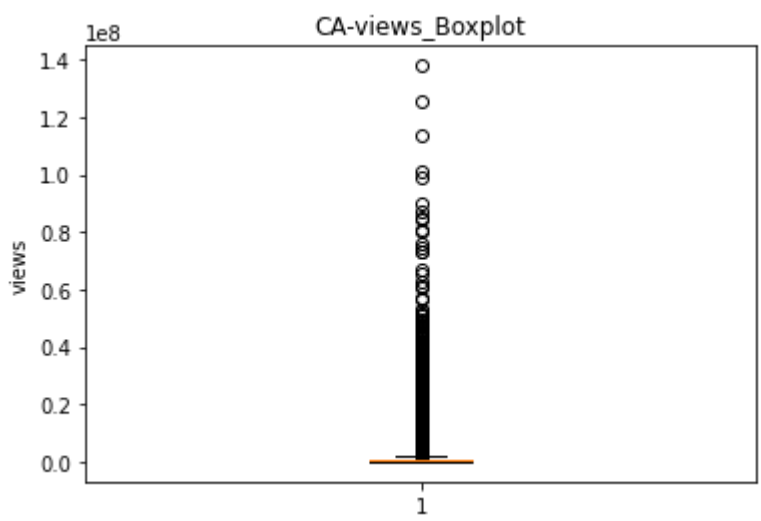

DE-likes_distribution
frequency
likes
1e6

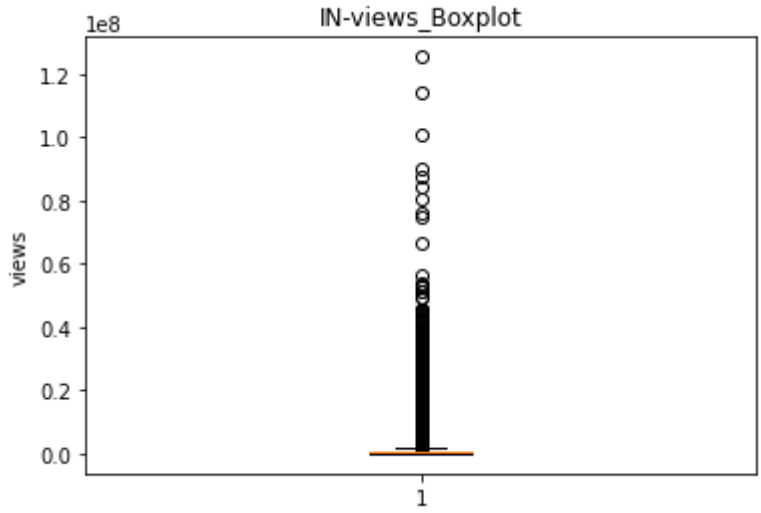
(2)**views盒图**

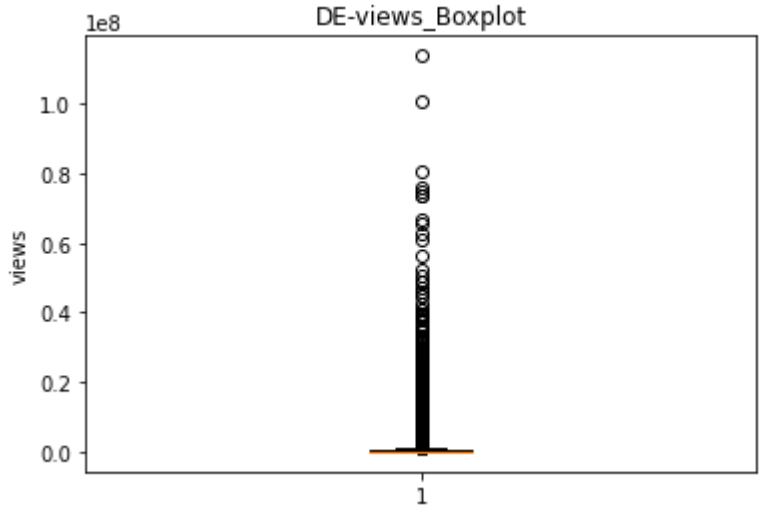
In [49]:

```
#views属性盒图
plt.boxplot(USvideo['views'].dropna().astype(int))
plt.ylabel('views')
plt.title('US-views_Boxplot')
plt.savefig('./videoResult/US/USviews_box.png')
plt.show()

plt.boxplot(CAvideo['views'].dropna().astype(int))
plt.ylabel('views')
plt.title('CA-views_Boxplot')
plt.savefig('./videoResult/CA/CAviews_box.png')
plt.show()

plt.boxplot(INvideo['views'].dropna().astype(int))
plt.ylabel('views')
plt.title('IN-views_Boxplot')
plt.savefig('./videoResult/IN/INviews_box.png')
plt.show()

plt.boxplot(DEvideo['views'].dropna().astype(int))
plt.ylabel('views')
plt.title('DE-views_Boxplot')
plt.savefig('./videoResult/DE/DEviews_box.png')
plt.show()
```




CA-views_Boxplot
1e8
views
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1

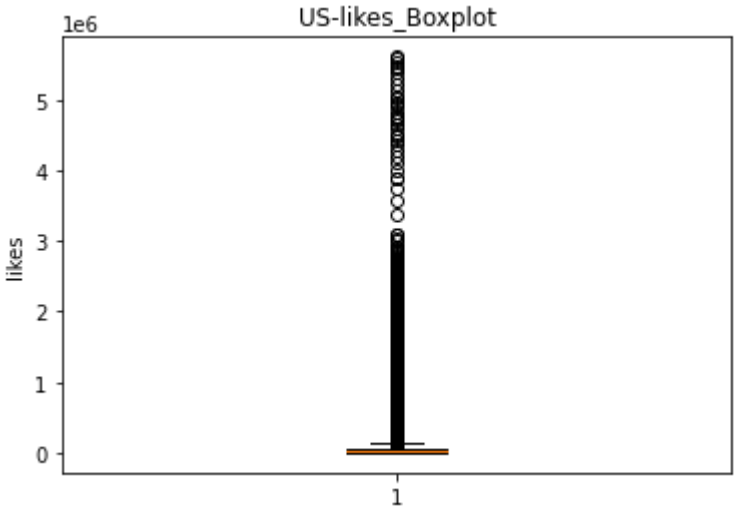

IN-views_Boxplot
1e8
views
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1

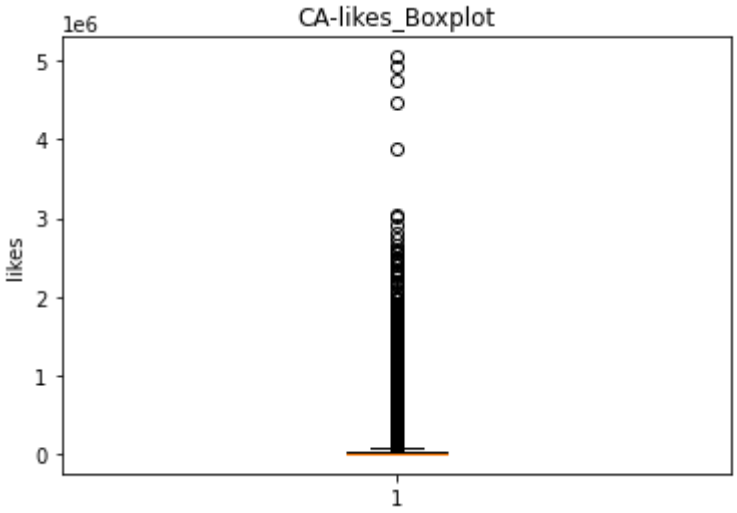

DE-views_Boxplot
1e8
views
1.0
0.8
0.6
0.4
0.2
0.0
1

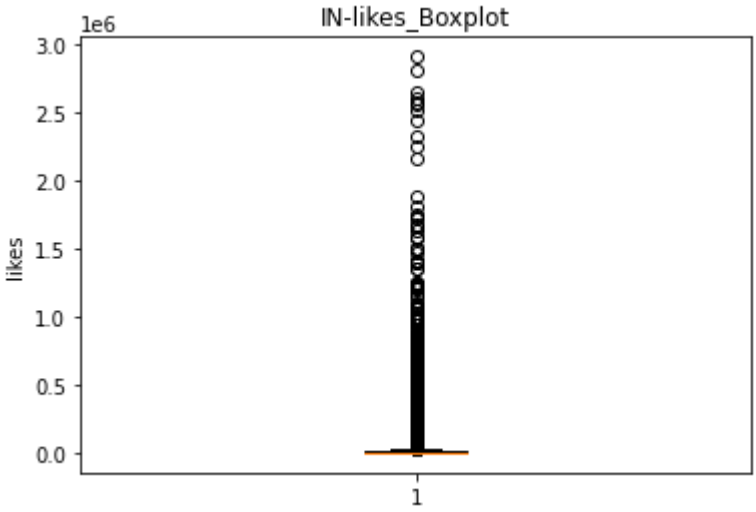
likes盒图

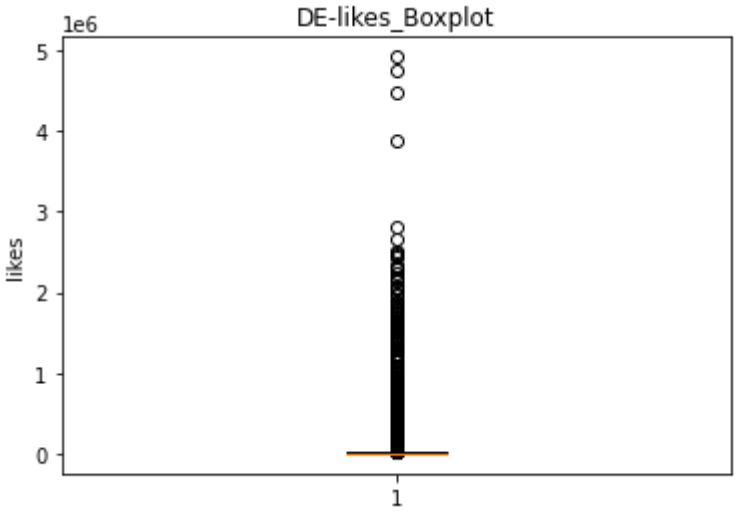
In [50]:

```
#likes属性盒图
plt.boxplot(USvideo['likes'].dropna().astype(int))
plt.ylabel('likes')
plt.title('US-likes_Boxplot')
plt.savefig('./videoResult/US/USlikes_box.png')
plt.show()

plt.boxplot(CAvideo['likes'].dropna().astype(int))
plt.ylabel('likes')
plt.title('CA-likes_Boxplot')
plt.savefig('./videoResult/CA/CAlikes_box.png')
plt.show()

plt.boxplot(INvideo['likes'].dropna().astype(int))
plt.ylabel('likes')
plt.title('IN-likes_Boxplot')
plt.savefig('./videoResult/IN/INlikes_box.png')
plt.show()

plt.boxplot(DEvideo['likes'].dropna().astype(int))
plt.ylabel('likes')
plt.title('DE-likes_Boxplot')
plt.savefig('./videoResult/DE/DElikes_box.png')
plt.show()
```





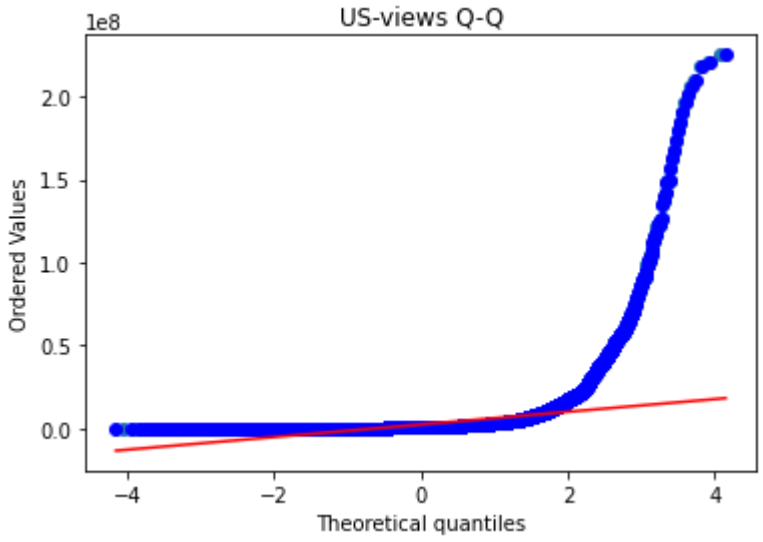

IN-likes_Boxplot
1e6
3.0
2.5
2.0
1.5
1.0
0.5
0.0
likes
1

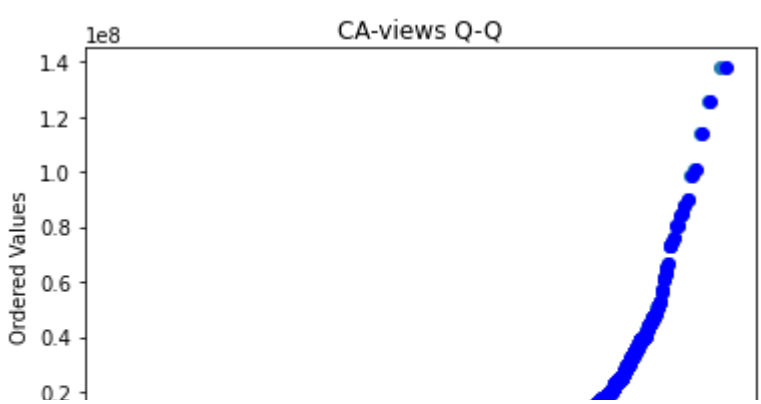

DE-likes_Boxplot
1e6
5
4
3
2
1
0
likes
1

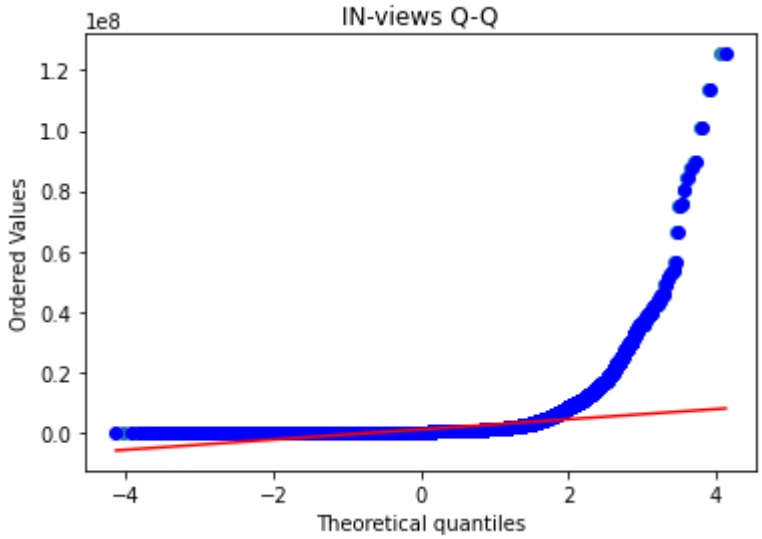
(3)**viewsQ-Q图**

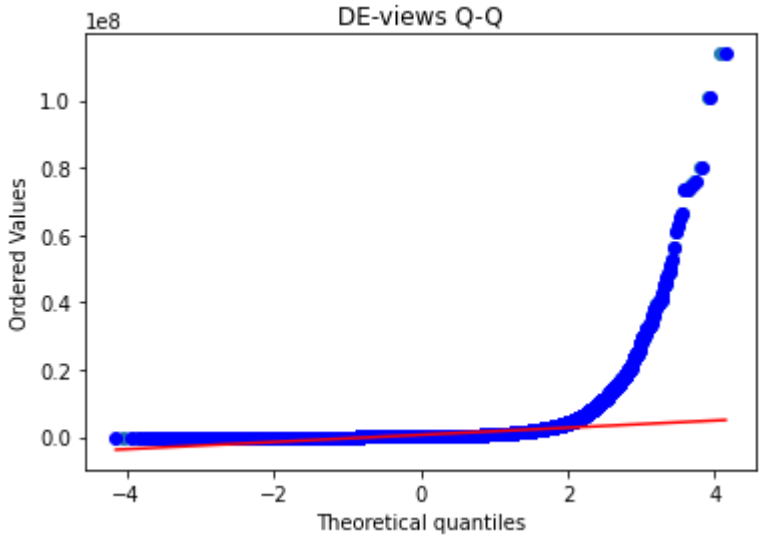
In [51]:

```
#views属性Q-Q图
sorted_ = np.sort(USvideo['views'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['views'].dropna().astype(int), dist="norm", plot=plt)
plt.title('US-views Q-Q')
plt.savefig('./videoResult/US/USviews_qq.png')
plt.show()

sorted_ = np.sort(CAvideo['views'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(CAvideo['views'].dropna().astype(int), dist="norm", plot=plt)
plt.title('CA-views Q-Q')
plt.savefig('./videoResult/CA/CAviews_qq.png')
plt.show()

sorted_ = np.sort(INvideo['views'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(INvideo['views'].dropna().astype(int), dist="norm", plot=plt)
plt.title('IN-views Q-Q')
plt.savefig('./videoResult/IN/INviews_qq.png')
plt.show()

sorted_ = np.sort(DEvideo['views'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(DEvideo['views'].dropna().astype(int), dist="norm", plot=plt)
plt.title('DE-views Q-Q')
plt.savefig('./videoResult/DE/DEviews_qq.png')
plt.show()
```




CA-views Q-Q
1e8
Ordered Values

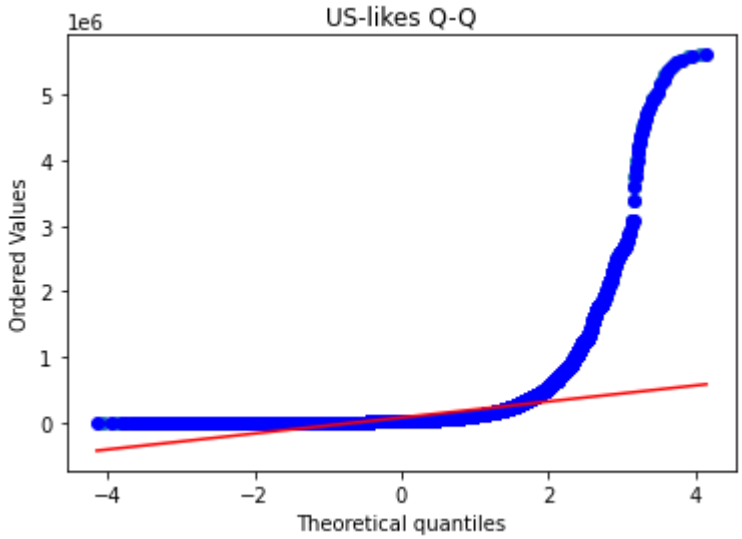

IN-views Q-Q
1e8
Ordered Values
Theoretical quantiles

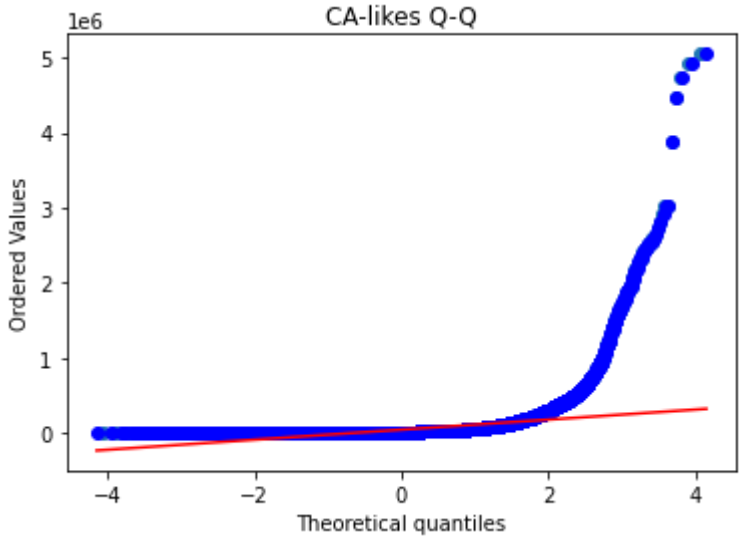

DE-views Q-Q
1e8
Ordered Values
Theoretical quantiles

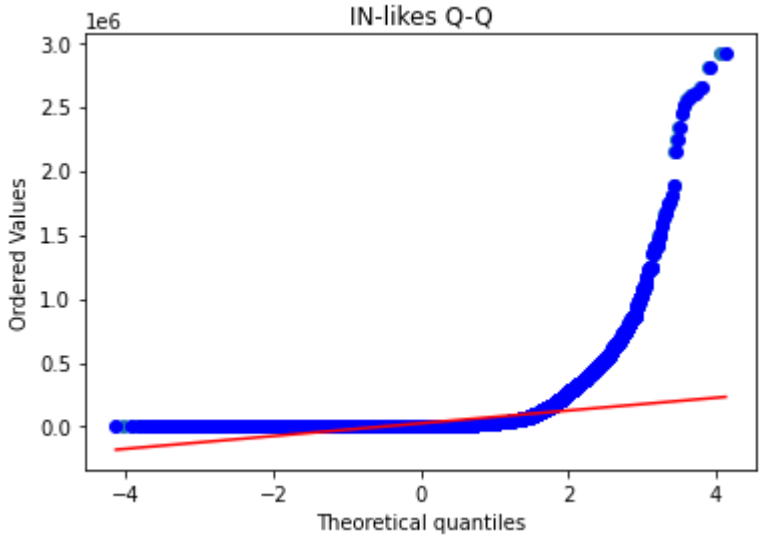
likesQ-Q图

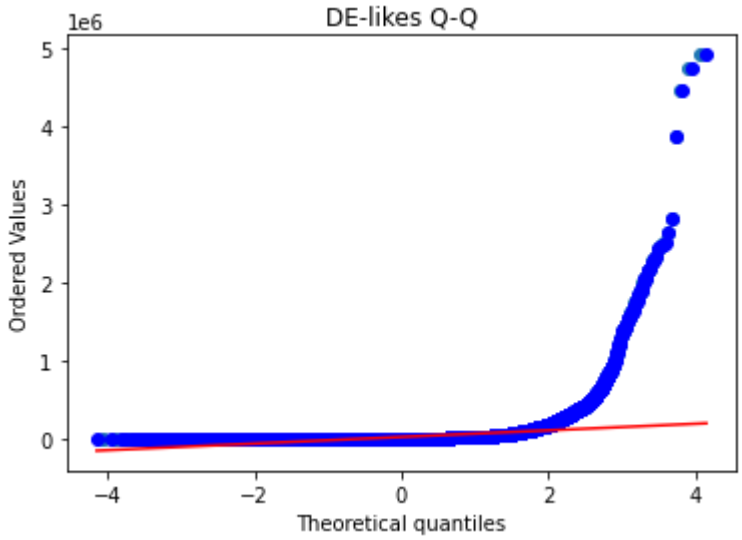
In [52]:

```
#likes属性Q-Q图
sorted_ = np.sort(USvideo['likes'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['likes'].dropna().astype(int), dist="norm", plot=plt)
plt.title('US-likes Q-Q')
plt.savefig('./videoResult/US/USlikes_qq.png')
plt.show()

sorted_ = np.sort(CAvideo['likes'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(CAvideo['likes'].dropna().astype(int), dist="norm", plot=plt)
plt.title('CA-likes Q-Q')
plt.savefig('./videoResult/CA/CAlikes_qq.png')
plt.show()

sorted_ = np.sort(INvideo['likes'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(INvideo['likes'].dropna().astype(int), dist="norm", plot=plt)
plt.title('IN-likes Q-Q')
plt.savefig('./videoResult/IN/INlikes_qq.png')
plt.show()

sorted_ = np.sort(DEvideo['likes'].dropna().astype(int))
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(DEvideo['likes'].dropna().astype(int), dist="norm", plot=plt)
plt.title('DE-likes Q-Q')
plt.savefig('./videoResult/DE/DElikes_qq.png')
plt.show()
```




CA-likes Q-Q
1e6
Ordered Values
Theoretical quantiles


IN-likes Q-Q
1e6
Ordered Values
Theoretical quantiles

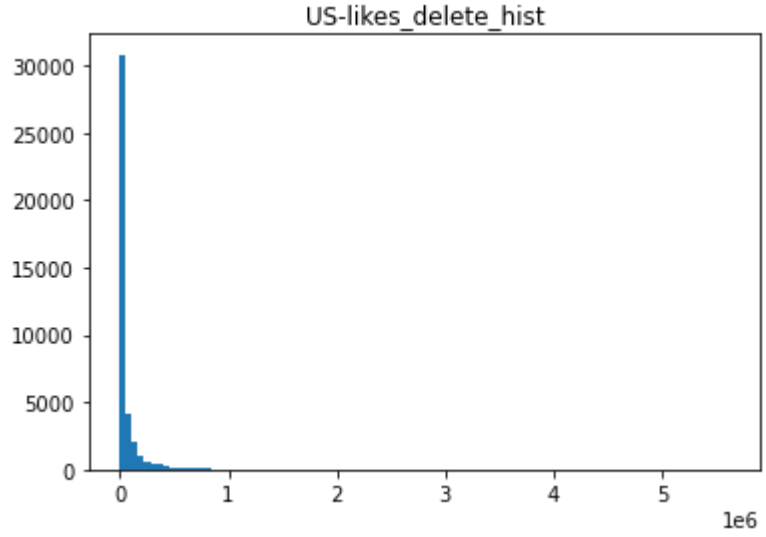


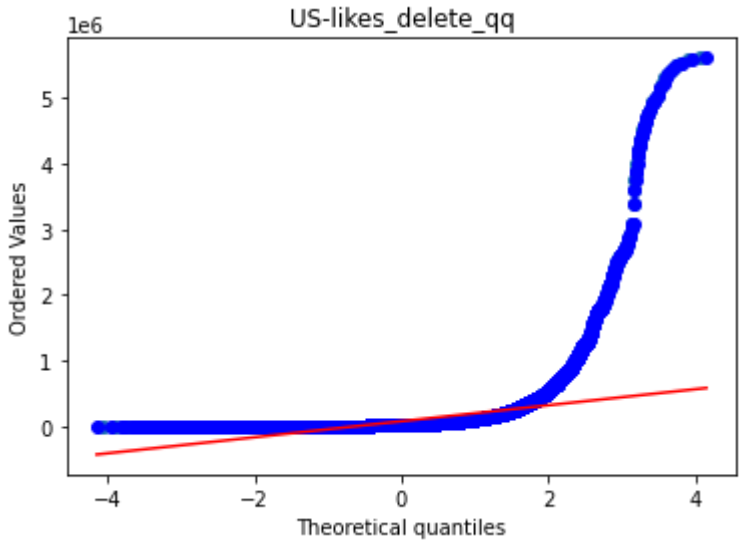
2.2 数据缺失的处理

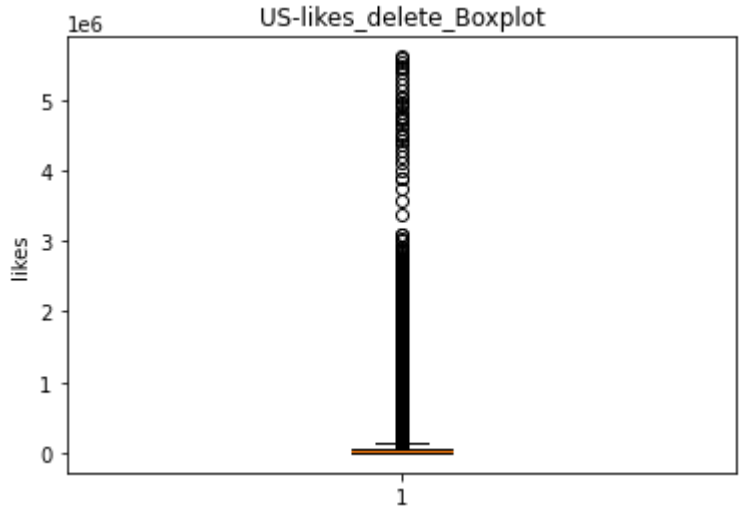
2.2.1 将缺失部分剔除

In [64]:

```
#将缺失值剔除
#直方图
plt.hist(USvideo['likes'].dropna(),bins=100)
plt.title('US-likes_delete_hist')
plt.savefig('./videoResult/us-likes_delete_hist.png')
plt.show()

#QQ图
sorted_ = np.sort(USvideo['likes'].dropna())
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['likes'], dist="norm", plot=plt)
plt.title('US-likes_delete_qq')
plt.savefig('./videoResult/us-likes_delete_qq.png')
plt.show()

#盒图
plt.boxplot(USvideo['likes'].dropna())
plt.ylabel('likes')
plt.title('US-likes_delete_Boxplot')
plt.savefig('./videoResult/us-likes_delete_box.png')
plt.show()
```



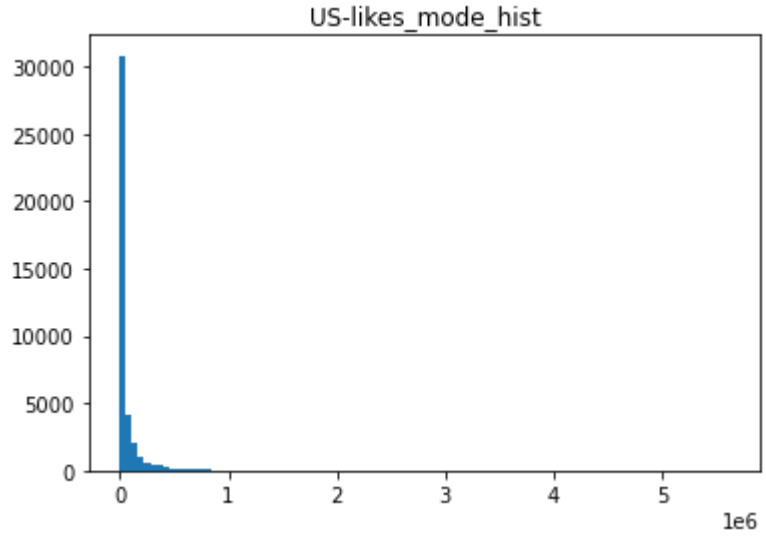


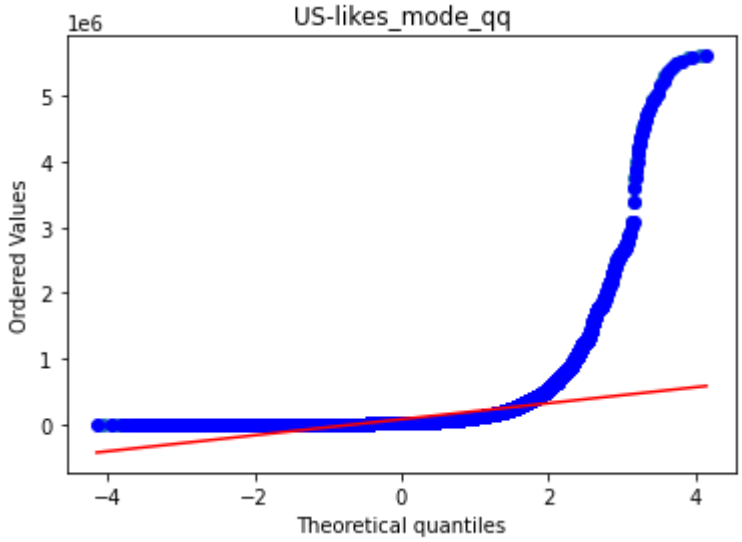


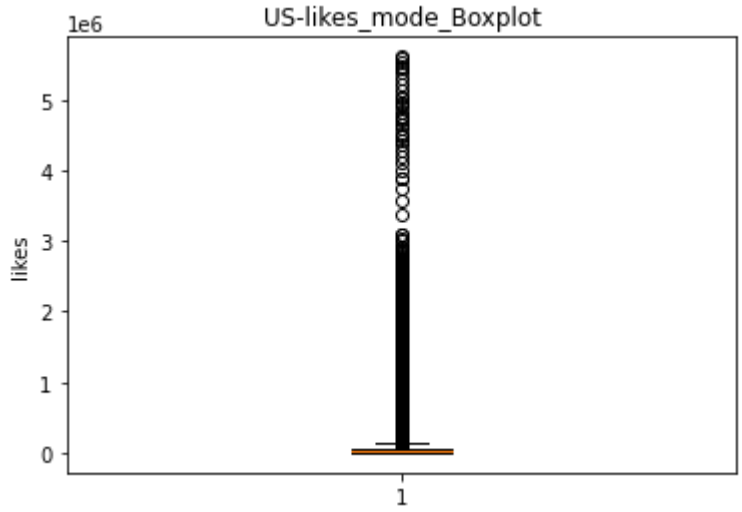
2.2.2 最高频率值填补缺失值

In [65]:

```
#最高频率
#直方图
plt.hist(USvideo['likes'].fillna(USvideo['likes'].interpolate(missing_values='NaN', strategy='mode',
plt.title('US-likes_mode_hist')
plt.savefig('./videoResult/likes_mode_hist.png')
plt.show()

#QQ图
sorted_ = np.sort(USvideo['likes'].fillna(USvideo['likes'].interpolate(missing_values='NaN', strateg
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['likes'], dist="norm", plot=plt)
plt.title('US-likes_mode_qq')
plt.savefig('./videoResult/likes_mode_qq.png')
plt.show()

#盒图
plt.boxplot(USvideo['likes'].fillna(USvideo['likes'].interpolate(missing_values='NaN', strategy='mod
plt.ylabel('likes')
plt.title('US-likes_mode_Boxplot')
plt.savefig('./videoResult/likes_mode_box.png')
plt.show()
```



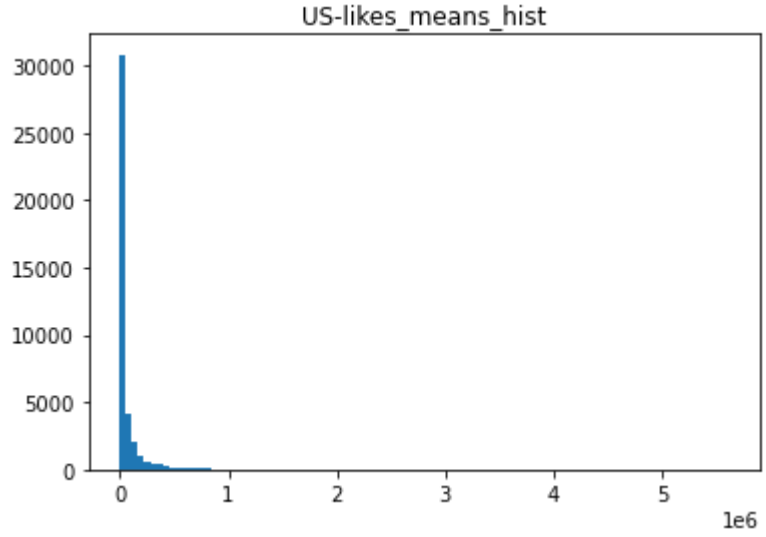


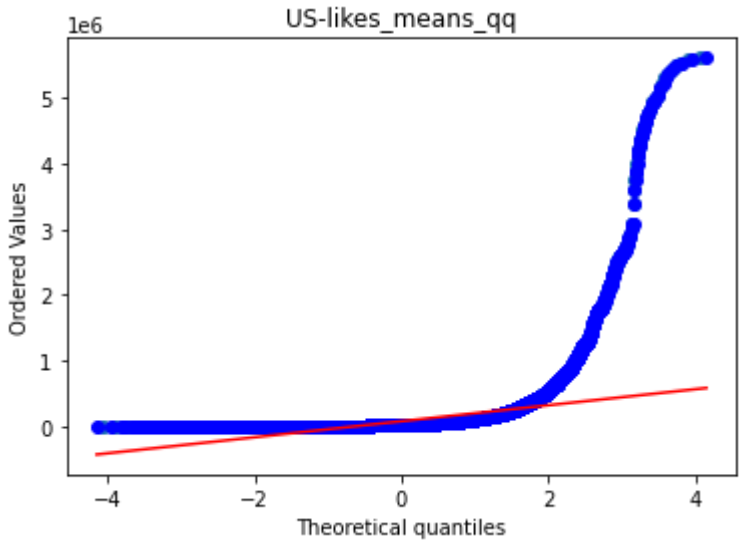


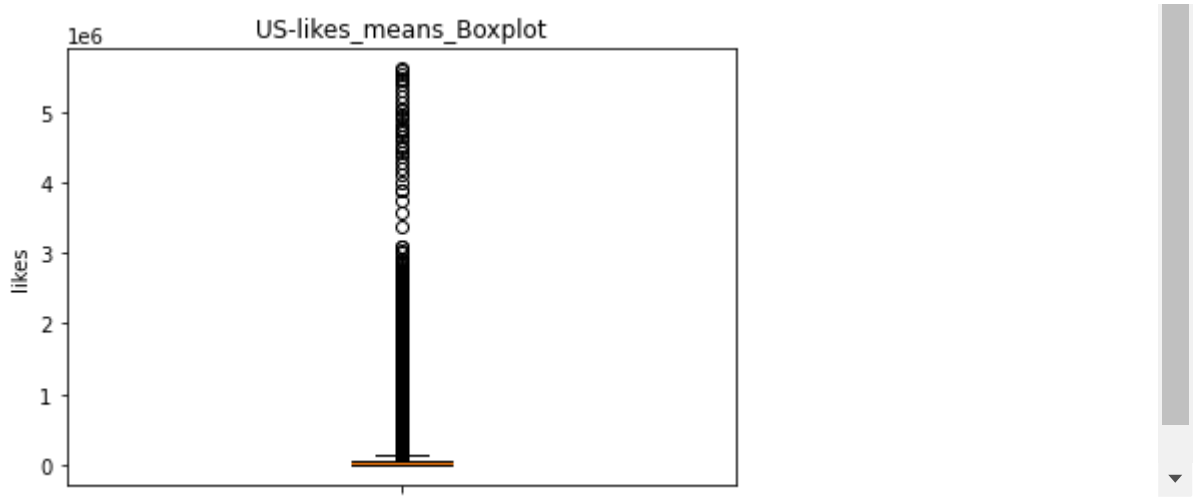
2.2.3 通过属性相关关系来填补缺失值

In [66]:

```
#通过属性的相关关系来填补缺失值
#直方图
plt.hist(USvideo['likes'].interpolate(missing_values='NaN', strategy='mean', axis=0, verbose=0, copy
plt.title('US-likes_means_hist')
plt.savefig('./videoResult/likes_means_hist.png')
plt.show()

#QQ图
sorted_ = np.sort(USvideo['likes'].interpolate(missing_values='NaN', strategy='mean', axis=0, verbos
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['likes'].interpolate(missing_values='NaN', strategy='mean', axis=0, verbose=0
plt.title('US-likes_means_qq')
plt.savefig('./videoResult/likes_means_qq.png')
plt.show()

#盒图
plt.boxplot(USvideo['likes'].interpolate(missing_values='NaN', strategy='mean', axis=0, verbose=0, c
plt.ylabel('likes')
plt.title('US-likes_means_Boxplot')
plt.savefig('./videoResult/likes_means_box.png')
plt.show()
```







2.2.4 通过数据对象之间的相似性来填补缺失值

In [*]:

```
#通过数据对象之间的相似性来填补缺失值
#USvideo_data = USvideo[USvideo['views'].notnull()]
known_price = USvideo[USvideo['likes'].notnull()].sample(frac=0.1)
unknown_price = USvideo[USvideo['likes'].isnull()]
x = known_price[['views']]
y = known_price[['likes']]
t_x = unknown_price[['views']]
fc = RandomForestClassifier()
fc.fit(x, y.values.ravel())
pr = fc.predict(t_x)
USvideo.loc[USvideo.likes.isnull(), 'likes'] = pr

#直方图
plt.hist(USvideo['likes'].astype(int), bins=100)
plt.title('US-likes_relative_hist')
plt.savefig('./videoResult/likes_relative_hist.png')
plt.show()

#QQ图
sorted_ = np.sort(USvideo['likes'])
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(USvideo['likes'])
plt.title('US-likes_relative_qq')
plt.savefig('./videoResult/likes_relative_qq.png')
plt.show()

#盒图
plt.boxplot(USvideo['likes'])
plt.ylabel('likes')
plt.title('US-likes_relative_Boxplot')
plt.savefig('./videoResult/likes_relative_box.png')
plt.show()
```

In [ ]:

```

```