自行选择两个数据集进行探索性分析

分析报告一

一、数据

1.1 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)
```

1.2 编程语言：python

1.3 导入所需各类依赖包

In [ ]:

```
import pandas as pd
import numpy as np
from scipy import stats
import matplotlib.pyplot as plt
from sklearn.ensemble import RandomForestClassifier
```

二、数据分析要求

2.1 数据可视化及摘要

* 数据摘要

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：country、disignation、province、region_1、region_2、variety、winery

由于属性值较多，这里我们以country为例作展示，其余标称属性可能取值的频数运行代码后可查看

Name: country, dtype: int64

In [ ]:

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

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

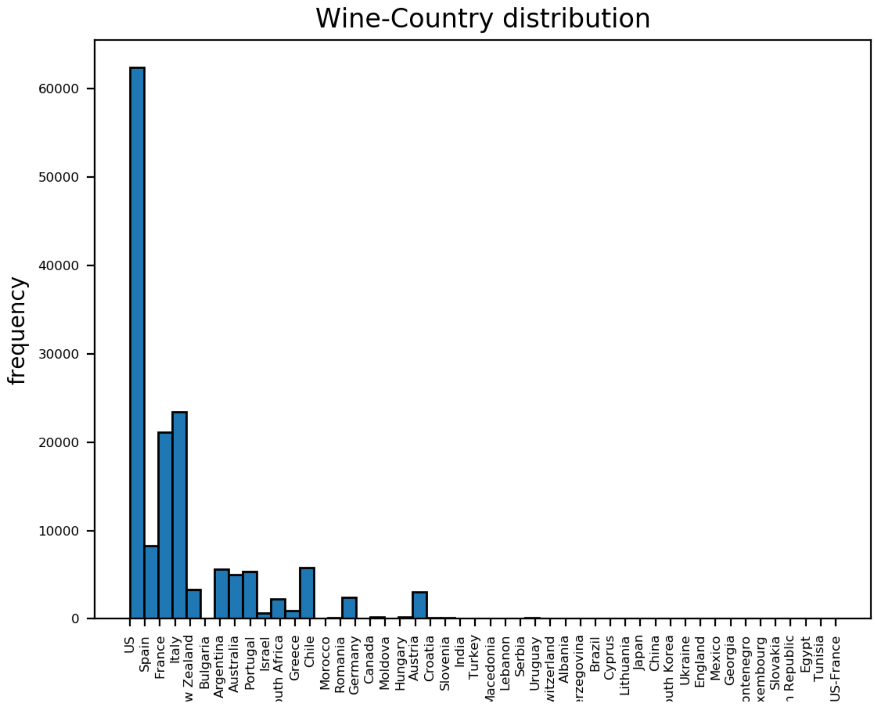
In [ ]:

```
#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()
```

In [27]:

```
from IPython.display import Image
Image(filename = 'country_distribution_hist.png', width=500, height=500)
```

Out[27]:



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：price、points

Name: price, dtype: float64

In [ ]:

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

	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 [ ]:

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

	points
count	150930.0000
mean	87.8884
std	3.2224
min	80.0000
25%	86.0000
50%	88.0000
75%	90.0000
max	100.0000

该数据集的缺省值情况为

```
In [ ]: print(wine.isna().sum())
```

	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

* 数据可视化

2.1.3 使用直方图、盒图等检查数据分布及离群点

（这里给出price和points属性的可视化展示）

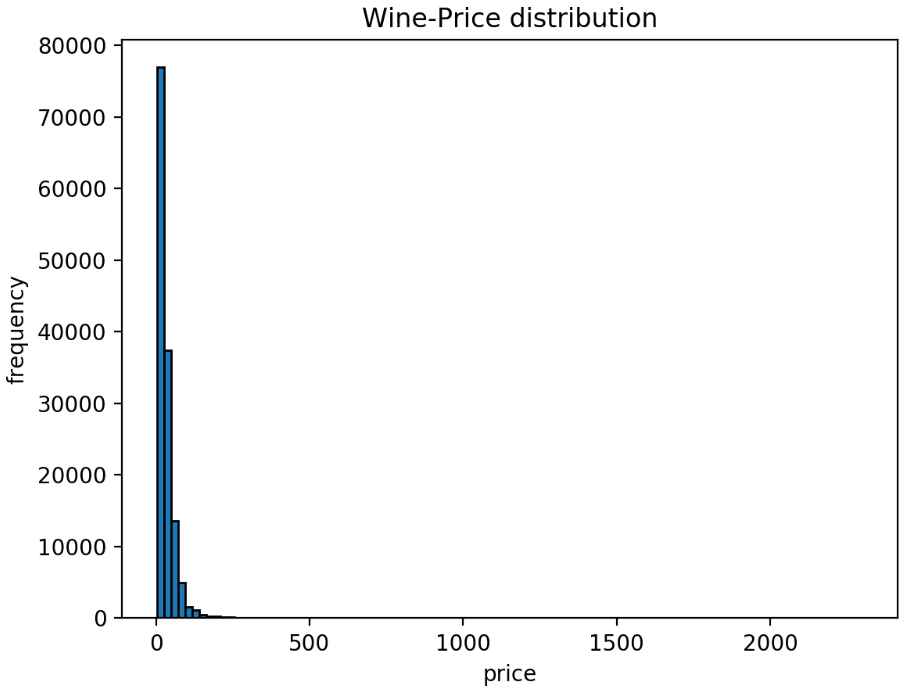
(1)、 **price属性直方图**

```
In [ ]: #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()
```

In [11]:

```
from IPython.display import Image
Image(filename = 'price_distribution_hist.png', width=500, height=500)
```

Out[11]:



price属性盒图

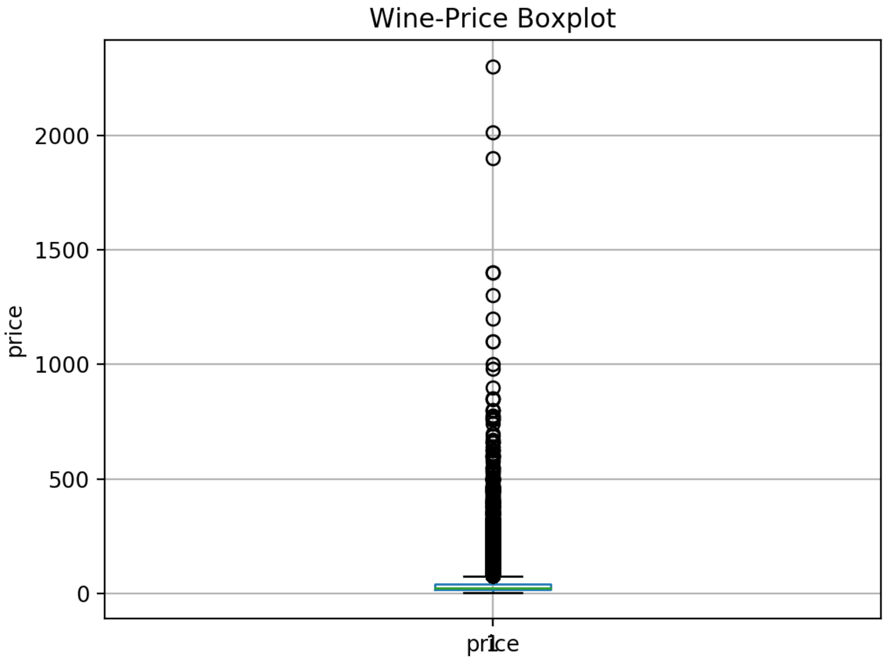
In [ ]:

```
#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()
```

In [8]:

```
from IPython.display import Image
Image(filename = 'price_box.png', width=500, height=500)
```

Out[8]:



price属性Q-Q图

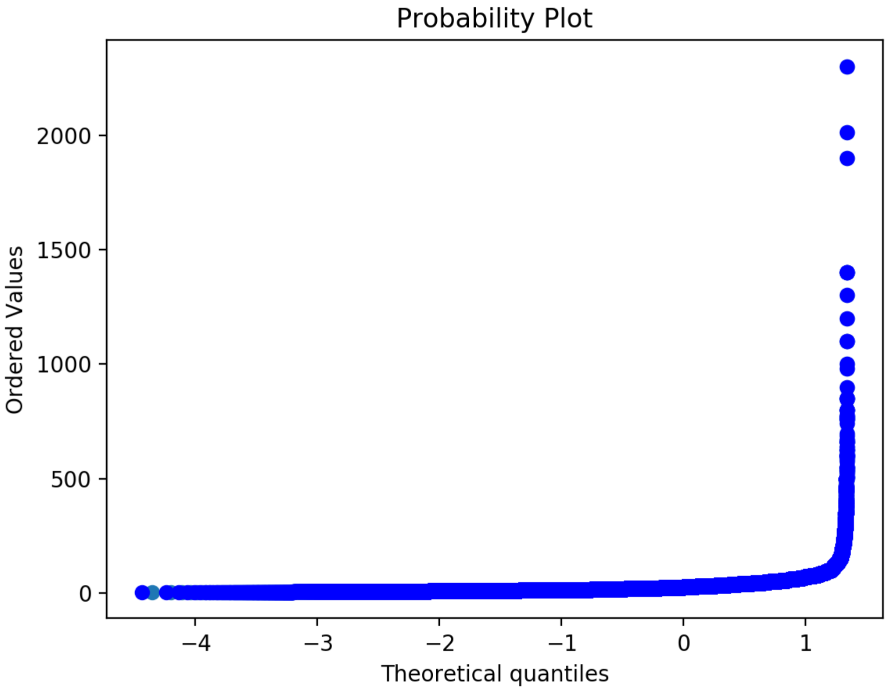
In [ ]:

```
#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()
```

In [7]:

```
from IPython.display import Image
Image(filename = 'price_qq.png', width=500, height=500)
```

Out[7]:



(2)、 **points属性直方图**

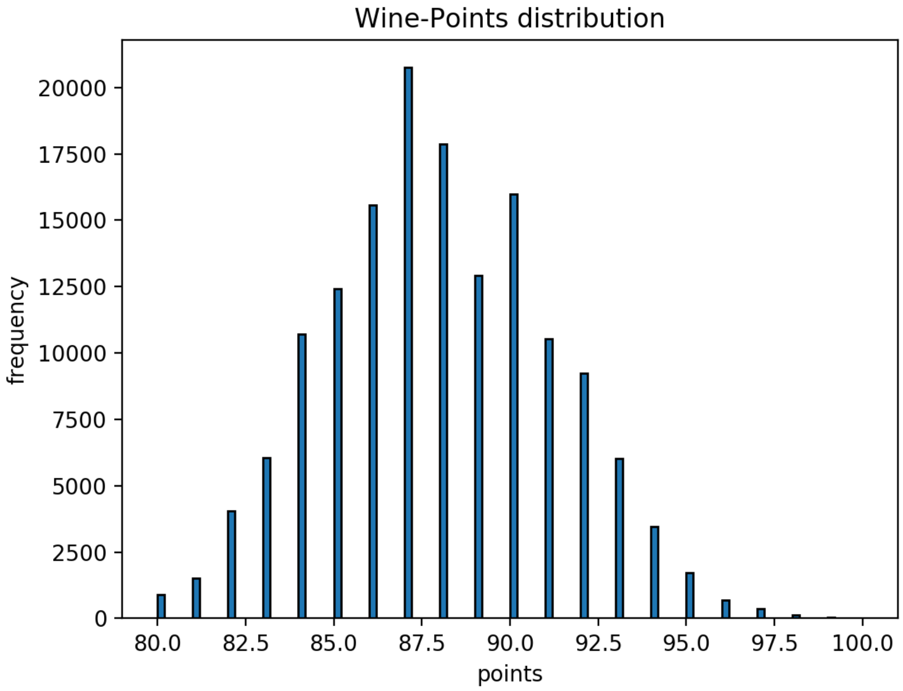
In [ ]:

```
#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()
```

In [6]:

```
from IPython.display import Image
Image(filename = 'points_distribution_hist.png', width=500, height=500)
```

Out[6]:



points属性盒图

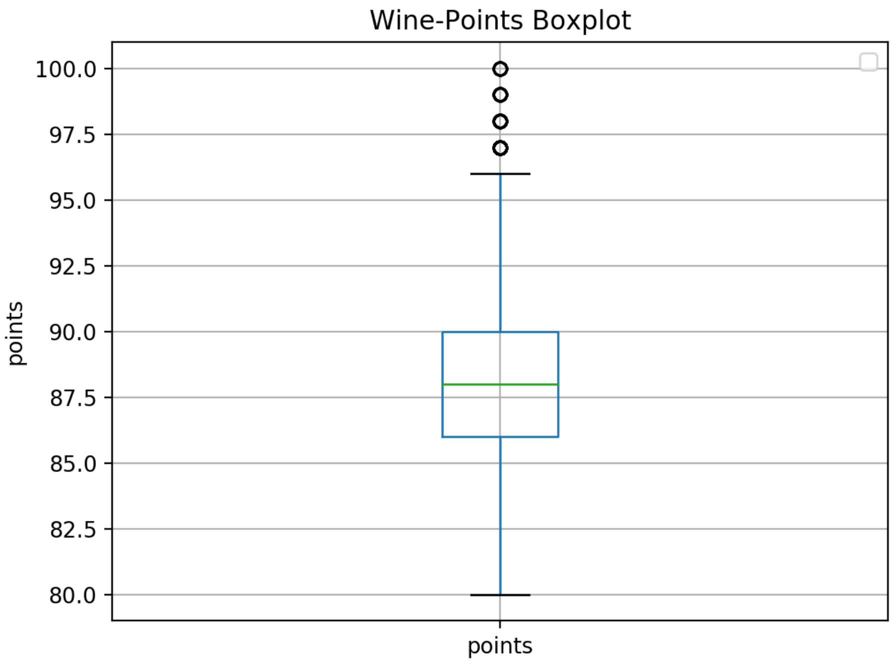
In [ ]:

```
#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()
```

In [5]:

```
from IPython.display import Image
Image(filename = 'points_box.png', width=500, height=500)
```

Out[5]:



In [ ]:

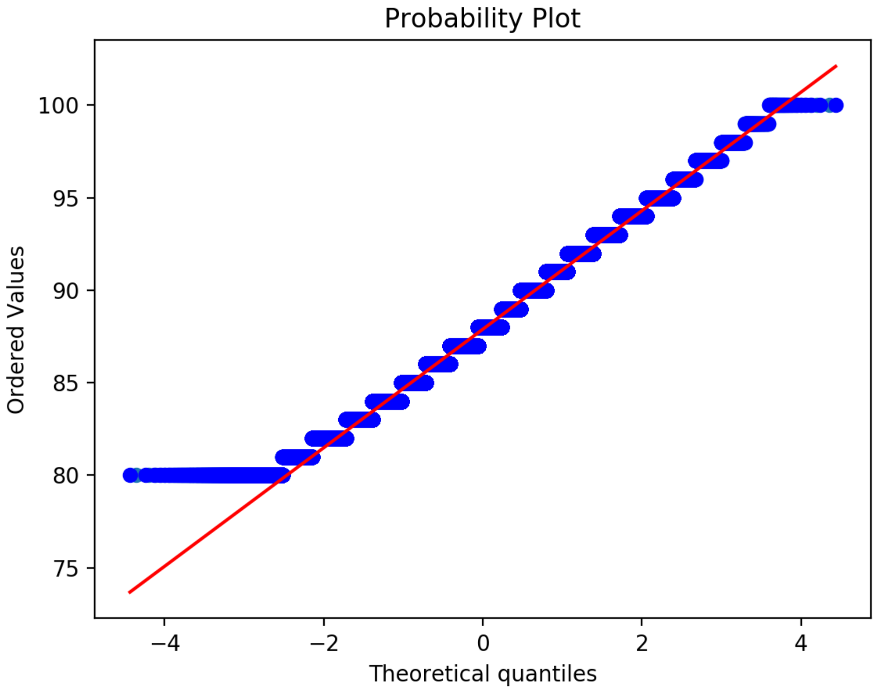
```
#points属性QQ图(不丢弃缺失值)
sorted_ = np.sort(wine['points'])
yvals = np.arange(len(sorted_))/float(len(sorted_))
x_label = stats.norm.ppf(yvals)
plt.scatter(x_label, sorted_)
stats.probplot(wine['points'], dist="norm", plot=plt)
plt.savefig('./wineResult/points_qq.png')
plt.show()
```

points属性Q-Q图

In [4]:

```
from IPython.display import Image
Image(filename = 'points_qq.png', width=500, height=500)
```

Out[4]:



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 (左为丢弃数据后直方图，右为原始数据直方图)

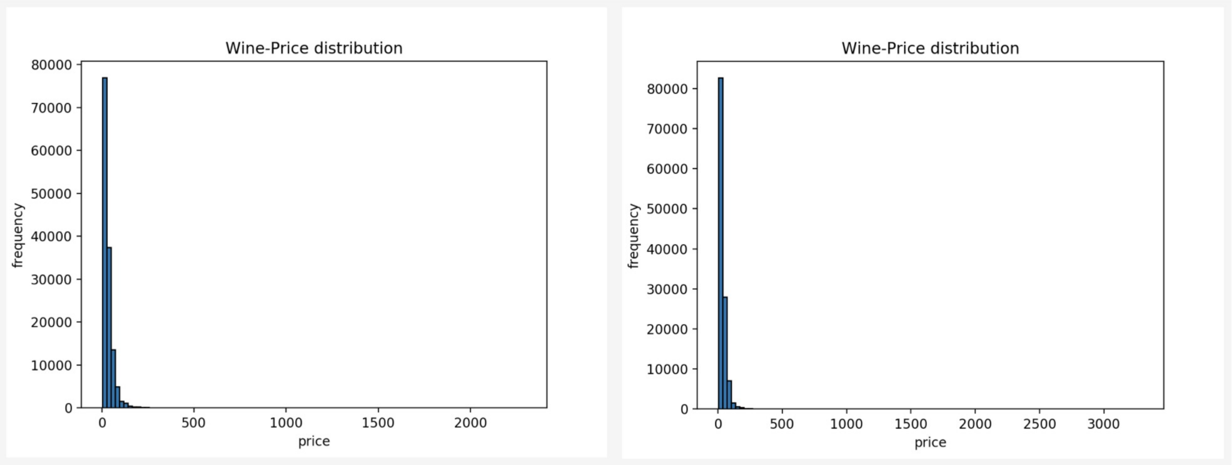
In [ ]:

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

#删除
#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 distribution')
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 distribution')
plt.savefig('./wineResult/priceCom_hist.png')
plt.show()
```

In [3]:

```
from IPython.display import Image
Image(filename = 'price_hist.png')
```

Out[3]:



country直方图 (左为丢弃数据后直方图，右为原始数据直方图)

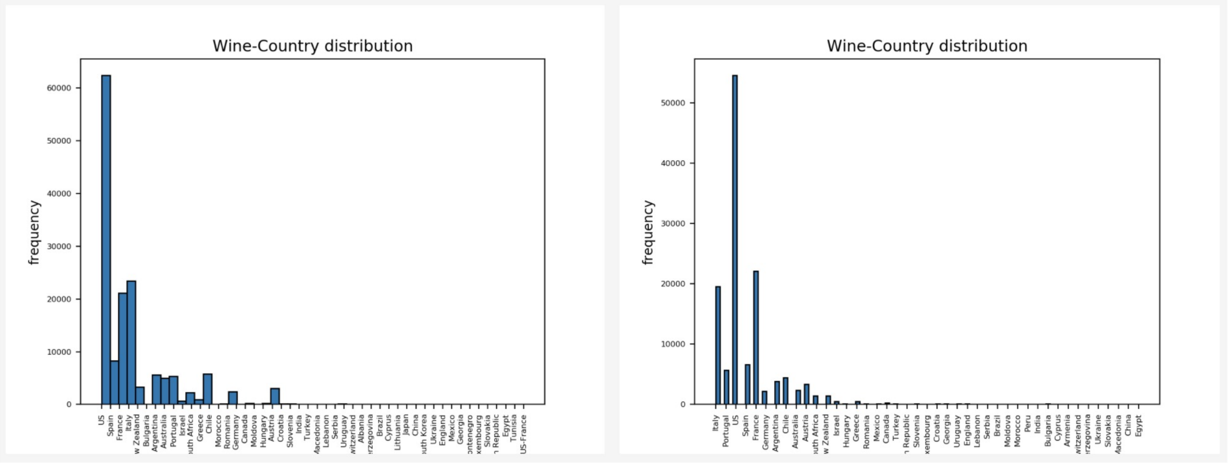
In [ ]:

```
#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 distribution')
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 distribution')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/countryCom_hist.png')
plt.show()
```

In [29]:

```python
from IPython.display import Image
Image(filename = 'countryNew.png')
```

Out[29]:



price盒图 (左为丢弃数据后盒图，右为原始数据盒图)

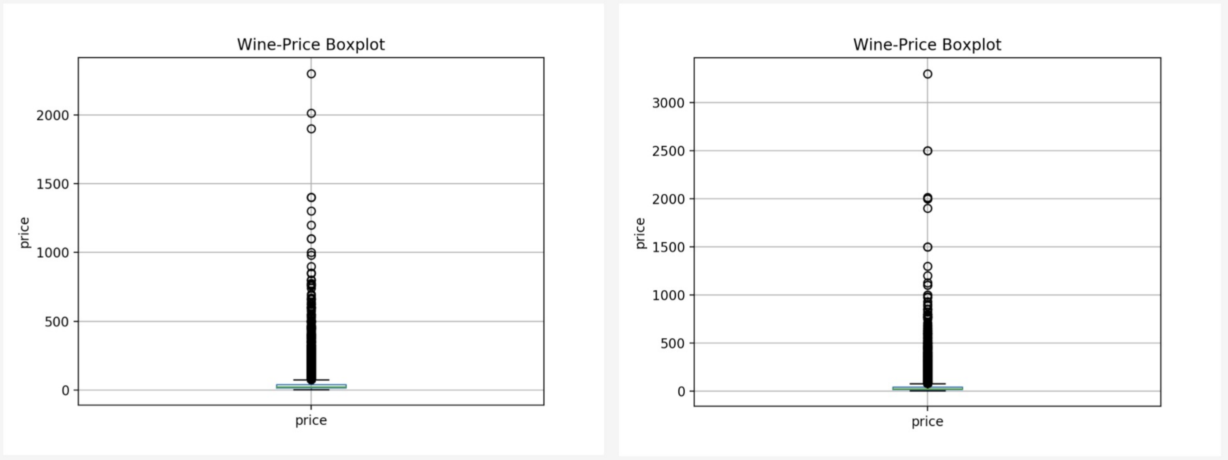
In [ ]:

```python
#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()
```

In [4]:

```python
from IPython.display import Image
Image(filename = 'price_box2.png')
```

Out[4]:



priceQ-Q图 (左为丢弃数据后Q-Q图，右为原始数据Q-Q图)

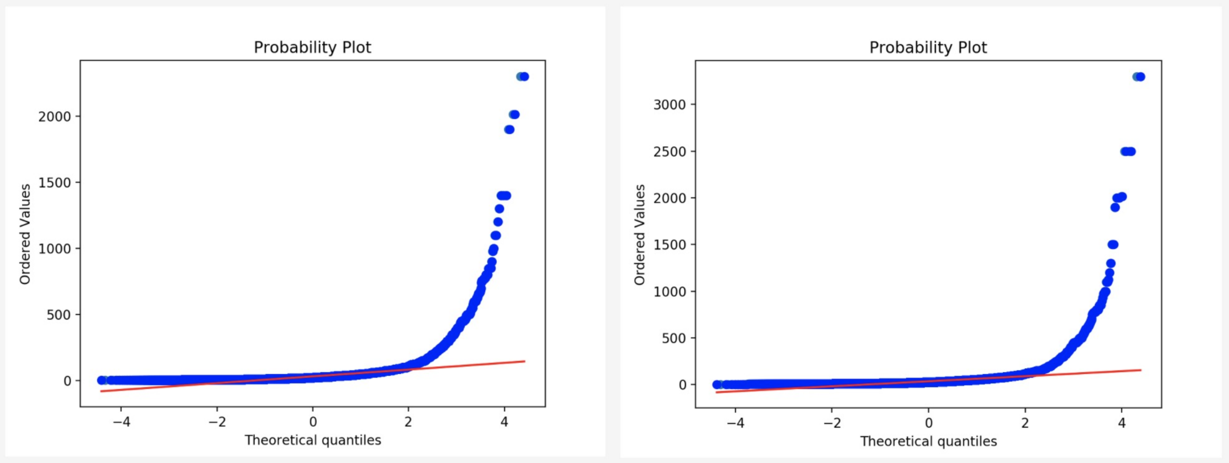
In [ ]:

```
#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()
```

In [5]:

```
from IPython.display import Image
Image(filename = 'price_delete_qq.png')
```

Out[5]:



2.2.2 用最高频率值来填补缺失值

price直方图 (左为利用众数填充缺失值后直方图，右为原始数据直方图)

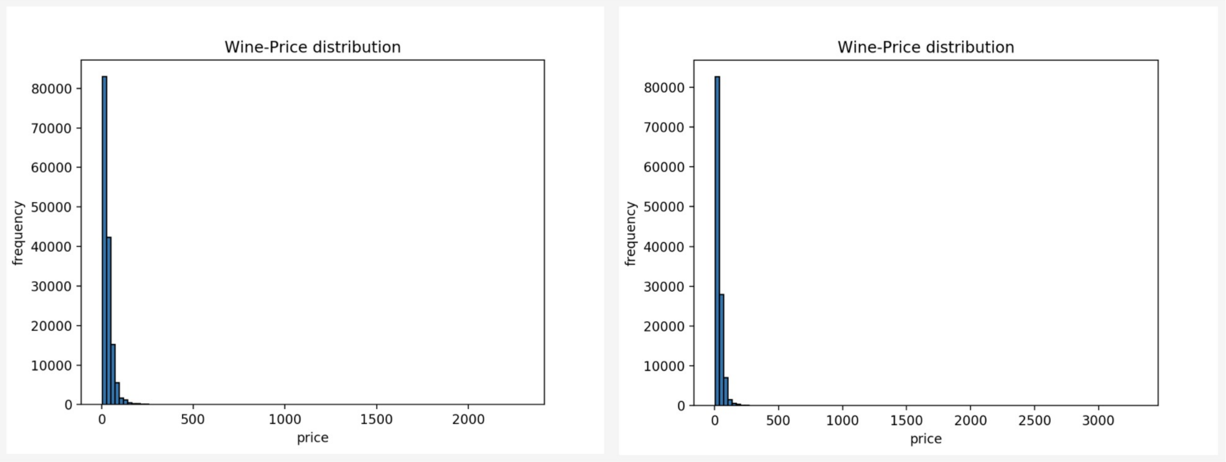
In [ ]:

```
plt.hist(wine['price'].fillna(wine['price'].interpolate(missing_values='NaN', strategy='mode', axis=0, verbose=0, copy=True)),
         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_mode_hist.png')
plt.show()
```

In [10]:

```
from IPython.display import Image
Image(filename = 'price_mode_hist.png')
```

Out[10]:



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

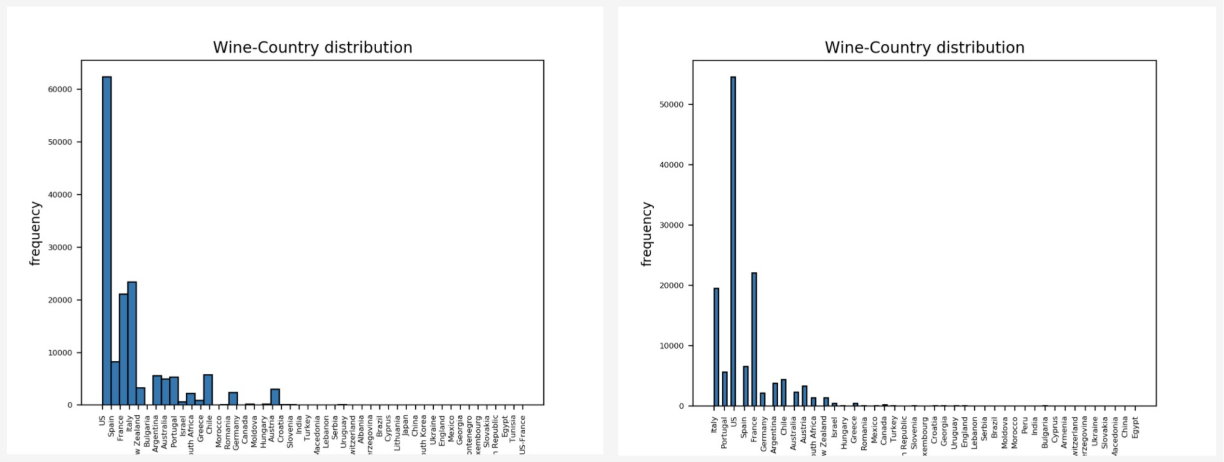
In [ ]:

```
#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 distribution')
plt.xticks(rotation=90)
plt.tick_params(labelsize=6)
plt.savefig('./wineResult/country_mode_hist.png')
plt.show()
```

In [31]:

```
from IPython.display import Image
Image(filename = 'countryNew_mode.png')
```

Out[31]:

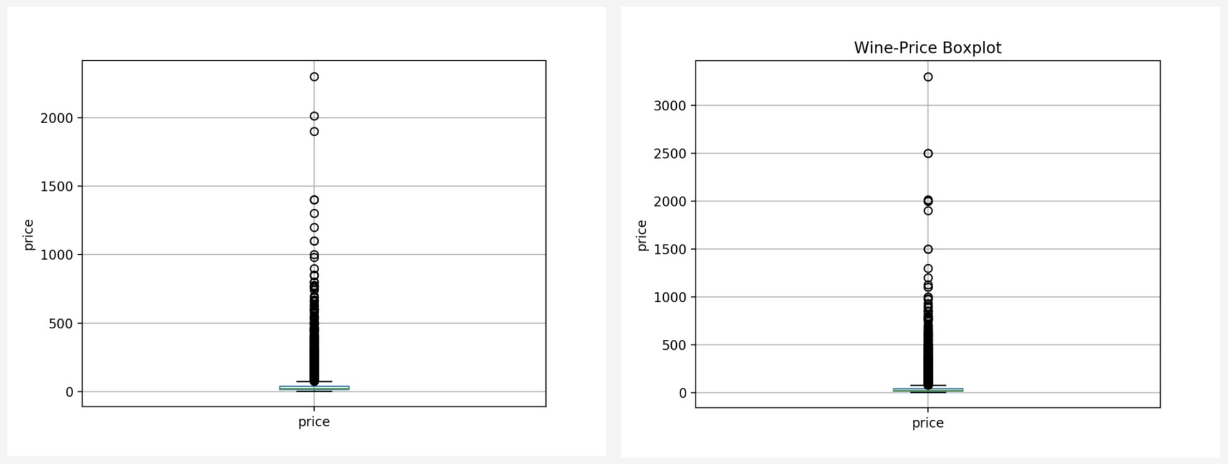


price盒图 (左为利用众数填充缺失值后盒图，右为原始数据盒图)

```
In [ ]: #盒图
        priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price).fi
        llna(wine['price'].interpolate(missing_values='NaN', strategy='mode',
                                                       axis=0, verbose
        =0, copy=True))
        priceNa.boxplot(sym='o')
        plt.ylabel('price')
        plt.savefig('./wineResult/price_mode_box.png')
        plt.show()
```

```
In [11]: from IPython.display import Image, display, HTML
         Image(filename = 'price_mode_box.png')
```

Out[11]:

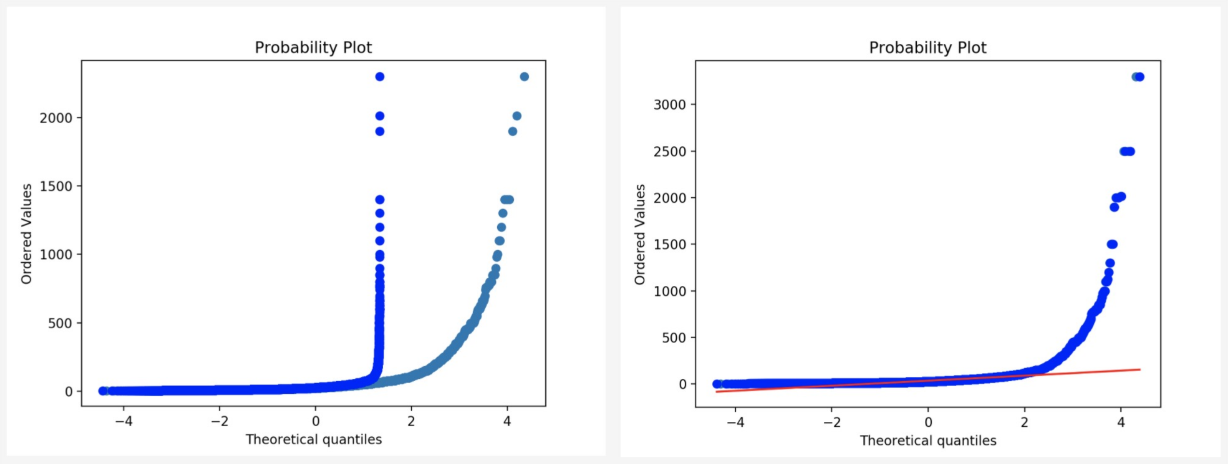


priceQ-Q图 (左为利用众数填充缺失值后Q-Q图，右为原始数据Q-Q图)

```
In [ ]: #Q-Q图
        sorted_ = np.sort(wine['price'].fillna(wine['price'].interpolate(missing_v
        alues='NaN', strategy='mode', axis=0, verbose=0, copy=True)))
        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()
```

```
In [13]: from IPython.display import Image
         Image(filename = 'price_mode_qq.png')
```

Out[13]:



2.2.3 通过属性的相关关系来填补缺失值

这部分缺失值本来打算用KNN（K近邻算法）来实现，即距离越近关系越好，但是代码实现有点问题就暂时用了中位数插值

price直方图 (左为利用中位数填充缺失值后直方图，右为原始数据直方图)

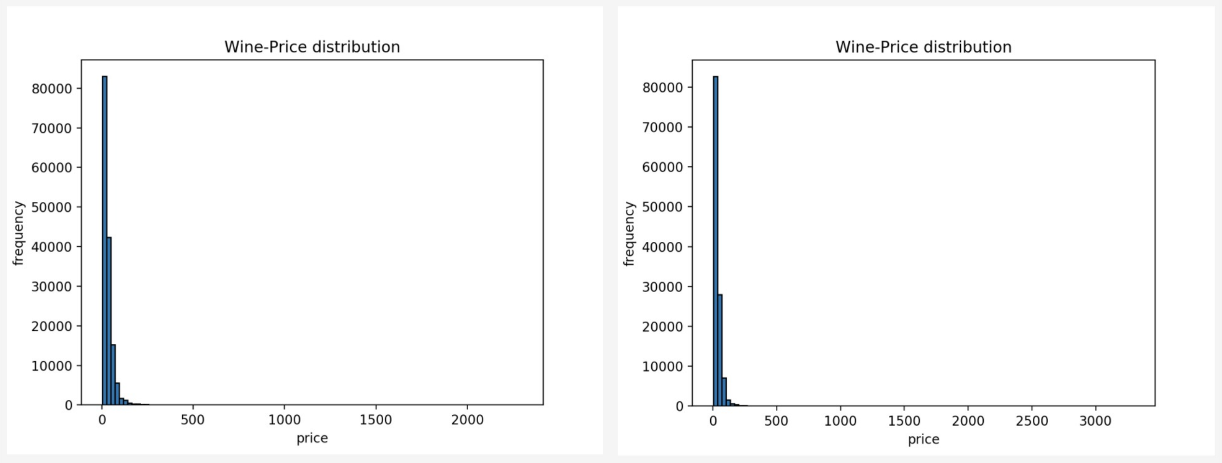
In [ ]:

```
#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=True),
         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_means_hist.png')
plt.show()
```

In [15]:

```
from IPython.display import Image
Image(filename = 'price_median_hist.png')
```

Out[15]:

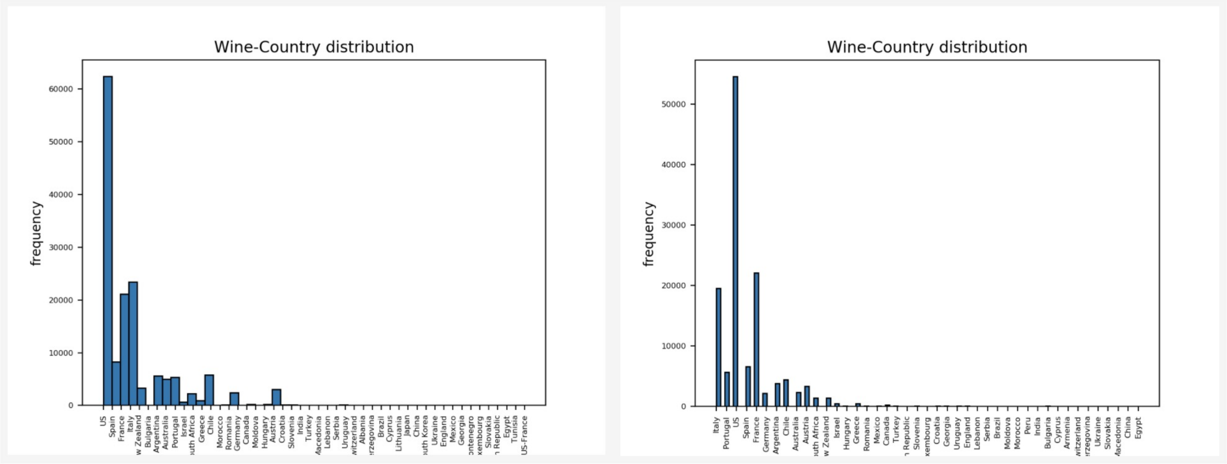


country直方图 (左为利用随机森林算法填充缺失值后直方图，右为原始数据直方图)

```
In [ ]: #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 distribution')
        plt.xticks(rotation=90)
        plt.tick_params(labelsize=6)
        plt.savefig('./wineResult/country_relative_hist.png')
        plt.show()
```

```
In [33]: from IPython.display import Image
         Image(filename = 'countryNew_relative.png')
```

Out[33]:



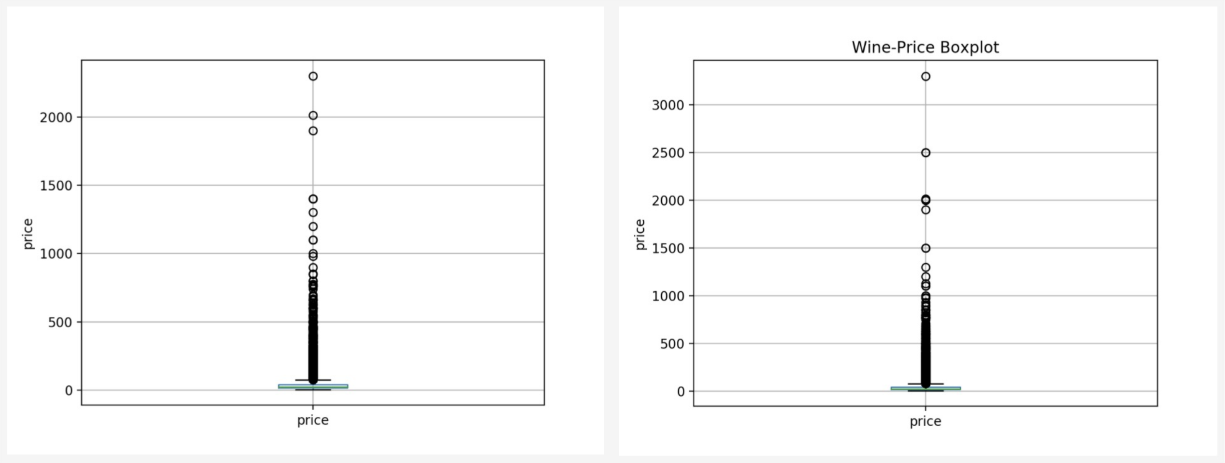
price盒图 (左为利用中位数填充缺失值后盒图，右为原始数据盒图)

```
In [ ]: #盒图
        priceNa = pd.DataFrame(pd.read_csv('winemag-data_first150k.csv').price).fi
        llna(wine['price'].interpolate(missing_values='NaN', strategy='median',

        axis=0, verbose=0, copy=True))
        priceNa.boxplot(sym='o')
        plt.ylabel('price')
        plt.savefig('./wineResult/price_median_box.png')
        plt.show()
```

In [17]:

```
from IPython.display import Image
Image(filename = 'price_median_box.png')
```

Out[17]:



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

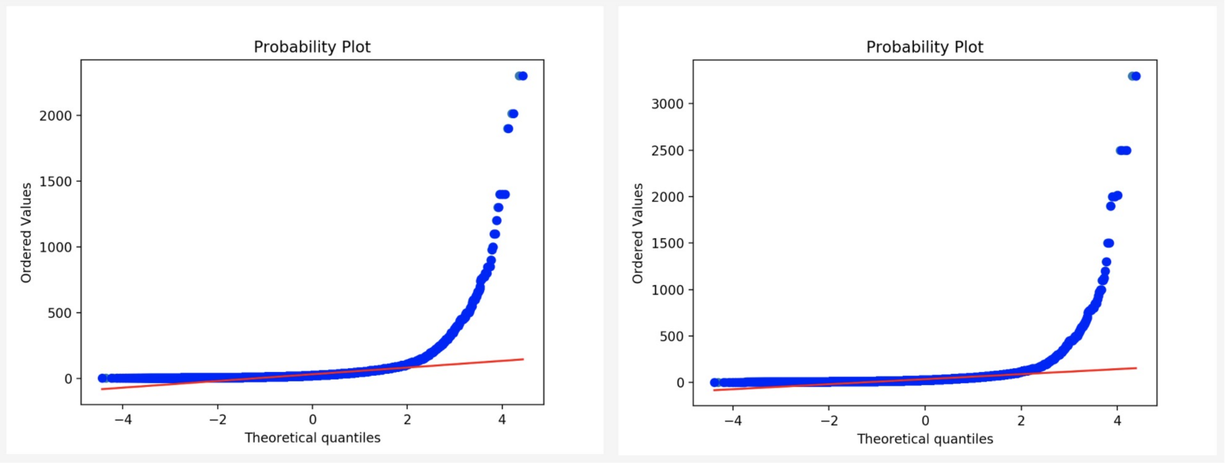
In [ ]:

```
#Q-Q图
sorted_ = np.sort(wine['price'].interpolate(missing_values='NaN', strategy
='median', axis=0, verbose=0, copy=True))
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=0, copy=True), dist="norm", plot=plt)
plt.savefig('./wineResult/price_median_qq.png')
plt.show()
```

In [20]:

```
from IPython.display import Image
Image(filename = 'price_median_qq.png')
```

Out[20]:



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 (左为利用随机森林预测值填充缺失值后直方图，右为原始数据直方图)

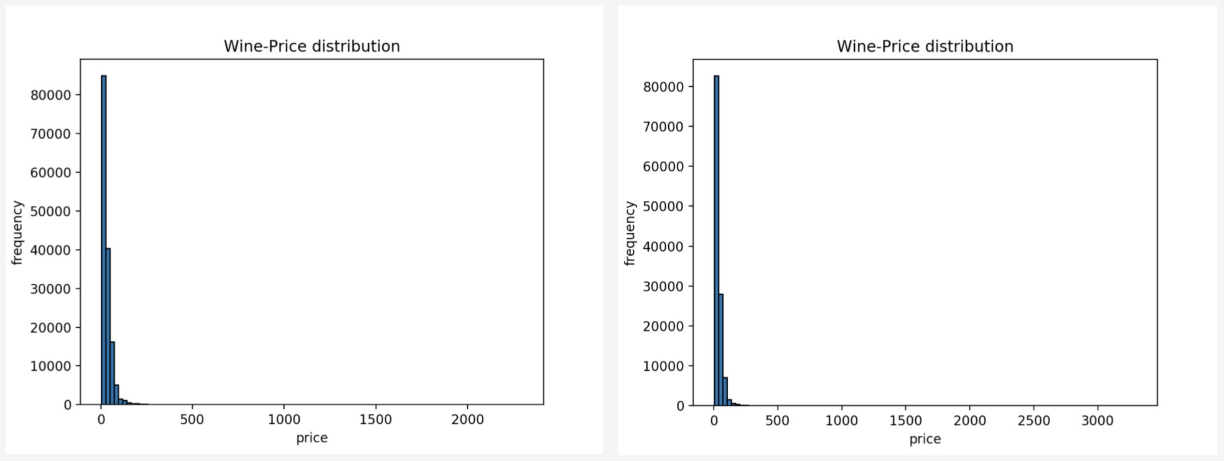
In [ ]:

```
#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 distribution')
plt.savefig('./wineResult/price_relative_hist.png')
plt.show()
```

In [22]:

```
from IPython.display import Image
Image(filename = 'price_relative_hist.png')
```

Out[22]:



price盒图 (左为利用随机森林预测值填充缺失值后盒图，右为原始数据盒图)

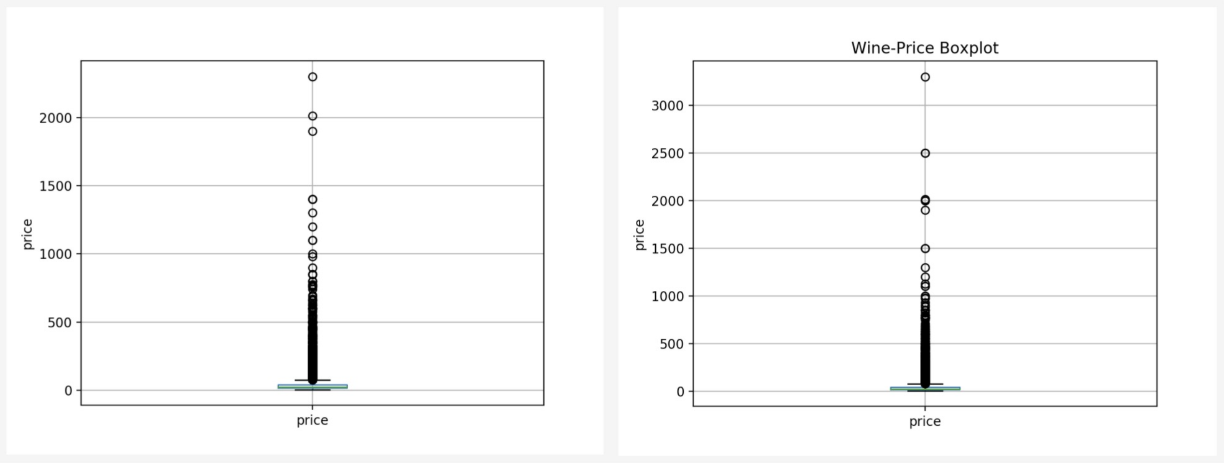
In [ ]:

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

In [24]:

```
from IPython.display import Image
Image(filename = 'price_relative_box.png')
```

Out[24]:



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

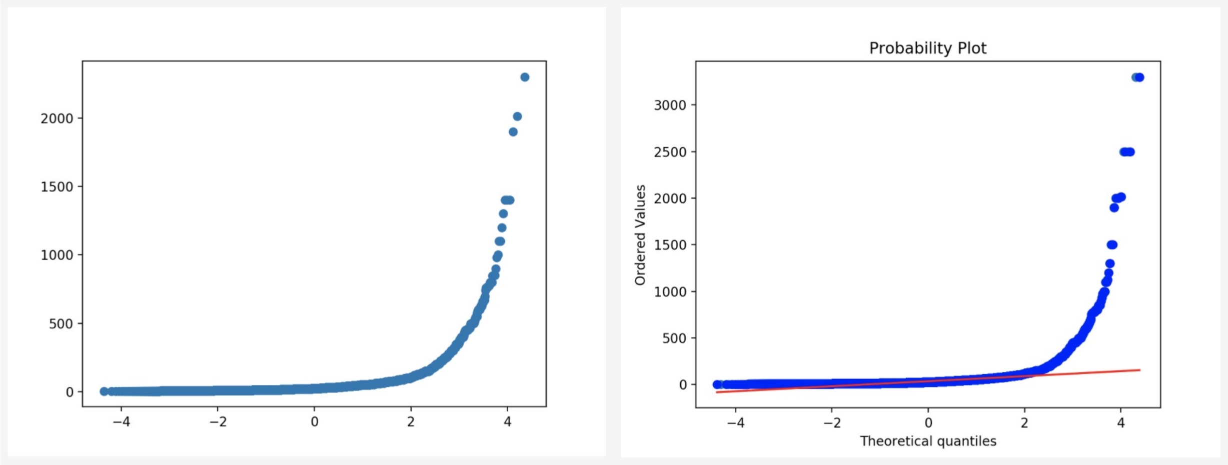
In [ ]:

```
#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()
```

In [26]:

```
from IPython.display import Image
Image(filename = 'price_relative_qq.png')
```

Out[26]:



自行选择两个数据集进行探索性分析

分析报告二

一、数据

1.1 数据集选择

> 该数据集中csv个数较多，这里选择四个做分析
> `Trending YouTube Video Statistics：USvideos.csv CAvideos.csv INvideos.csv MXvideos.csv`

1.2 编程语言：python

1.3 导入所需各类依赖包

In [ ]:

```
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('USvideos.csv', encoding='ANSI', low_memory=False))
CAvideo = pd.DataFrame(pd.read_csv('CAvideos.csv', encoding='ANSI', low_memory=False))
INvideo = pd.DataFrame(pd.read_csv('INvideos.csv', encoding='ANSI', low_memory=False))
DEvideo = pd.DataFrame(pd.read_csv('DEvideos.csv', low_memory=False))
```

二、数据分析要求

2.1 数据可视化及摘要

* 数据摘要

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

由于属性值较多，这里我们以category_id为例作展示，其余标称属性可能取值的频数运行代码后可查看

Name: category_id, dtype: int64

In [ ]:

```
#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())
```

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		

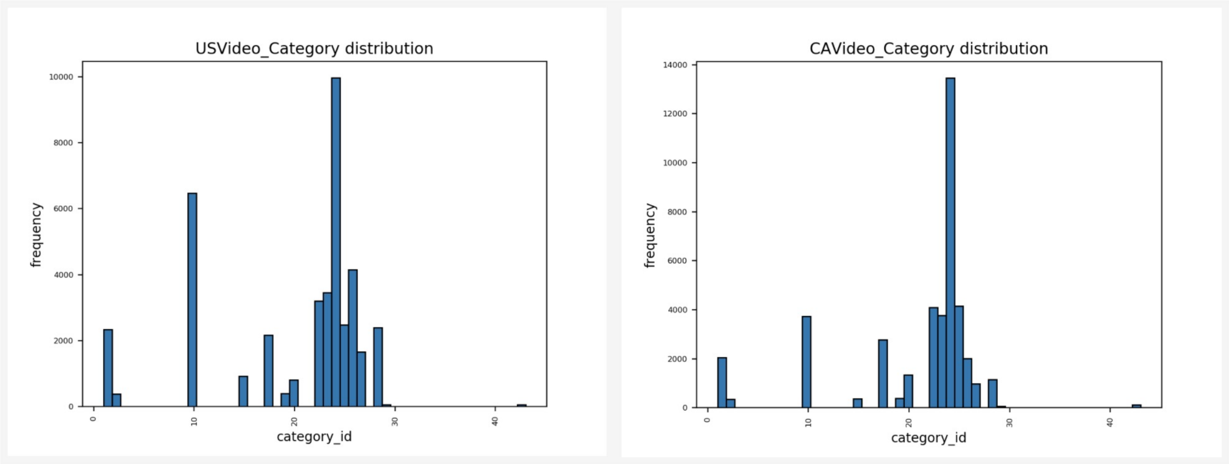
INvideo-category_id	频数	DEvideo-category_id	频数
24	16712	24	15292
25	5241	22	5988
10	3858	25	2935
23	3429	17	2752
22	2624	23	2534
1	1658	1	2376
27	1227	10	2372
26	845	26	1745
17	731	20	1565
28	552	2	873
43	205	27	844
29	105	28	806
2	72	29	256
20	66	15	251
30	16	19	141
19	8	43	107
15	3	30	2
44	1		

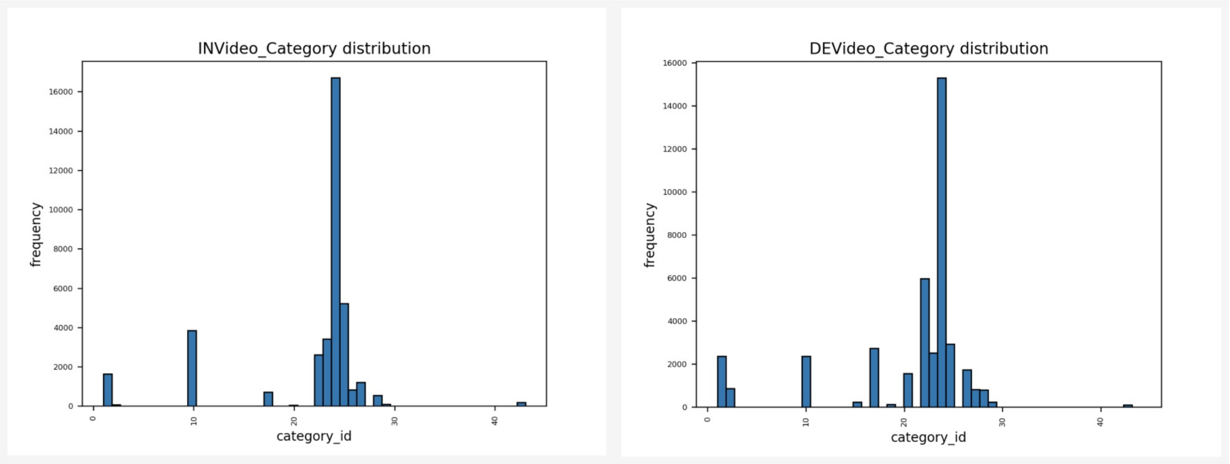
category_id属性直方图

从左至右依次是

In [4]:

```
from IPython.display import Image, display
display(Image(filename = 'com_hist1.png'))
display(Image(filename = 'com_hist2.png'))
```





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 [ ]:

```
#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())
```

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 [ ]: #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())
```

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
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 [ ]: #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())
```

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
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 [ ]: #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())
```

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_removed	
description	570	description	1296	description	561	description	1

** 根据上述缺省值情况，description缺失值填写后的数据可视化展示有问题，所以这里就不做展示了

* 数据可视化

2.1.3 使用直方图、盒图等检查数据分布及离群点

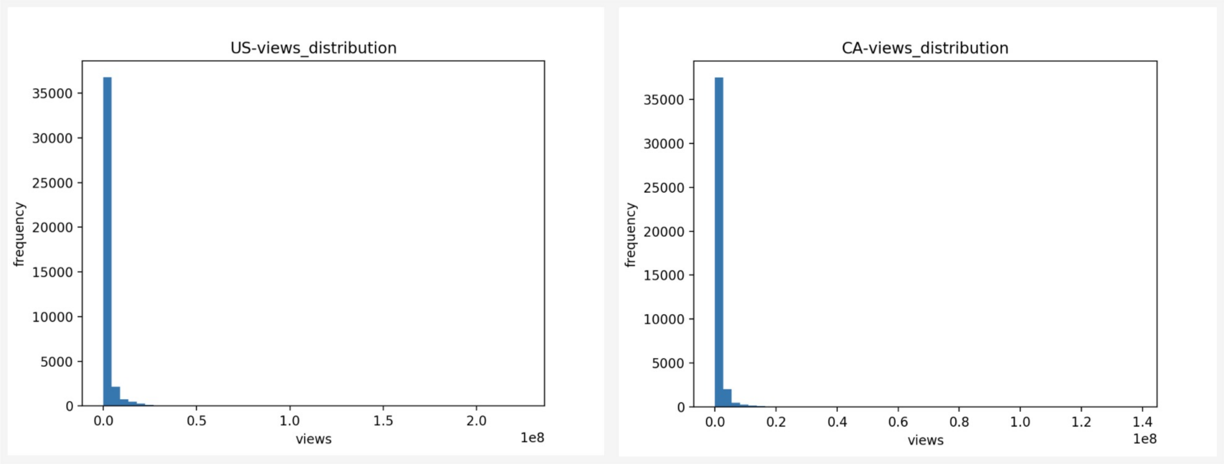
（这里给出views、likes属性的可视化展示）

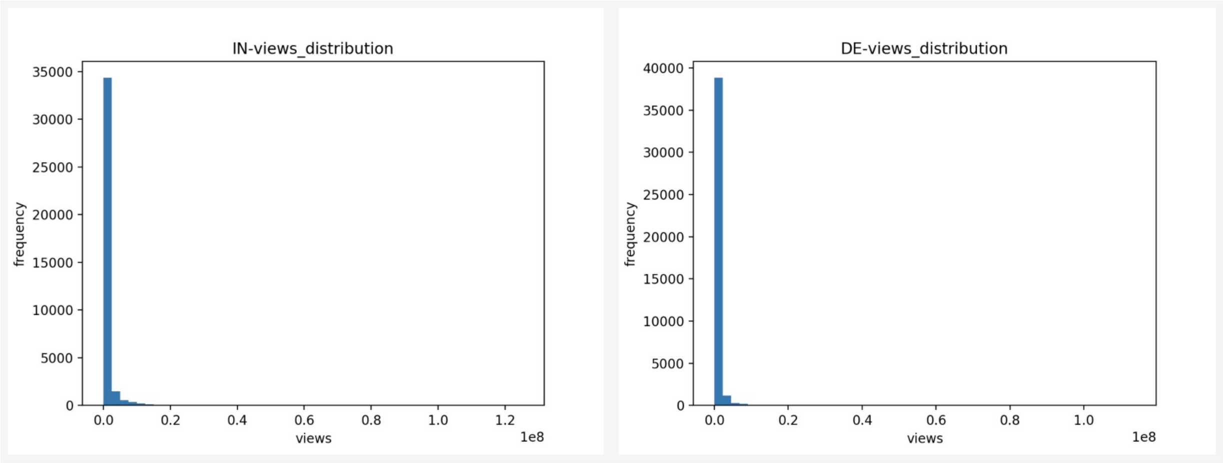
(1)、 **views直方图**

In [ ]:

```
#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()
```

```
In [6]: from IPython.display import Image,display
        display(Image(filename = 'viewNew_hist1.png'))
        display(Image(filename = 'viewNew_hist2.png'))
```





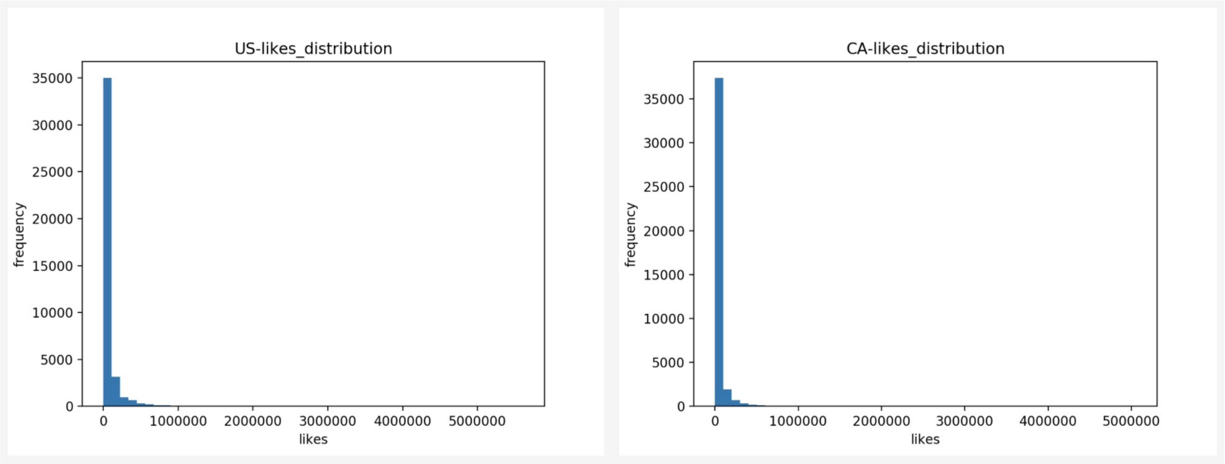
likes直方图

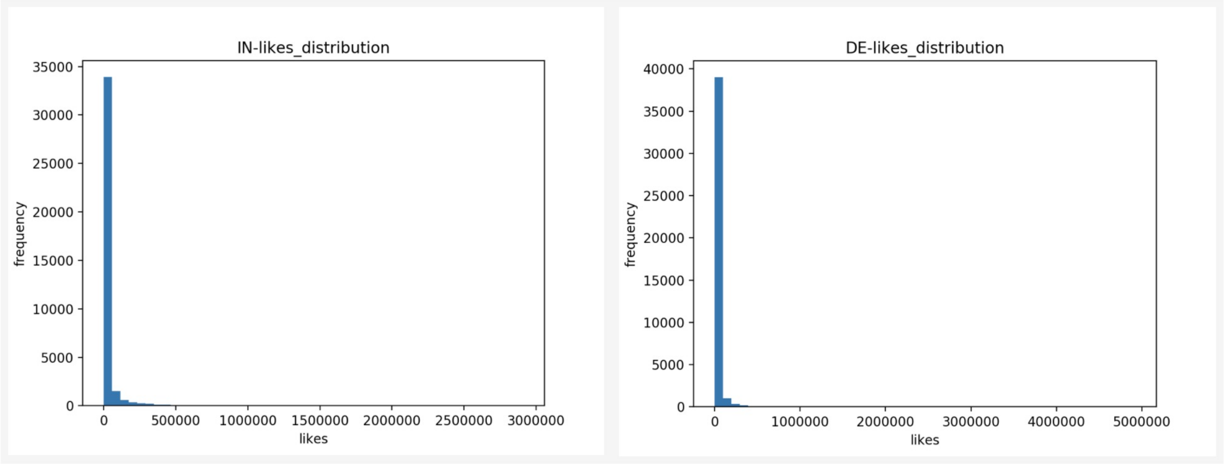
In [ ]:

```
#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()
```

In [8]:

```
from IPython.display import Image, display
display(Image(filename = 'likeNew_hist1.png'))
display(Image(filename = 'likeNew_hist2.png'))
```





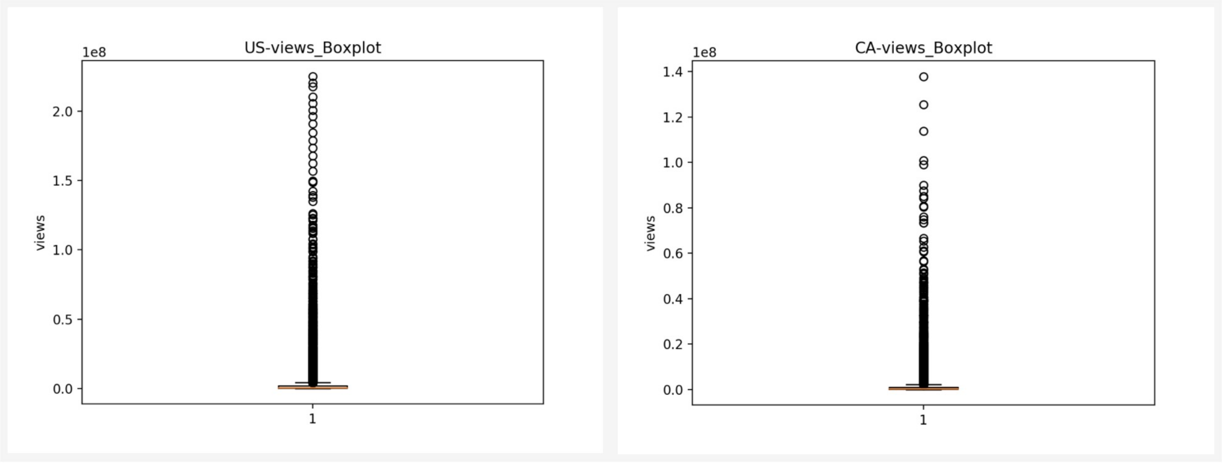
(2)、 views盒图

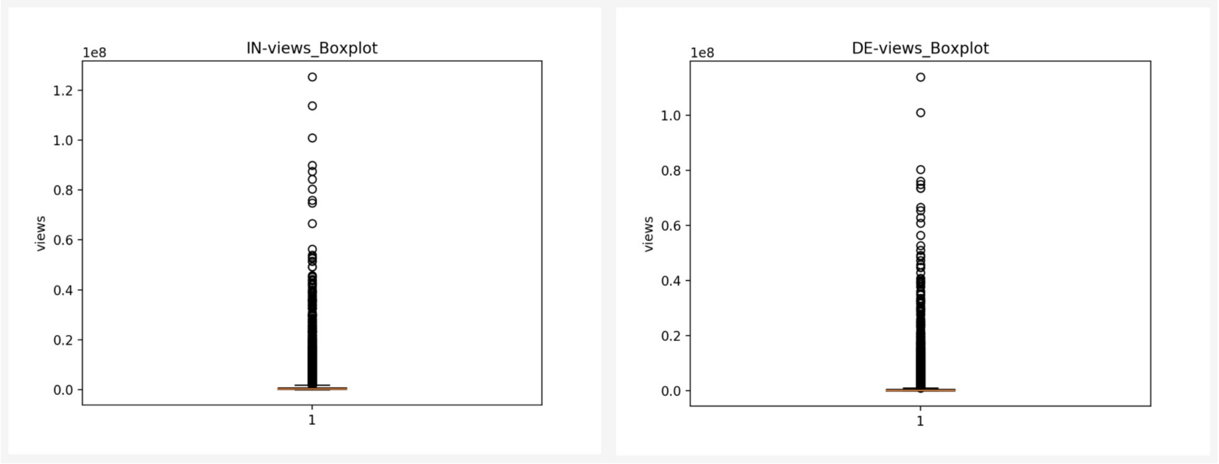
In [ ]:

```
#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()
```

In [10]:

```python
from IPython.display import Image, display
display(Image(filename = 'viewNew_box.png'))
display(Image(filename = 'viewNew_box1.png'))
```





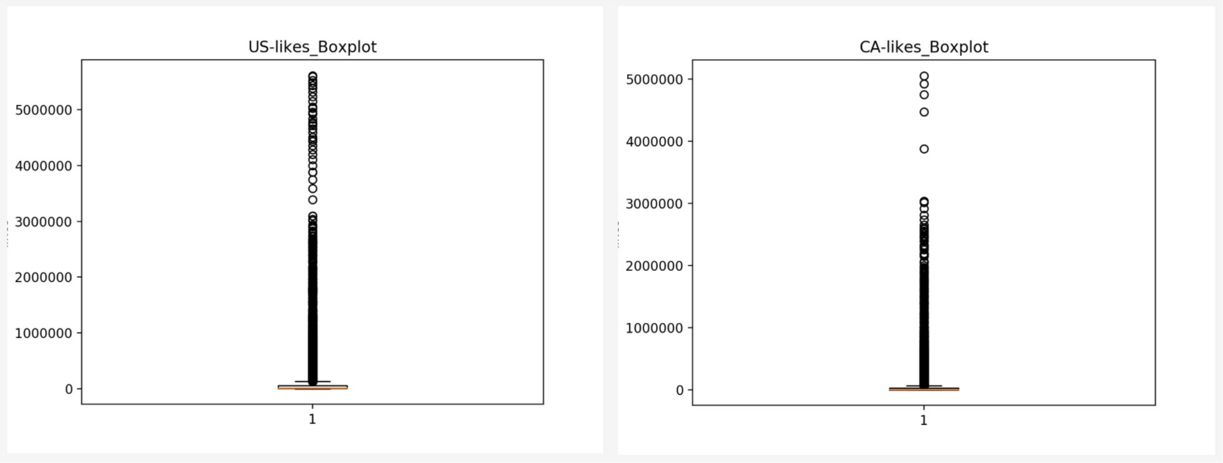
likes盒图

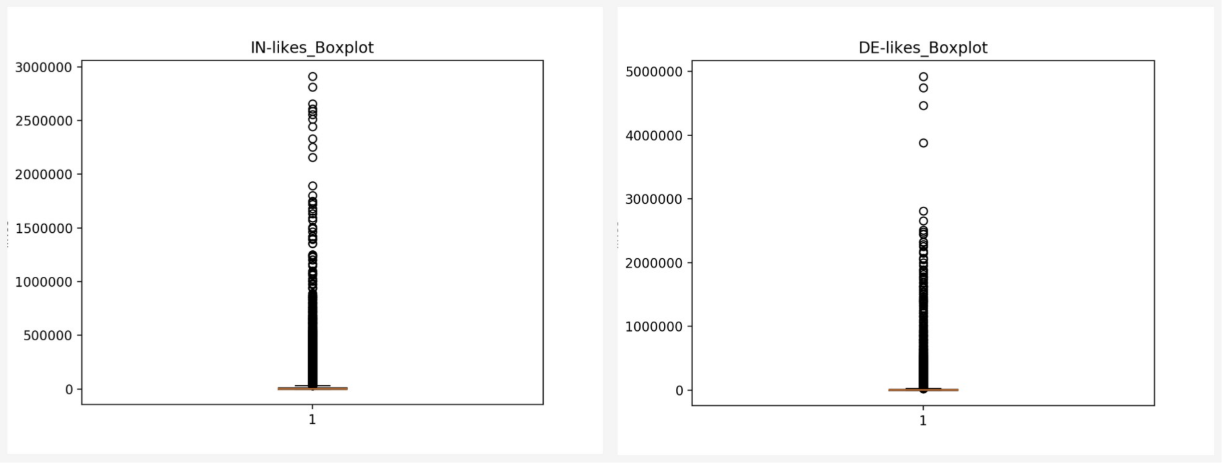
In [ ]:

```python
#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 [40]:

```python
from IPython.display import Image, display, HTML
display(Image(filename = 'likeNew_box1.png'))
display(Image(filename = 'likeNew_box2.png'))
```





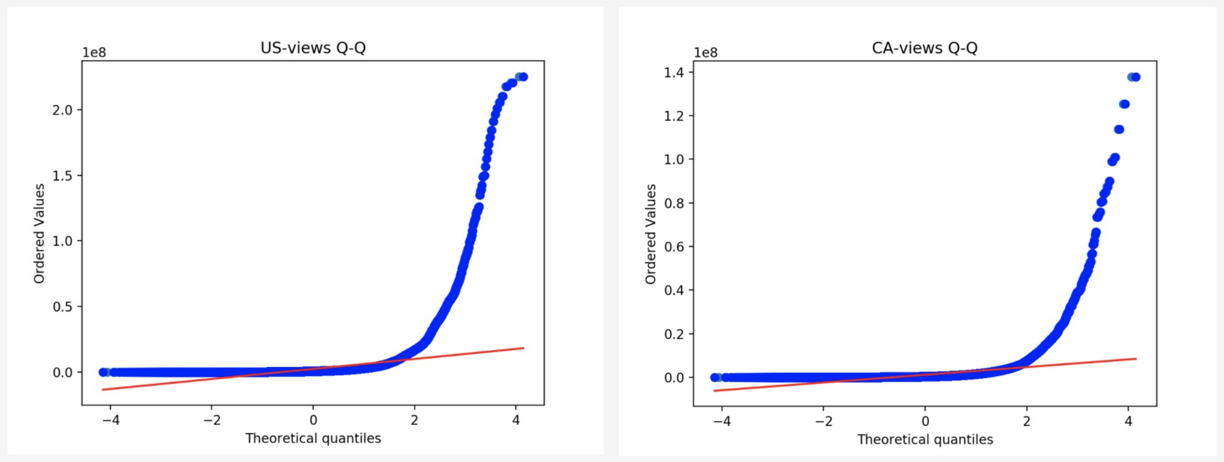
(3)、 **viewsQ-Q图**

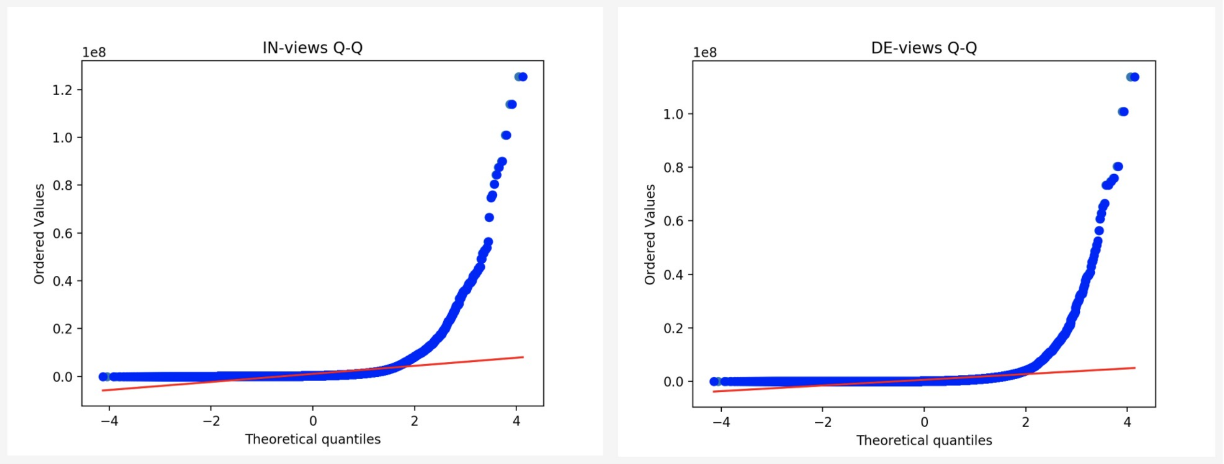
In [ ]:

```
#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=pl
t)
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=pl
t)
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=pl
t)
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=pl
t)
plt.title('DE-views Q-Q')
plt.savefig('./videoResult/DE/DEviews_qq.png')
plt.show()
```

In [43]:

```
from IPython.display import Image, display, HTML
display(Image(filename = 'viewNew_qq.png'))
display(Image(filename = 'viewNew_qq1.png'))
```



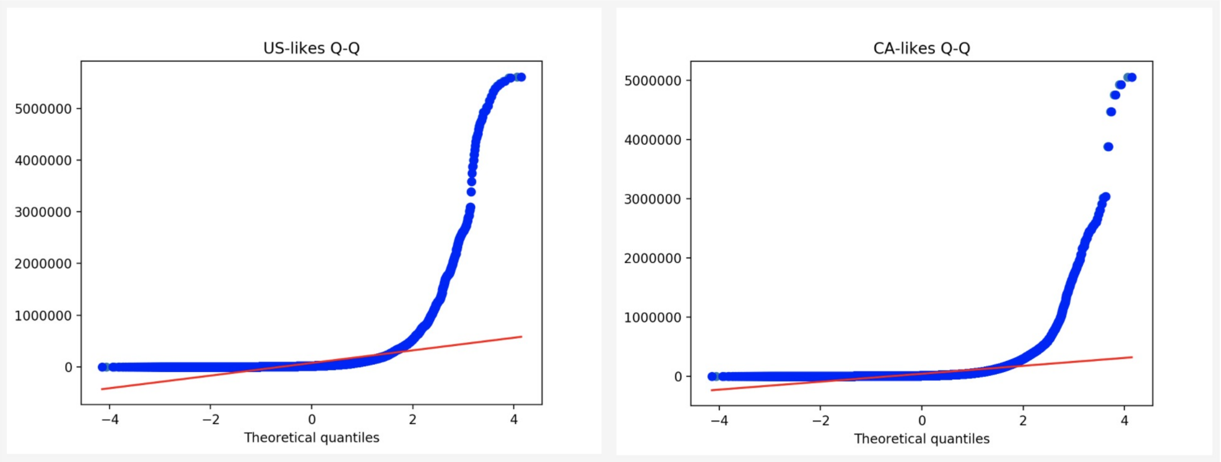


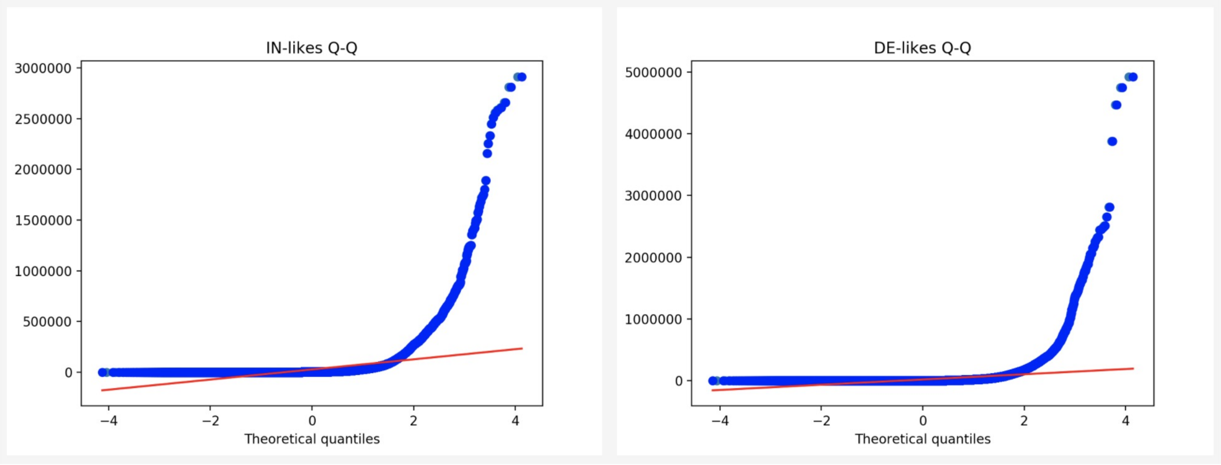
likesQ-Q图

In [ ]:

```
#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()
```

```
In [45]: from IPython.display import Image, display, HTML
         display(Image(filename = 'likeNew_qq.png'))
         display(Image(filename = 'likeNew_qq1.png'))
```


US-likes Q-Q
Theoretical quantiles
CA-likes Q-Q
Theoretical quantiles


IN-likes Q-Q
Theoretical quantiles
DE-likes Q-Q
Theoretical quantiles