

In [1]:

```
%matplotlib inline
import matplotlib
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import tqdm
from efficient_apriori import apriori
import warnings
warnings.filterwarnings('ignore')
```

In [5]:

```
data = pd.read_csv('../round2dataset/winemag-data_first150k.csv', index_col=0)
print('属性类别数:', len(data.columns))
print('总行数:', len(data))
print('示例数据:')
data.head(5)
```

属性类别数: 10
总行数: 150930
示例数据:

Out[5]:

	country	description	designation	points	price	province	region_1	region_2	variety
0	US	This tremendous 100% varietal wine hails from ...	Martha's Vineyard	96	235.0	California	Napa Valley	Napa	Cabernet Sauvignon
1	Spain	Ripe aromas of fig, blackberry and cassis are ...	Carodorum Selección Especial Reserva	96	110.0	Northern Spain	Toro	NaN	Tinta de Toro
2	US	Mac Watson honors the memory of a wine once ma...	Special Selected Late Harvest	96	90.0	California	Knights Valley	Sonoma	Sauvignon Blanc
3	US	This spent 20 months in 30% new French oak, an...	Reserve	96	65.0	Oregon	Willamette Valley	Willamette Valley	Pinot Noir
4	France	This is the top wine from La Bégude, named aft...	La Brûlade	95	66.0	Provence	Bandol	NaN	Provence red blend

In [6]:

```
print('提取每一列属性以及名称')
num_fields = data.select_dtypes(include=np.number).columns.values
nom_fields = data.select_dtypes(exclude=np.number).columns.values
all_fields=[]
for field in range(len(num_fields)):
    all_fields.append(num_fields[field])
for field in range(len(nom_fields)):
    all_fields.append(nom_fields[field])
print("所有属性:", all_fields)
print('标称属性:', nom_fields)
print('数值属性:', num_fields)
print(data.shape, " ", nom_fields.shape, " ", num_fields.shape)
```

提取每一列属性以及名称

所有属性: ['points', 'price', 'country', 'description', 'designation', 'province', 'region_1', 'region_2', 'variety', 'winery']

标称属性: ['country' 'description' 'designation' 'province' 'region_1' 'region_2'

'variety' 'winery']

数值属性: ['points' 'price']

(150930, 10) (8,) (2,)

In [7]:

```
print('所有属性的空值统计如下:')
for field in all_fields:
    print(field, ":", data[field].isnull().sum())
```

所有属性的空值统计如下:

points : 0

price : 13695

country : 5

description : 0

designation : 45735

province : 5

region_1 : 25060

region_2 : 89977

variety : 0

winery : 0

In [8]:

```
print("分析一下几个:", '葡萄酒产地', '品种', '打分')
```

分析一下几个: 葡萄酒产地 品种 打分

In [9]:

```
print('原始数据行数:', len(data))
data = data[['country', 'province', 'variety', 'points']]
data = data.dropna(how='any')
print('将缺失部分剔除后数据行数:', len(data))
```

原始数据行数：150930
将缺失部分剔除后数据行数：150925

In [10]:

```
data.head()
```

Out[10]:

	country	province	variety	points
0	US	California	Cabernet Sauvignon	96
1	Spain	Northern Spain	Tinta de Toro	96
2	US	California	Sauvignon Blanc	96
3	US	Oregon	Pinot Noir	96
4	France	Provence	Provence red blend	95

In [11]:

```
print('不难看出points节点部分数值是一个确切的值，在分析预测时不利于进行关联分析，因此应该将其变为离
```

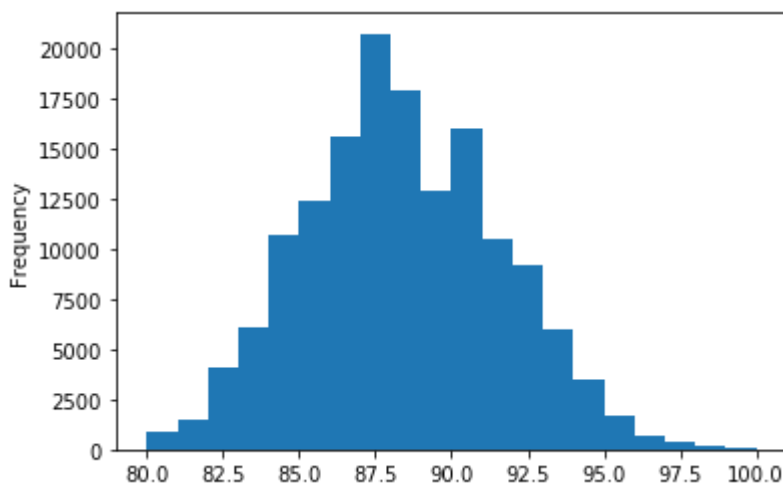
不难看出points节点部分数值是一个确切的值，在分析预测时不利于进行关联分析，因此应该将其变为离散值（即有几个离散区间来表示）

In [12]:

```
data['points'].plot.hist(bins=20)
values = [75, 80, 85, 90, 95, 100]
data['points'] = pd.cut(data['points'], values)
data['points'] = data['points'].astype('str')
data['points'].value_counts()
data.head()
```

Out[12]:

	country	province	variety	points
0	US	California	Cabernet Sauvignon	(95, 100]
1	Spain	Northern Spain	Tinta de Toro	(95, 100]
2	US	California	Sauvignon Blanc	(95, 100]
3	US	Oregon	Pinot Noir	(95, 100]
4	France	Provence	Provence red blend	(90, 95]



In [14]:

```
apriori_data = []
for _, (country, province, variety, points) in tqdm.tqdm(data.iterrows(), total=len(data)):
    apriori_data.append((country, province, variety, points))
```

```
100%|████████████████████████████████████████████████████████████████████████████████| 150925/150925 [00:13<00:00, 11192.66it/s]
```

In [15]:

```
print("利用apriori算法进行频繁算法")
itemsets, rules = apriori(apriori_data, min_support=0.005, min_confidence=0.3)
```

利用apriori算法进行频繁算法

In [16]:

```
itemsets
```

Out[16]:

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      ('Champagne',): 1370,
      ('Veneto',): 3962,
      ('Douro',): 1075,
      ('Vioignier',): 1263,
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(' (85, 90]', 'Red Blend', 'US'): 1696,
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(' (85, 90]', 'Australia', 'South Australia'): 1881,
(' (85, 90]', 'Barbera', 'Italy'): 934,
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(' (80, 85]', 'California', 'Merlot'): 1064,
(' (80, 85]', 'Merlot', 'US'): 1380,
(' (80, 85]', 'Argentina', 'Mendoza Province'): 1967,
(' (80, 85]', 'Northern Spain', 'Spain'): 1700,
(' (85, 90]', 'Australia', 'Shiraz'): 826,
('Australia', 'Shiraz', 'South Australia'): 1020,
(' (80, 85]', 'California', 'Chardonnay'): 1797,
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('80, 85]', 'California', 'Zinfandel'): 1365,
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('80, 85]', 'California', 'Pinot Noir', 'US'): 1380,
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('85, 90]', 'Corvina, Rondinella, Molinara', 'Italy', 'Veneto'): 1123}}

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In []:

```
print("导出关联规则，计算其支持度和置信度")  
print("关联规则:")
```

In [17]:

```
rules
```

Out[17]:

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[{Cabernet Sauvignon} -> {California},
 {Cabernet Sauvignon} -> {US},
 {US} -> {California},
 {California} -> {US},
 {Spain} -> {Northern Spain},
 {Northern Spain} -> {Spain},
 {Sauvignon Blanc} -> {California},
 {Sauvignon Blanc} -> {US},
 {Oregon} -> {Pinot Noir},
 {Oregon} -> {US},
 {Pinot Noir} -> {US},
 {Provence} -> {France},
 {(90, 95]} -> {US},
 {(90, 95]} -> {California},
 {Pinot Noir} -> {California},
 {Northeastern Italy} -> {Italy},
 {Southwest France} -> {France},
 {Chardonnay} -> {US},
 {Tempranillo} -> {Northern Spain},
 {Northern Spain} -> {Tempranillo},
 {Tempranillo} -> {Spain},
 {Chardonnay} -> {California},
 {Syrah} -> {US},
 {Washington} -> {US},
 {California} -> {(85, 90]},
 {Chardonnay} -> {(85, 90]},
 {US} -> {(85, 90]},
 {(85, 90]} -> {US},
 {Italy} -> {(85, 90]},
 {Sangiovese} -> {(85, 90]},
 {Tuscany} -> {(85, 90]},
 {Sangiovese} -> {Italy},
 {Tuscany} -> {Italy},
 {Italy} -> {Tuscany},
 {Tuscany} -> {Sangiovese},
 {Sangiovese} -> {Tuscany},
 {France} -> {(85, 90]},
 {Sparkling Blend} -> {(85, 90]},
 {Washington} -> {(85, 90]},
 {Rhône Valley} -> {(85, 90]},
 {Rhône Valley} -> {France},
 {Red Blend} -> {(85, 90]},
 {Red Blend} -> {Italy},
 {Tuscany} -> {Red Blend},
 {Spain} -> {(85, 90]},
 {Petite Sirah} -> {US},
 {Syrah} -> {(85, 90]},
 {Cabernet Sauvignon} -> {(85, 90]},
 {Burgundy} -> {(85, 90]},
 {Burgundy} -> {Chardonnay},
 {Burgundy} -> {France},
 {Loire Valley} -> {(85, 90]},
 {Sauvignon Blanc} -> {(85, 90]},
 {Loire Valley} -> {France},
 {Loire Valley} -> {Sauvignon Blanc},
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{New York} -> {(85, 90]},
{Riesling} -> {(85, 90]},
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{Malbec} -> {Argentina},
{Argentina} -> {Malbec},
{Mendoza Province} -> {Argentina},
{Argentina} -> {Mendoza Province},
{Mendoza Province} -> {Malbec},
{Malbec} -> {Mendoza Province},
{Burgundy} -> {(90, 95]},
{Alentejano} -> {Portugal},
{Portuguese Red} -> {Portugal},
{Portugal} -> {Portuguese Red},
{Syrah} -> {California},
{Nebbiolo} -> {(90, 95]},
{Piedmont} -> {(90, 95]},
{Nebbiolo} -> {Italy},
{Piedmont} -> {Italy},
{Piedmont} -> {Nebbiolo},
{Nebbiolo} -> {Piedmont},
{Pinot Gris} -> {US},
{Champagne} -> {France},
{Portugal} -> {(85, 90]},
{Veneto} -> {(85, 90]},
{Veneto} -> {Italy},
{Portuguese Red} -> {(85, 90]},
{Douro} -> {Portugal},
{Southwest France} -> {(85, 90]},
{Viognier} -> {US},
{Cabernet Franc} -> {(85, 90]},
{Cabernet Franc} -> {US},
{White Blend} -> {(85, 90]},
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{Mendoza Province} -> {(85, 90]},
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{South Africa} -> {(85, 90]},
{Malbec} -> {(85, 90]},
{Rosé} -> {France},
{Zinfandel} -> {(85, 90]},
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{Zinfandel} -> {US},
{Northern Spain} -> {(85, 90]},
{Tempranillo} -> {(85, 90]},
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{White Blend} -> {Italy},
{Southern Italy} -> {(85, 90]},
{Southern Italy} -> {Italy},
{Barbera} -> {(85, 90]},
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{Bordeaux} -> {(85, 90]},
{Bordeaux} -> {France},
{Oregon} -> {(85, 90]},
{Catalonia} -> {(85, 90]},
{Catalonia} -> {Spain},
{Chile} -> {(85, 90]},
{Bordeaux-style Red Blend} -> {(85, 90]},
{Bordeaux-style Red Blend} -> {France},
{Colchagua Valley} -> {Chile},
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{Bordeaux} -> {Bordeaux-style Red Blend},
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{Alsace} -> {France},
{Bordeaux} -> {(90, 95]},
{Bordeaux-style White Blend} -> {Bordeaux},
{Bordeaux-style White Blend} -> {France},
{Merlot} -> {California},
{Nebbiolo} -> {(85, 90]},
{Piedmont} -> {(85, 90]},
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{Portuguese White} -> {Portugal},
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{Mosel} -> {Germany},
{Germany} -> {Mosel},
{Riesling} -> {Germany},
{Germany} -> {Riesling},
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{Alsace} -> {(85, 90]},
{Germany} -> {(85, 90]},
{Pinot Gris} -> {(85, 90]},
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{Burgenland} -> {Austria},
{Australia} -> {(85, 90]},
{South Australia} -> {(85, 90]},
{South Australia} -> {Australia},
{Australia} -> {South Australia},
{Barbera} -> {Italy},
{Barbera} -> {Piedmont},
{(80, 85]} -> {California},
{(80, 85]} -> {US},
{Rosé} -> {(80, 85]},
{Sauvignon Blanc} -> {(80, 85]},
{Merlot} -> {(80, 85]},
{Argentina} -> {(80, 85]},
{Mendoza Province} -> {(80, 85]},
{Northern Spain} -> {(80, 85]},
{Spain} -> {(80, 85]},
{Maipo Valley} -> {Chile},
{Casablanca Valley} -> {Chile},
{Shiraz} -> {(85, 90]},
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{South Australia} -> {Shiraz},
{Shiraz} -> {South Australia},
{Tuscany} -> {(90, 95]},
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{Marlborough} -> {New Zealand},
{Marlborough} -> {Sauvignon Blanc},
{New Zealand} -> {Sauvignon Blanc},
{Grüner Veltliner} -> {Austria},
{Austria} -> {Grüner Veltliner},
{Champagne Blend} -> {Champagne},
{Champagne} -> {Champagne Blend},
{Champagne Blend} -> {France},
{Zinfandel} -> {(80, 85]},
{New York} -> {(80, 85]},

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{Northeastern Italy} -> {(85, 90]},
{Central Italy} -> {(85, 90]},
{Central Italy} -> {Italy},
{Tempranillo} -> {(80, 85]},
{Marlborough} -> {(85, 90]},
{New Zealand} -> {(85, 90]},
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{Corvina, Rondinella, Molinara} -> {Veneto},
{Sangiovese Grosso} -> {Italy},
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{California, Sauvignon Blanc} -> {US},
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{Portuguese Red} -> {(85, 90], Portugal},
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{(85, 90], Catalonia} -> {Spain},
{Catalonia} -> {(85, 90], Spain},
{Bordeaux-style Red Blend, France} -> {(85, 90]},
{(85, 90], Bordeaux-style Red Blend} -> {France},
{Bordeaux-style Red Blend} -> {(85, 90], France},
{Bordeaux-style Red Blend, US} -> {(85, 90]},
{Bordeaux-style Red Blend, US} -> {California},
{Bordeaux-style Red Blend, California} -> {US},
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90]},
{(85, 90], Bordeaux-style Red Blend} -> {Bordeaux},
{(85, 90], Bordeaux} -> {Bordeaux-style Red Blend},
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux},
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend},
{Bordeaux-style Red Blend, France} -> {Bordeaux},
{Bordeaux, France} -> {Bordeaux-style Red Blend},

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{Bordeaux, Bordeaux-style Red Blend} -> {France},
{Bordeaux-style Red Blend} -> {Bordeaux, France},
{Bordeaux} -> {Bordeaux-style Red Blend, France},
{Merlot, US} -> {(85, 90]},
{(85, 90], Merlot} -> {US},
{Merlot} -> {(85, 90], US},
{Merlot, Washington} -> {US},
{Bordeaux, France} -> {(90, 95]},
{(90, 95], France} -> {Bordeaux},
{(90, 95], Bordeaux} -> {France},
{Bordeaux} -> {(90, 95], France},
{Bordeaux-style White Blend, France} -> {Bordeaux},
{Bordeaux, Bordeaux-style White Blend} -> {France},
{Bordeaux-style White Blend} -> {Bordeaux, France},
{California, Merlot} -> {(85, 90]},
{(85, 90], Merlot} -> {California},
{Merlot, US} -> {California},
{California, Merlot} -> {US},
{Merlot} -> {California, US},
{Italy, Nebbiolo} -> {(85, 90]},
{(85, 90], Nebbiolo} -> {Italy},
{Nebbiolo} -> {(85, 90], Italy},
{Italy, Piedmont} -> {(85, 90]},
{(85, 90], Piedmont} -> {Italy},
{Piedmont} -> {(85, 90], Italy},
{Nebbiolo, Piedmont} -> {(85, 90]},
{(85, 90], Piedmont} -> {Nebbiolo},
{(85, 90], Nebbiolo} -> {Piedmont},
{Nebbiolo} -> {(85, 90], Piedmont},
{California, Red Blend} -> {(85, 90]},
{Red Blend, US} -> {(85, 90]},
{Red Blend, US} -> {California},
{California, Red Blend} -> {US},
{France, Pinot Noir} -> {Burgundy},
{Burgundy, Pinot Noir} -> {France},
{Burgundy, France} -> {Pinot Noir},
{Burgundy} -> {France, Pinot Noir},
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95]},
{(90, 95], Bordeaux-style Red Blend} -> {Bordeaux},
{(90, 95], Bordeaux} -> {Bordeaux-style Red Blend},
{Bordeaux-style Red Blend, France} -> {(90, 95]},
{(90, 95], Bordeaux-style Red Blend} -> {France},
{(90, 95], Red Blend} -> {Italy},
{Provence, Rosé} -> {France},
{France, Rosé} -> {Provence},
{France, Provence} -> {Rosé},
{Rosé} -> {France, Provence},
{Provence} -> {France, Rosé},
{Mosel, Riesling} -> {Germany},
{Germany, Riesling} -> {Mosel},
{Germany, Mosel} -> {Riesling},
{Mosel} -> {Germany, Riesling},
{Germany} -> {Mosel, Riesling},
{Alsace, France} -> {(85, 90]},
{(85, 90], Alsace} -> {France},
{Alsace} -> {(85, 90], France},
{Burgundy, Pinot Noir} -> {(85, 90]},
{(85, 90], Burgundy} -> {Pinot Noir},
{Germany, Riesling} -> {(85, 90]},
{(85, 90], Riesling} -> {Germany},
{(85, 90], Germany} -> {Riesling},

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```

{Germany} -> {(85, 90], Riesling},
{Australia, South Australia} -> {(85, 90]},
{(85, 90], South Australia} -> {Australia},
{(85, 90], Australia} -> {South Australia},
{South Australia} -> {(85, 90], Australia},
{Australia} -> {(85, 90], South Australia},
{Barbera, Italy} -> {(85, 90]},
{(85, 90], Barbera} -> {Italy},
{Barbera} -> {(85, 90], Italy},
{Barbera, Piedmont} -> {(85, 90]},
{(85, 90], Piedmont} -> {Barbera},
{(85, 90], Barbera} -> {Piedmont},
{Barbera} -> {(85, 90], Piedmont},
{Barbera, Piedmont} -> {Italy},
{Barbera, Italy} -> {Piedmont},
{Barbera} -> {Italy, Piedmont},
{(80, 85], US} -> {California},
{(80, 85], California} -> {US},
{(80, 85]} -> {California, US},
{(80, 85], Red Blend} -> {US},
{(80, 85], Cabernet Sauvignon} -> {California},
{(80, 85], Cabernet Sauvignon} -> {US},
{California, Merlot} -> {(80, 85]},
{(80, 85], Merlot} -> {California},
{Merlot, US} -> {(80, 85]},
{(80, 85], Merlot} -> {US},
{Argentina, Mendoza Province} -> {(80, 85]},
{(80, 85], Mendoza Province} -> {Argentina},
{(80, 85], Argentina} -> {Mendoza Province},
{Mendoza Province} -> {(80, 85], Argentina},
{Argentina} -> {(80, 85], Mendoza Province},
{Northern Spain, Spain} -> {(80, 85]},
{(80, 85], Spain} -> {Northern Spain},
{(80, 85], Northern Spain} -> {Spain},
{Northern Spain} -> {(80, 85], Spain},
{Australia, Shiraz} -> {(85, 90]},
{(85, 90], Shiraz} -> {Australia},
{Shiraz} -> {(85, 90], Australia},
{Shiraz, South Australia} -> {Australia},
{Australia, South Australia} -> {Shiraz},
{Australia, Shiraz} -> {South Australia},
{South Australia} -> {Australia, Shiraz},
{Shiraz} -> {Australia, South Australia},
{(80, 85], Chardonnay} -> {California},
{(80, 85], Chardonnay} -> {US},
{Italy, Tuscany} -> {(90, 95]},
{(90, 95], Tuscany} -> {Italy},
{(90, 95], Italy} -> {Tuscany},
{Tuscany} -> {(90, 95], Italy},
{Red Blend, Tuscany} -> {(90, 95]},
{(90, 95], Tuscany} -> {Red Blend},
{(90, 95], Red Blend} -> {Tuscany},
{Red Blend, Washington} -> {(85, 90]},
{Red Blend, Washington} -> {US},
{Red Blend, US} -> {Washington},
{New Zealand, Sauvignon Blanc} -> {Marlborough},
{Marlborough, Sauvignon Blanc} -> {New Zealand},
{Marlborough, New Zealand} -> {Sauvignon Blanc},
{Marlborough} -> {New Zealand, Sauvignon Blanc},
{Champagne Blend, France} -> {Champagne},
{Champagne, France} -> {Champagne Blend},

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```

{Champagne, Champagne Blend} -> {France},
{Champagne Blend} -> {Champagne, France},
{Champagne} -> {Champagne Blend, France},
{Sauvignon Blanc, US} -> {(80, 85]},
{(80, 85], Sauvignon Blanc} -> {US},
{(80, 85], Washington} -> {US},
{California, Zinfandel} -> {(80, 85]},
{(80, 85], Zinfandel} -> {California},
{Zinfandel} -> {(80, 85], California},
{US, Zinfandel} -> {(80, 85]},
{(80, 85], Zinfandel} -> {US},
{Zinfandel} -> {(80, 85], US},
{New York, US} -> {(80, 85]},
{(80, 85], New York} -> {US},
{New York} -> {(80, 85], US},
{Petite Sirah, US} -> {California},
{California, Petite Sirah} -> {US},
{Petite Sirah} -> {California, US},
{(80, 85], Pinot Noir} -> {California},
{(80, 85], Pinot Noir} -> {US},
{California, Sauvignon Blanc} -> {(80, 85]},
{(80, 85], Sauvignon Blanc} -> {California},
{Italy, Northeastern Italy} -> {(85, 90]},
{(85, 90], Northeastern Italy} -> {Italy},
{Northeastern Italy} -> {(85, 90], Italy},
{Central Italy, Italy} -> {(85, 90]},
{(85, 90], Central Italy} -> {Italy},
{Central Italy} -> {(85, 90], Italy},
{(80, 85], Bordeaux} -> {France},
{(80, 85], Syrah} -> {US},
{Spain, Tempranillo} -> {(80, 85]},
{(80, 85], Tempranillo} -> {Spain},
{Tempranillo} -> {(80, 85], Spain},
{Marlborough, New Zealand} -> {(85, 90]},
{(85, 90], New Zealand} -> {Marlborough},
{(85, 90], Marlborough} -> {New Zealand},
{New Zealand} -> {(85, 90], Marlborough},
{Marlborough} -> {(85, 90], New Zealand},
{New Zealand, Sauvignon Blanc} -> {(85, 90]},
{(85, 90], New Zealand} -> {Sauvignon Blanc},
{Corvina, Rondinella, Molinara, Italy} -> {(85, 90]},
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy},
{Corvina, Rondinella, Molinara} -> {(85, 90], Italy},
{Corvina, Rondinella, Molinara, Veneto} -> {(85, 90]},
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara},
{(85, 90], Corvina, Rondinella, Molinara} -> {Veneto},
{Corvina, Rondinella, Molinara} -> {(85, 90], Veneto},
{Italy, Veneto} -> {Corvina, Rondinella, Molinara},
{Corvina, Rondinella, Molinara, Veneto} -> {Italy},
{Corvina, Rondinella, Molinara, Italy} -> {Veneto},
{Veneto} -> {Corvina, Rondinella, Molinara, Italy},
{Corvina, Rondinella, Molinara} -> {Italy, Veneto},
{Sangiovese Grosso, Tuscany} -> {Italy},
{Italy, Sangiovese Grosso} -> {Tuscany},
{Sangiovese Grosso} -> {Italy, Tuscany},
{California, Pinot Noir, US} -> {(90, 95]},
{(90, 95], Pinot Noir, US} -> {California},
{(90, 95], California, Pinot Noir} -> {US},
{California, Pinot Noir} -> {(90, 95], US},
{(90, 95], Pinot Noir} -> {California, US},
{Cabernet Sauvignon, California, US} -> {(90, 95]},

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{(90, 95], Cabernet Sauvignon, US} -> {California},
{(90, 95], Cabernet Sauvignon, California} -> {US},
{Cabernet Sauvignon, California} -> {(90, 95], US},
{(90, 95], Cabernet Sauvignon} -> {California, US},
{(90, 95], Chardonnay, US} -> {California},
{(90, 95], California, Chardonnay} -> {US},
{(90, 95], Chardonnay} -> {California, US},
{California, Chardonnay, US} -> {(85, 90]},
{(85, 90], Chardonnay, US} -> {California},
{(85, 90], California, Chardonnay} -> {US},
{Chardonnay, US} -> {(85, 90], California},
{California, Chardonnay} -> {(85, 90], US},
{(85, 90], Chardonnay} -> {California, US},
{Italy, Sangiovese, Tuscany} -> {(85, 90]},
{(85, 90], Sangiovese, Tuscany} -> {Italy},
{(85, 90], Italy, Tuscany} -> {Sangiovese},
{(85, 90], Italy, Sangiovese} -> {Tuscany},
{Sangiovese, Tuscany} -> {(85, 90], Italy},
{Italy, Sangiovese} -> {(85, 90], Tuscany},
{(85, 90], Tuscany} -> {Italy, Sangiovese},
{(85, 90], Sangiovese} -> {Italy, Tuscany},
{Sangiovese} -> {(85, 90], Italy, Tuscany},
{Italy, Red Blend, Tuscany} -> {(85, 90]},
{(85, 90], Red Blend, Tuscany} -> {Italy},
{(85, 90], Italy, Tuscany} -> {Red Blend},
{(85, 90], Italy, Red Blend} -> {Tuscany},
{Red Blend, Tuscany} -> {(85, 90], Italy},
{Italy, Red Blend} -> {(85, 90], Tuscany},
{(85, 90], Tuscany} -> {Italy, Red Blend},
{Cabernet Sauvignon, California, US} -> {(85, 90]},
{(85, 90], Cabernet Sauvignon, US} -> {California},
{(85, 90], Cabernet Sauvignon, California} -> {US},
{Cabernet Sauvignon, US} -> {(85, 90], California},
{Cabernet Sauvignon, California} -> {(85, 90], US},
{(85, 90], Cabernet Sauvignon} -> {California, US},
{Cabernet Sauvignon, US, Washington} -> {(85, 90]},
{(85, 90], Cabernet Sauvignon, Washington} -> {US},
{Cabernet Sauvignon, Washington} -> {(85, 90], US},
{Burgundy, Chardonnay, France} -> {(85, 90]},
{(85, 90], Chardonnay, France} -> {Burgundy},
{(85, 90], Burgundy, France} -> {Chardonnay},
{(85, 90], Burgundy, Chardonnay} -> {France},
{Chardonnay, France} -> {(85, 90], Burgundy},
{Burgundy, Chardonnay} -> {(85, 90], France},
{(85, 90], Burgundy} -> {Chardonnay, France},
{Burgundy, Chardonnay, France} -> {(90, 95]},
{(90, 95], Chardonnay, France} -> {Burgundy},
{(90, 95], Burgundy, France} -> {Chardonnay},
{(90, 95], Burgundy, Chardonnay} -> {France},
{Burgundy, Chardonnay} -> {(90, 95], France},
{(90, 95], Burgundy} -> {Chardonnay, France},
{Italy, Nebbiolo, Piedmont} -> {(90, 95]},
{(90, 95], Nebbiolo, Piedmont} -> {Italy},
{(90, 95], Italy, Piedmont} -> {Nebbiolo},
{(90, 95], Italy, Nebbiolo} -> {Piedmont},
{Nebbiolo, Piedmont} -> {(90, 95], Italy},
{Italy, Nebbiolo} -> {(90, 95], Piedmont},
{(90, 95], Piedmont} -> {Italy, Nebbiolo},
{(90, 95], Nebbiolo} -> {Italy, Piedmont},
{Nebbiolo} -> {(90, 95], Italy, Piedmont},
{Argentina, Malbec, Mendoza Province} -> {(85, 90]},

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{(85, 90], Malbec, Mendoza Province} -> {Argentina},
{(85, 90], Argentina, Mendoza Province} -> {Malbec},
{(85, 90], Argentina, Malbec} -> {Mendoza Province},
{Malbec, Mendoza Province} -> {(85, 90], Argentina},
{Argentina, Malbec} -> {(85, 90], Mendoza Province},
{(85, 90], Mendoza Province} -> {Argentina, Malbec},
{(85, 90], Malbec} -> {Argentina, Mendoza Province},
{(85, 90], Argentina} -> {Malbec, Mendoza Province},
{Malbec} -> {(85, 90], Argentina, Mendoza Province},
{California, US, Zinfandel} -> {(85, 90]},
{(85, 90], US, Zinfandel} -> {California},
{(85, 90], California, Zinfandel} -> {US},
{US, Zinfandel} -> {(85, 90], California},
{California, Zinfandel} -> {(85, 90], US},
{(85, 90], Zinfandel} -> {California, US},
{Zinfandel} -> {(85, 90], California, US},
{Northern Spain, Spain, Tempranillo} -> {(85, 90]},
{(85, 90], Spain, Tempranillo} -> {Northern Spain},
{(85, 90], Northern Spain, Tempranillo} -> {Spain},
{(85, 90], Northern Spain, Spain} -> {Tempranillo},
{Spain, Tempranillo} -> {(85, 90], Northern Spain},
{Northern Spain, Tempranillo} -> {(85, 90], Spain},
{(85, 90], Tempranillo} -> {Northern Spain, Spain},
{(85, 90], Northern Spain} -> {Spain, Tempranillo},
{Tempranillo} -> {(85, 90], Northern Spain, Spain},
{California, Sauvignon Blanc, US} -> {(85, 90]},
{(85, 90], Sauvignon Blanc, US} -> {California},
{(85, 90], California, Sauvignon Blanc} -> {US},
{Sauvignon Blanc, US} -> {(85, 90], California},
{California, Sauvignon Blanc} -> {(85, 90], US},
{(85, 90], Sauvignon Blanc} -> {California, US},
{California, Pinot Noir, US} -> {(85, 90]},
{(85, 90], Pinot Noir, US} -> {California},
{(85, 90], California, Pinot Noir} -> {US},
{Pinot Noir, US} -> {(85, 90], California},
{California, Pinot Noir} -> {(85, 90], US},
{(85, 90], Pinot Noir} -> {California, US},
{California, Syrah, US} -> {(85, 90]},
{(85, 90], Syrah, US} -> {California},
{(85, 90], California, Syrah} -> {US},
{California, Syrah} -> {(85, 90], US},
{(85, 90], Syrah} -> {California, US},
{Oregon, Pinot Noir, US} -> {(85, 90]},
{(85, 90], Pinot Noir, US} -> {Oregon},
{(85, 90], Oregon, US} -> {Pinot Noir},
{(85, 90], Oregon, Pinot Noir} -> {US},
{Oregon, US} -> {(85, 90], Pinot Noir},
{Oregon, Pinot Noir} -> {(85, 90], US},
{(85, 90], Oregon} -> {Pinot Noir, US},
{Oregon} -> {(85, 90], Pinot Noir, US},
{Bordeaux, Bordeaux-style Red Blend, France} -> {(85, 90]},
{(85, 90], Bordeaux-style Red Blend, France} -> {Bordeaux},
{(85, 90], Bordeaux, France} -> {Bordeaux-style Red Blend},
{(85, 90], Bordeaux, Bordeaux-style Red Blend} -> {France},
{Bordeaux-style Red Blend, France} -> {(85, 90], Bordeaux},
{Bordeaux, France} -> {(85, 90], Bordeaux-style Red Blend},
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90], France},
{(85, 90], Bordeaux-style Red Blend} -> {Bordeaux, France},
{(85, 90], Bordeaux} -> {Bordeaux-style Red Blend, France},
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux, France},
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend, France},

```

```

{California, Merlot, US} -> {(85, 90]},
{(85, 90], Merlot, US} -> {California},
{(85, 90], California, Merlot} -> {US},
{California, Merlot} -> {(85, 90], US},
{(85, 90], Merlot} -> {California, US},
{Italy, Nebbiolo, Piedmont} -> {(85, 90]},
{(85, 90], Nebbiolo, Piedmont} -> {Italy},
{(85, 90], Italy, Piedmont} -> {Nebbiolo},
{(85, 90], Italy, Nebbiolo} -> {Piedmont},
{Nebbiolo, Piedmont} -> {(85, 90], Italy},
{Italy, Nebbiolo} -> {(85, 90], Piedmont},
{(85, 90], Piedmont} -> {Italy, Nebbiolo},
{(85, 90], Nebbiolo} -> {Italy, Piedmont},
{Nebbiolo} -> {(85, 90], Italy, Piedmont},
{California, Red Blend, US} -> {(85, 90]},
{(85, 90], Red Blend, US} -> {California},
{(85, 90], California, Red Blend} -> {US},
{California, Red Blend} -> {(85, 90], US},
{Bordeaux, Bordeaux-style Red Blend, France} -> {(90, 95]},
{(90, 95], Bordeaux-style Red Blend, France} -> {Bordeaux},
{(90, 95], Bordeaux, France} -> {Bordeaux-style Red Blend},
{(90, 95], Bordeaux, Bordeaux-style Red Blend} -> {France},
{Bordeaux-style Red Blend, France} -> {(90, 95], Bordeaux},
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95], France},
{(90, 95], Bordeaux-style Red Blend} -> {Bordeaux, France},
{(90, 95], Bordeaux} -> {Bordeaux-style Red Blend, France},
{Burgundy, France, Pinot Noir} -> {(85, 90]},
{(85, 90], France, Pinot Noir} -> {Burgundy},
{(85, 90], Burgundy, Pinot Noir} -> {France},
{(85, 90], Burgundy, France} -> {Pinot Noir},
{France, Pinot Noir} -> {(85, 90], Burgundy},
{Burgundy, Pinot Noir} -> {(85, 90], France},
{(85, 90], Burgundy} -> {France, Pinot Noir},
{Barbera, Italy, Piedmont} -> {(85, 90]},
{(85, 90], Italy, Piedmont} -> {Barbera},
{(85, 90], Barbera, Piedmont} -> {Italy},
{(85, 90], Barbera, Italy} -> {Piedmont},
{Barbera, Piedmont} -> {(85, 90], Italy},
{Barbera, Italy} -> {(85, 90], Piedmont},
{(85, 90], Piedmont} -> {Barbera, Italy},
{(85, 90], Barbera} -> {Italy, Piedmont},
{Barbera} -> {(85, 90], Italy, Piedmont},
{(80, 85], Cabernet Sauvignon, US} -> {California},
{(80, 85], Cabernet Sauvignon, California} -> {US},
{(80, 85], Cabernet Sauvignon} -> {California, US},
{California, Merlot, US} -> {(80, 85]},
{(80, 85], Merlot, US} -> {California},
{(80, 85], California, Merlot} -> {US},
{California, Merlot} -> {(80, 85], US},
{(80, 85], Merlot} -> {California, US},
{(80, 85], Chardonnay, US} -> {California},
{(80, 85], California, Chardonnay} -> {US},
{(80, 85], Chardonnay} -> {California, US},
{Italy, Red Blend, Tuscany} -> {(90, 95]},
{(90, 95], Red Blend, Tuscany} -> {Italy},
{(90, 95], Italy, Tuscany} -> {Red Blend},
{(90, 95], Italy, Red Blend} -> {Tuscany},
{Red Blend, Tuscany} -> {(90, 95], Italy},
{(90, 95], Tuscany} -> {Italy, Red Blend},
{(90, 95], Red Blend} -> {Italy, Tuscany},
{Red Blend, US, Washington} -> {(85, 90]},

```

```
{(85, 90], Red Blend, Washington} -> {US},
{(85, 90], Red Blend, US} -> {Washington},
{Red Blend, Washington} -> {(85, 90], US},
{California, US, Zinfandel} -> {(80, 85]},
{(80, 85], US, Zinfandel} -> {California},
{(80, 85], California, Zinfandel} -> {US},
{US, Zinfandel} -> {(80, 85], California},
{California, Zinfandel} -> {(80, 85], US},
{(80, 85], Zinfandel} -> {California, US},
{Zinfandel} -> {(80, 85], California, US},
{(80, 85], Pinot Noir, US} -> {California},
{(80, 85], California, Pinot Noir} -> {US},
{(80, 85], Pinot Noir} -> {California, US},
{California, Sauvignon Blanc, US} -> {(80, 85]},
{(80, 85], Sauvignon Blanc, US} -> {California},
{(80, 85], California, Sauvignon Blanc} -> {US},
{Sauvignon Blanc, US} -> {(80, 85], California},
{California, Sauvignon Blanc} -> {(80, 85], US},
{(80, 85], Sauvignon Blanc} -> {California, US},
{Corvina, Rondinella, Molinara, Italy, Veneto} -> {(85, 90]},
{(85, 90], Italy, Veneto} -> {Corvina, Rondinella, Molinara},
{(85, 90], Corvina, Rondinella, Molinara, Veneto} -> {Italy},
{(85, 90], Corvina, Rondinella, Molinara, Italy} -> {Veneto},
{Corvina, Rondinella, Molinara, Veneto} -> {(85, 90], Italy},
{Corvina, Rondinella, Molinara, Italy} -> {(85, 90], Veneto},
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara, Italy},
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy, Veneto},
{Corvina, Rondinella, Molinara} -> {(85, 90], Italy, Veneto}]
```

In [18]:

```
print("计算关联规则与置信度")
for rule in sorted(rules, key=lambda rule: rule.confidence):
    print(repr(rule), 'support:', rule.support, 'confidence:', rule.confidence)
```

计算关联规则与置信度

```
{Cabernet Sauvignon, US} -> {(90, 95]} support: 0.018273977140964057 conf
idence: 0.3005011985181957
{(85, 90], Tuscany} -> {Red Blend} support: 0.008381646513168792 confiden
ce: 0.3009039010466223
{(85, 90], Italy, Tuscany} -> {Red Blend} support: 0.008381646513168792 c
onfidence: 0.3009039010466223
{(85, 90], Tuscany} -> {Italy, Red Blend} support: 0.008381646513168792 c
onfidence: 0.3009039010466223
{Piedmont} -> {(90, 95]} support: 0.008189498095080338 confidence: 0.3019
789885169802
{Italy, Piedmont} -> {(90, 95]} support: 0.008189498095080338 confidence:
0.3019789885169802
{Piedmont} -> {(90, 95], Italy} support: 0.008189498095080338 confidence:
0.3019789885169802
{Cabernet Sauvignon, California} -> {(90, 95]} support: 0.014961073380818
287 confidence: 0.30300590445517983
{Cabernet Sauvignon, California, US} -> {(90, 95]} support: 0.01496107338
0818287 confidence: 0.30300590445517983
{Cabernet Sauvignon, California} -> {(90, 95], US} support: 0.01496107338
0818287 confidence: 0.30300590445517983
{Rosé} -> {(85, 90], France} support: 0.005658439622328972 confidence: 0.
3031593894213703
{Tuscany} -> {Red Blend} support: 0.014676163657445751 confidence: 0.3042
164537838209
{Italy, Tuscany} -> {Red Blend} support: 0.014676163657445751 confidence:
0.3042164537838209
{Tuscany} -> {Italy, Red Blend} support: 0.014676163657445751 confidence:
0.3042164537838209
{(85, 90], Pinot Noir, US} -> {Oregon} support: 0.010495279112141792 conf
idence: 0.30438124519600307
{Sauvignon Blanc, US} -> {(80, 85], California} support: 0.00525426536359
1188 confidence: 0.3066511987625677
{(85, 90], Riesling} -> {US} support: 0.0066456849428524105 confidence:
0.3069155446756426
{Tempranillo} -> {(80, 85], Spain} support: 0.005201258903428855 confiden
ce: 0.3071205007824726
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux} support: 0.01501407984
098062 confidence: 0.3084252075677147
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux, France} support: 0.015
01407984098062 confidence: 0.3084252075677147
{Rosé} -> {Provence} support: 0.005777704157694219 confidence: 0.30954916
57791977
{Rosé} -> {France, Provence} support: 0.005777704157694219 confidence: 0.
3095491657791977
{Italy} -> {Tuscany} support: 0.04824250455524267 confidence: 0.310120112
4456938
{Germany} -> {Mosel, Riesling} support: 0.005128375020705648 confidence:
0.31566068515497553
{Sauvignon Blanc} -> {(80, 85]} support: 0.013271492463143946 confidence:
0.31693037974683547
{Pinot Noir, US} -> {(90, 95]} support: 0.02175252608911711 confidence:
0.31750483558994197
{(85, 90], Sauvignon Blanc} -> {California} support: 0.007798575451383137
```

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confidence: 0.3200108754758021
{(85, 90], Sauvignon Blanc} -> {California, US} support: 0.00779857545138
3137 confidence: 0.3200108754758021
{Germany} -> {Mosel} support: 0.005201258903428855 confidence: 0.32014681
89233279
{Malbec} -> {(85, 90], Mendoza Province} support: 0.006811330130859699 co
nfidence: 0.3204488778054863
{Malbec} -> {(85, 90], Argentina, Mendoza Province} support: 0.0068113301
30859699 confidence: 0.3204488778054863
{Tuscany} -> {(90, 95]} support: 0.015464634752360444 confidence: 0.32056
036258755666
{Italy, Tuscany} -> {(90, 95]} support: 0.015464634752360444 confidence:
0.32056036258755666
{Tuscany} -> {(90, 95], Italy} support: 0.015464634752360444 confidence:
0.32056036258755666
{Syrah, US} -> {Washington} support: 0.009130362762961737 confidence: 0.3
2241459990641086
{(90, 95]} -> {California} support: 0.06621169455027331 confidence: 0.322
6462611390934
{(90, 95]} -> {California, US} support: 0.06621169455027331 confidence:
0.3226462611390934
{Bordeaux-style Red Blend} -> {(85, 90], France} support: 0.0157429186682
12688 confidence: 0.32339730502245817
{Austria} -> {Grüner Veltliner} support: 0.006579426867649495 confidence:
0.32482826300294404
{Cabernet Sauvignon} -> {(85, 90], US} support: 0.02774888189498095 confi
dence: 0.3271875
{(90, 95], Chardonnay} -> {France} support: 0.0066854397879741595 confide
nce: 0.328130081300813
{Red Blend} -> {US} support: 0.02220970680801723 confidence: 0.3331676771
692675
{US} -> {(85, 90], California} support: 0.13849925459665396 confidence:
0.3350000801320576
{California, Pinot Noir} -> {(90, 95]} support: 0.016988570482027496 conf
idence: 0.33590986505960957
{California, Pinot Noir, US} -> {(90, 95]} support: 0.016988570482027496
confidence: 0.33590986505960957
{California, Pinot Noir} -> {(90, 95], US} support: 0.016988570482027496
confidence: 0.33590986505960957
{Argentina} -> {Malbec, Mendoza Province} support: 0.012542653635911876 c
onfidence: 0.33617474693660093
{New Zealand} -> {Sauvignon Blanc} support: 0.007407652807685937 confiden
ce: 0.33674698795180724
{(85, 90], New Zealand} -> {Sauvignon Blanc} support: 0.00518800728838827
2 confidence: 0.3367741935483871
{Sauvignon Blanc, US} -> {(80, 85]} support: 0.005804207387775385 confide
nce: 0.33874709976798145
{South Australia} -> {Shiraz} support: 0.006758323670697366 confidence:
0.3395472703062583
{Australia, South Australia} -> {Shiraz} support: 0.006758323670697366 co
nfidence: 0.3395472703062583
{South Australia} -> {Australia, Shiraz} support: 0.006758323670697366 co
nfidence: 0.3395472703062583
{Italy, Red Blend} -> {(85, 90], Tuscany} support: 0.008381646513168792 c
onfidence: 0.3403282216841539
{(90, 95], Tuscany} -> {Red Blend} support: 0.005267516978631771 confiden
ce: 0.34061696658097684
{(90, 95], Italy, Tuscany} -> {Red Blend} support: 0.005267516978631771 c
onfidence: 0.34061696658097684
{(90, 95], Tuscany} -> {Italy, Red Blend} support: 0.005267516978631771 c
onfidence: 0.34061696658097684
```

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{Merlot} -> {(85, 90], US} support: 0.011462647010104356 confidence: 0.34122287968441817
{Pinot Noir, US} -> {(85, 90], California} support: 0.023422229584230576 confidence: 0.3418762088974855
{Oregon} -> {(85, 90], Pinot Noir} support: 0.010495279112141792 confidence: 0.34517324035737634
{Oregon, US} -> {(85, 90], Pinot Noir} support: 0.010495279112141792 confidence: 0.34517324035737634
{Oregon} -> {(85, 90], Pinot Noir, US} support: 0.010495279112141792 confidence: 0.34517324035737634
{Northern Spain} -> {(80, 85]} support: 0.01126387278449561 confidence: 0.3475061324611611
{Northern Spain, Spain} -> {(80, 85]} support: 0.01126387278449561 confidence: 0.3475061324611611
{Northern Spain} -> {(80, 85], Spain} support: 0.01126387278449561 confidence: 0.3475061324611611
{Tuscany} -> {Sangiovese} support: 0.016776544641378167 confidence: 0.347544293366296
{Italy, Tuscany} -> {Sangiovese} support: 0.016776544641378167 confidence: 0.3477544293366296
{Tuscany} -> {Italy, Sangiovese} support: 0.016776544641378167 confidence: 0.3477544293366296
{Chardonnay, France} -> {(90, 95]} support: 0.0066854397879741595 confidence: 0.34889349930843705
{Argentina} -> {(80, 85], Mendoza Province} support: 0.01303296339241345 confidence: 0.34931628485171373
{White Blend} -> {Italy} support: 0.006552923637568328 confidence: 0.3502124645892351
{Burgundy, Chardonnay} -> {(90, 95]} support: 0.005572304124565181 confidence: 0.3502707205331112
{Burgundy, Chardonnay, France} -> {(90, 95]} support: 0.005572304124565181 confidence: 0.3502707205331112
{Burgundy, Chardonnay} -> {(90, 95], France} support: 0.005572304124565181 confidence: 0.3502707205331112
{Sauvignon Blanc} -> {California} support: 0.01470929269504721 confidence: 0.3512658227848101
{Sauvignon Blanc} -> {California, US} support: 0.01470929269504721 confidence: 0.3512658227848101
{Spain} -> {(80, 85]} support: 0.019247970846446912 confidence: 0.35135462022254477
{Malbec} -> {(85, 90], Argentina} support: 0.007526917343051184 confidence: 0.3541147132169576
{Bordeaux-style Red Blend, France} -> {(90, 95], Bordeaux} support: 0.011681298658273977 confidence: 0.3554435483870968
{Burgundy} -> {(90, 95]} support: 0.010157362928606924 confidence: 0.35584958217270196
{Burgundy, France} -> {(90, 95]} support: 0.010157362928606924 confidence: 0.35584958217270196
{Burgundy} -> {(90, 95], France} support: 0.010157362928606924 confidence: 0.35584958217270196
{(90, 95], France} -> {Bordeaux} support: 0.014517144276958754 confidence: 0.3564920273348519
{California, Sauvignon Blanc} -> {(80, 85]} support: 0.005254265363591188 confidence: 0.3572072072072072
{California, Sauvignon Blanc, US} -> {(80, 85]} support: 0.005254265363591188 confidence: 0.3572072072072072
{California, Sauvignon Blanc} -> {(80, 85], US} support: 0.005254265363591188 confidence: 0.3572072072072072
{Cabernet Sauvignon, US} -> {(85, 90], California} support: 0.021726022859035944 confidence: 0.35726737851383744
{Syrah} -> {(85, 90], US} support: 0.013828060294848435 confidence: 0.358
```

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2832618025751
{New Zealand} -> {(85, 90], Marlborough} support: 0.007884710949146927 co
nfidence: 0.35843373493975905
{Bordeaux} -> {(90, 95]} support: 0.014517144276958754 confidence: 0.3585
3379152348225
{Bordeaux, France} -> {(90, 95]} support: 0.014517144276958754 confidenc
e: 0.35853379152348225
{Bordeaux} -> {(90, 95], France} support: 0.014517144276958754 confidenc
e: 0.35853379152348225
{Red Blend, Tuscany} -> {(90, 95]} support: 0.005267516978631771 confiden
ce: 0.35891647855530473
{Italy, Red Blend, Tuscany} -> {(90, 95]} support: 0.005267516978631771 c
onfidence: 0.35891647855530473
{Red Blend, Tuscany} -> {(90, 95], Italy} support: 0.005267516978631771 c
onfidence: 0.35891647855530473
{Zinfandel} -> {(80, 85], California} support: 0.009044227265197945 confi
dence: 0.3593050802842853
{Zinfandel} -> {(80, 85], California, US} support: 0.009044227265197945 c
onfidence: 0.3593050802842853
{Bordeaux-style Red Blend, France} -> {(90, 95]} support: 0.0118336922312
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{US, Zinfandel} -> {(80, 85], California} support: 0.009044227265197945 c
onfidence: 0.3602533650039588
{Bordeaux-style Red Blend} -> {(90, 95]} support: 0.017677654464137816 co
nfidence: 0.3631414182659589
{Zinfandel} -> {(80, 85], US} support: 0.009143614378002318 confidence:
0.3632534877599368
{Zinfandel} -> {(80, 85]} support: 0.009163491800563193 confidence: 0.364
04316925506713
{US, Zinfandel} -> {(80, 85]} support: 0.009143614378002318 confidence:
0.3642121931908155
{Pinot Noir} -> {(85, 90], US} support: 0.03448070233559715 confidence:
0.36422172452407614
{Northern Spain} -> {Tempranillo} support: 0.0118204406162001 confidence:
0.36467702371218313
{Northern Spain, Spain} -> {Tempranillo} support: 0.0118204406162001 conf
idence: 0.36467702371218313
{Northern Spain} -> {Spain, Tempranillo} support: 0.0118204406162001 conf
idence: 0.36467702371218313
{Tempranillo} -> {(80, 85]} support: 0.006188504223952294 confidence: 0.3
65414710485133
{Tempranillo} -> {(85, 90], Northern Spain} support: 0.006188504223952294
confidence: 0.365414710485133
{Tempranillo} -> {(85, 90], Northern Spain, Spain} support: 0.00618850422
3952294 confidence: 0.365414710485133
{(90, 95], Red Blend} -> {Tuscany} support: 0.005267516978631771 confiden
ce: 0.3656853725850966
{(90, 95], Red Blend} -> {Italy, Tuscany} support: 0.005267516978631771 c
onfidence: 0.3656853725850966
{Spain, Tempranillo} -> {(80, 85]} support: 0.005201258903428855 confiden
ce: 0.36596736596736595
{Rosé} -> {(80, 85]} support: 0.006837833360940865 confidence: 0.36634717
78487753
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95]} support: 0.01168129865
8273977 confidence: 0.3678280826204882
{Bordeaux, Bordeaux-style Red Blend, France} -> {(90, 95]} support: 0.011
681298658273977 confidence: 0.3678280826204882
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95], France} support: 0.011
681298658273977 confidence: 0.3678280826204882
{Red Blend} -> {Italy} support: 0.024628126552923638 confidence: 0.369446
37709969186
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{Germany, Riesling} -> {Mosel} support: 0.005128375020705648 confidence: 0.36962750716332377
{California, Zinfandel} -> {(80, 85]} support: 0.009044227265197945 confidence: 0.3698184773774045
{California, US, Zinfandel} -> {(80, 85]} support: 0.009044227265197945 confidence: 0.3698184773774045
{California, Zinfandel} -> {(80, 85], US} support: 0.009044227265197945 confidence: 0.3698184773774045
{(80, 85]} -> {California} support: 0.08510849759814477 confidence: 0.37009825107327055
{(80, 85]} -> {California, US} support: 0.08510849759814477 confidence: 0.37009825107327055
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend} support: 0.01501407984098062 confidence: 0.3708067419407626
{Bordeaux, France} -> {(85, 90], Bordeaux-style Red Blend} support: 0.01501407984098062 confidence: 0.3708067419407626
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend, France} support: 0.01501407984098062 confidence: 0.3708067419407626
{Chile} -> {(80, 85]} support: 0.014358124896471758 confidence: 0.37259284731774417
{(85, 90], Piedmont} -> {Barbera} support: 0.006122246148749379 confidence: 0.37318255250403876
{(85, 90], Italy, Piedmont} -> {Barbera} support: 0.006122246148749379 confidence: 0.37318255250403876
{(85, 90], Piedmont} -> {Barbera, Italy} support: 0.006122246148749379 confidence: 0.37318255250403876
{(85, 90], Riesling} -> {Germany} support: 0.008123240019877423 confidence: 0.37515299877600977
{(85, 90]} -> {US} support: 0.20746065926784826 confidence: 0.37686409975566604
{New York} -> {(80, 85]} support: 0.006089117111147921 confidence: 0.378500823723229
{New York, US} -> {(80, 85]} support: 0.006089117111147921 confidence: 0.378500823723229
{New York} -> {(80, 85], US} support: 0.006089117111147921 confidence: 0.378500823723229
{Riesling} -> {Germany} support: 0.013874440947490475 confidence: 0.3790731354091238
{Australia} -> {(85, 90], South Australia} support: 0.012463143945668378 confidence: 0.37946338511196287
{Merlot, US} -> {(80, 85]} support: 0.009143614378002318 confidence: 0.38016528925619836
{(85, 90], Northern Spain} -> {Tempranillo} support: 0.006188504223952294 confidence: 0.3804480651731161
{(85, 90], Northern Spain, Spain} -> {Tempranillo} support: 0.006188504223952294 confidence: 0.3804480651731161
{(85, 90], Northern Spain} -> {Spain, Tempranillo} support: 0.006188504223952294 confidence: 0.3804480651731161
{(85, 90], Sauvignon Blanc} -> {US} support: 0.009282756335928441 confidence: 0.3809135399673736
{Argentina} -> {Malbec} support: 0.014212357131025343 confidence: 0.38092701118806604
{Chardonnay, US} -> {(85, 90], California} support: 0.020864667881398045 confidence: 0.3874738525901317
{(85, 90], Tuscany} -> {Sangiovese} support: 0.010800066258075202 confidence: 0.3877259752616556
{(85, 90], Italy, Tuscany} -> {Sangiovese} support: 0.010800066258075202 confidence: 0.3877259752616556
{(85, 90], Tuscany} -> {Italy, Sangiovese} support: 0.010800066258075202 confidence: 0.3877259752616556
{Argentina} -> {(85, 90], Mendoza Province} support: 0.014596653967202253


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confidence: 0.3912271354999112
{Merlot} -> {(80, 85]} support: 0.013251615040583071 confidence: 0.394477
31755424065
{Red Blend, US} -> {Washington} support: 0.008772569156865993 confidence:
0.39498806682577564
{(80, 85], Sauvignon Blanc} -> {California} support: 0.005254265363591188
confidence: 0.39590614078881675
{(80, 85], Sauvignon Blanc} -> {California, US} support: 0.00525426536359
1188 confidence: 0.39590614078881675
{(85, 90], Portugal} -> {Portuguese Red} support: 0.00807023355971509 con
fidence: 0.3966134809508303
{(85, 90], Burgundy} -> {Pinot Noir} support: 0.005936723538181216 confid
ence: 0.3978685612788632
{(85, 90], Burgundy, France} -> {Pinot Noir} support: 0.00593672353818121
6 confidence: 0.3978685612788632
{(85, 90], Burgundy} -> {France, Pinot Noir} support: 0.00593672353818121
6 confidence: 0.3978685612788632
{(85, 90], Merlot} -> {California} support: 0.006347523604439291 confiden
ce: 0.39916666666666667
{(85, 90], Merlot} -> {California, US} support: 0.006347523604439291 conf
idence: 0.39916666666666667
{Mendoza Province} -> {Malbec} support: 0.012542653635911876 confidence:
0.3991986503584985
{Argentina, Mendoza Province} -> {Malbec} support: 0.012542653635911876 c
onfidence: 0.3991986503584985
{Mendoza Province} -> {Argentina, Malbec} support: 0.012542653635911876 c
onfidence: 0.3991986503584985
{(85, 90], Piedmont} -> {Nebbiolo} support: 0.00655954944508862 confidenc
e: 0.3998384491114701
{(85, 90], Italy, Piedmont} -> {Nebbiolo} support: 0.00655954944508862 co
nfidence: 0.3998384491114701
{(85, 90], Piedmont} -> {Italy, Nebbiolo} support: 0.00655954944508862 co
nfidence: 0.3998384491114701
{Tempranillo} -> {(85, 90], Spain} support: 0.006811330130859699 confiden
ce: 0.40219092331768386
{(85, 90], Argentina} -> {Malbec, Mendoza Province} support: 0.0068113301
30859699 confidence: 0.4026635330983157
{(85, 90], Red Blend} -> {Italy} support: 0.015603776710286565 confidenc
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{Sauvignon Blanc} -> {US} support: 0.017134338247473912 confidence: 0.409
17721518987343
{Burgundy} -> {Pinot Noir} support: 0.011813814808679808 confidence: 0.41
38811513463324
{Burgundy, France} -> {Pinot Noir} support: 0.011813814808679808 confiden
ce: 0.4138811513463324
{Burgundy} -> {France, Pinot Noir} support: 0.011813814808679808 confiden
ce: 0.4138811513463324
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara} support: 0.00744078
1845287394 confidence: 0.4146971935007385
{(85, 90], Italy, Veneto} -> {Corvina, Rondinella, Molinara} support: 0.0
07440781845287394 confidence: 0.4146971935007385
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara, Italy} support: 0.0
07440781845287394 confidence: 0.4146971935007385
{Mendoza Province} -> {(80, 85]} support: 0.01303296339241345 confidence:
0.41480388021931675
{Argentina, Mendoza Province} -> {(80, 85]} support: 0.01303296339241345
confidence: 0.41480388021931675
{Mendoza Province} -> {(80, 85], Argentina} support: 0.01303296339241345
confidence: 0.41480388021931675
{Portugal} -> {Portuguese Red} support: 0.014682789464966043 confidence:
0.4163848177376926
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{California, Merlot} -> {(85, 90]} support: 0.006347523604439291 confidence: 0.4177932839075447

{California, Merlot, US} -> {(85, 90]} support: 0.006347523604439291 confidence: 0.4177932839075447

{California, Merlot} -> {(85, 90], US} support: 0.006347523604439291 confidence: 0.4177932839075447

{Shiraz} -> {(85, 90], Australia} support: 0.005472917011760808 confidence: 0.41928934010152286

{(85, 90], Syrah} -> {California} support: 0.0083750207056485 confidence: 0.4214738246082027

{(85, 90], Syrah} -> {California, US} support: 0.0083750207056485 confidence: 0.4214738246082027

{Veneto} -> {Corvina, Rondinella, Molinara} support: 0.011144608249130362 confidence: 0.42453306410903585

{Italy, Veneto} -> {Corvina, Rondinella, Molinara} support: 0.011144608249130362 confidence: 0.42453306410903585

{Veneto} -> {Corvina, Rondinella, Molinara, Italy} support: 0.011144608249130362 confidence: 0.42453306410903585

{(85, 90], Chardonnay} -> {California} support: 0.020864667881398045 confidence: 0.42559805379105287

{(85, 90], Chardonnay} -> {California, US} support: 0.020864667881398045 confidence: 0.42559805379105287

{Argentina} -> {(80, 85]} support: 0.016120589696869306 confidence: 0.4320724560468833

{France, Pinot Noir} -> {(85, 90], Burgundy} support: 0.005936723538181216 confidence: 0.432223830197781

{Spain, Tempranillo} -> {(85, 90], Northern Spain} support: 0.006188504223952294 confidence: 0.4354312354312354

{Loire Valley} -> {Sauvignon Blanc} support: 0.005174755673347689 confidence: 0.43729003359462487

{France, Loire Valley} -> {Sauvignon Blanc} support: 0.005174755673347689 confidence: 0.43729003359462487

{Loire Valley} -> {France, Sauvignon Blanc} support: 0.005174755673347689 confidence: 0.43729003359462487

{(80, 85], Sauvignon Blanc} -> {US} support: 0.005804207387775385 confidence: 0.43734398402396407

{Chardonnay, France} -> {(85, 90], Burgundy} support: 0.008388272320689083 confidence: 0.43775933609958506

{California, Red Blend} -> {(85, 90]} support: 0.005174755673347689 confidence: 0.4380257992148065

{California, Red Blend, US} -> {(85, 90]} support: 0.005174755673347689 confidence: 0.4380257992148065

{California, Red Blend} -> {(85, 90], US} support: 0.005174755673347689 confidence: 0.4380257992148065

{Cabernet Sauvignon, California} -> {(85, 90]} support: 0.021726022859035944 confidence: 0.44001610305958133

{Cabernet Sauvignon, California, US} -> {(85, 90]} support: 0.021726022859035944 confidence: 0.44001610305958133

{Cabernet Sauvignon, California} -> {(85, 90], US} support: 0.021726022859035944 confidence: 0.44001610305958133

{Nebbiolo} -> {(85, 90], Piedmont} support: 0.00655954944508862 confidence: 0.44176706827309237

{Nebbiolo} -> {(85, 90], Italy, Piedmont} support: 0.00655954944508862 confidence: 0.44176706827309237

{Bordeaux-style Red Blend, US} -> {(85, 90]} support: 0.0053735298989564355 confidence: 0.44268558951965065

{Nebbiolo} -> {(85, 90], Italy} support: 0.006605930097730661 confidence: 0.44489067380633646

{(85, 90], Argentina} -> {Malbec} support: 0.007526917343051184 confidence: 0.44496670583627107

{(90, 95]} -> {US} support: 0.09203909226436972 confidence: 0.44850187265

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{Chardonnay} -> {California} support: 0.043306277952625476 confidence: 0.4513188786079271
{Chardonnay} -> {California, US} support: 0.043306277952625476 confidence: 0.4513188786079271
{Italy, Nebbiolo} -> {(85, 90], Piedmont} support: 0.00655954944508862 confidence: 0.4520547945205479
{Merlot} -> {California} support: 0.01519297664402849 confidence: 0.4522682445759369
{Merlot} -> {California, US} support: 0.01519297664402849 confidence: 0.4522682445759369
{Argentina} -> {(85, 90]} support: 0.01691568659930429 confidence: 0.4533830580713905
{Nebbiolo, Piedmont} -> {(85, 90]} support: 0.00655954944508862 confidence: 0.4537121906507791
{Italy, Nebbiolo, Piedmont} -> {(85, 90]} support: 0.00655954944508862 confidence: 0.4537121906507791
{Nebbiolo, Piedmont} -> {(85, 90], Italy} support: 0.00655954944508862 confidence: 0.4537121906507791
{Sauvignon Blanc, US} -> {(85, 90], California} support: 0.007798575451383137 confidence: 0.4551430781129157
{Italy, Nebbiolo} -> {(85, 90]} support: 0.006605930097730661 confidence: 0.4552511415525114
{Cabernet Sauvignon, US} -> {(85, 90]} support: 0.02774888189498095 confidence: 0.4563085639572892
{Bordeaux-style Red Blend, France} -> {(85, 90], Bordeaux} support: 0.01501407984098062 confidence: 0.4568548387096774
{Nebbiolo} -> {(85, 90]} support: 0.006804704323339407 confidence: 0.45827755466309683
{Zinfandel} -> {(85, 90], California} support: 0.011548782507868146 confidence: 0.4588049486707028
{Zinfandel} -> {(85, 90], California, US} support: 0.011548782507868146 confidence: 0.4588049486707028
{US, Zinfandel} -> {(85, 90], California} support: 0.011548782507868146 confidence: 0.4600158353127474
{(85, 90], Red Blend, US} -> {California} support: 0.005174755673347689 confidence: 0.46049528301886794
{California, Pinot Noir} -> {(85, 90]} support: 0.023422229584230576 confidence: 0.46312066029084237
{California, Pinot Noir, US} -> {(85, 90]} support: 0.023422229584230576 confidence: 0.46312066029084237
{California, Pinot Noir} -> {(85, 90], US} support: 0.023422229584230576 confidence: 0.46312066029084237
{(90, 95], Italy} -> {Tuscany} support: 0.015464634752360444 confidence: 0.4635551142005958
{Bordeaux} -> {(85, 90]} support: 0.01877753851250621 confidence: 0.4637538864342988
{Bordeaux, France} -> {(85, 90]} support: 0.01877753851250621 confidence: 0.4637538864342988
{Bordeaux} -> {(85, 90], France} support: 0.01877753851250621 confidence: 0.4637538864342988
{California, Merlot} -> {(80, 85]} support: 0.007049859201590194 confidence: 0.46402093327518534
{California, Merlot, US} -> {(80, 85]} support: 0.007049859201590194 confidence: 0.46402093327518534
{California, Merlot} -> {(80, 85], US} support: 0.007049859201590194 confidence: 0.46402093327518534
{Syrah} -> {California} support: 0.017922809342388605 confidence: 0.4643768240343347
{Syrah} -> {California, US} support: 0.017922809342388605 confidence: 0.4643768240343347
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{Mendoza Province} -> {(85, 90]} support: 0.014596653967202253 confidence: 0.4645719105862505
{Argentina, Mendoza Province} -> {(85, 90]} support: 0.014596653967202253 confidence: 0.4645719105862505
{Mendoza Province} -> {(85, 90], Argentina} support: 0.014596653967202253 confidence: 0.4645719105862505
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{(85, 90], Argentina, Mendoza Province} -> {Malbec} support: 0.006811330130859699 confidence: 0.4666364049024058
{(85, 90], Mendoza Province} -> {Argentina, Malbec} support: 0.006811330130859699 confidence: 0.4666364049024058
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{California, Syrah, US} -> {(85, 90]} support: 0.0083750207056485 confidence: 0.46728280961182994
{California, Syrah} -> {(85, 90], US} support: 0.0083750207056485 confidence: 0.46728280961182994
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{(80, 85], Chardonnay} -> {California, US} support: 0.011906576113963889 confidence: 0.46894572025052195
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{California} -> {(85, 90], US} support: 0.13849925459665396 confidence: 0.4696459063539139
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{(85, 90], Pinot Noir} -> {California, US} support: 0.023422229584230576 confidence: 0.47139618615815443
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{California, US, Zinfandel} -> {(85, 90]} support: 0.011548782507868146 confidence: 0.4722297480357627
{California, Zinfandel} -> {(85, 90], US} support: 0.011548782507868146 confidence: 0.4722297480357627
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90]} support: 0.01501407984098062 confidence: 0.4727727936574171
{Bordeaux, Bordeaux-style Red Blend, France} -> {(85, 90]} support: 0.01501407984098062 confidence: 0.4727727936574171
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90], France} support: 0.01501407984098062 confidence: 0.4727727936574171
{Merlot} -> {(85, 90]} support: 0.015901938048699684 confidence: 0.47337278106508873
{(85, 90], Red Blend, US} -> {Washington} support: 0.005327149246314395 confidence: 0.4740566037735849
{Rosé} -> {France} support: 0.008891833692231241 confidence: 0.4763933262335818
{Merlot, US} -> {(85, 90]} support: 0.011462647010104356 confidence: 0.4765840220385675
{Zinfandel} -> {(85, 90], US} support: 0.012012589034288553 confidence: 0.47723085022374306
{Bordeaux-style Red Blend} -> {(85, 90]} support: 0.023269836011263874 confidence: 0.4780182387368994
{US, Zinfandel} -> {(85, 90]} support: 0.012012589034288553 confidence: 0.478490366851412
{Bordeaux-style Red Blend, France} -> {(85, 90]} support: 0.0157429186682
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12688 confidence: 0.4790322580645161
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{Spain, Tempranillo} -> {(85, 90]} support: 0.006811330130859699 confidence: 0.47925407925407926
{Argentina, Malbec} -> {(85, 90], Mendoza Province} support: 0.006811330130859699 confidence: 0.47925407925407926
{California, Chardonnay} -> {(85, 90]} support: 0.020864667881398045 confidence: 0.4817931456548348
{California, Chardonnay, US} -> {(85, 90]} support: 0.020864667881398045 confidence: 0.4817931456548348
{California, Chardonnay} -> {(85, 90], US} support: 0.020864667881398045 confidence: 0.4817931456548348
{(90, 95], Red Blend} -> {Italy} support: 0.006963723703826404 confidence: 0.4834406623735051
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{Sangiovese} -> {(85, 90], Italy, Tuscany} support: 0.010800066258075202 confidence: 0.4872944693572496
{Tempranillo} -> {(85, 90]} support: 0.008255756170283254 confidence: 0.4874804381846635
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{(90, 95], Chardonnay} -> {California, US} support: 0.010091104853404009 confidence: 0.49528455284552847
{New Zealand} -> {Marlborough} support: 0.010965711446082492 confidence: 0.49849397590361444
{Germany} -> {(85, 90], Riesling} support: 0.008123240019877423 confidence: 0.5
{US} -> {(85, 90]} support: 0.20746065926784826 confidence: 0.5018029712966969
{Northern Spain} -> {(85, 90]} support: 0.01626635746231572 confidence: 0.5018397383483238
{Northern Spain, Spain} -> {(85, 90]} support: 0.01626635746231572 confidence: 0.5018397383483238
{Northern Spain} -> {(85, 90], Spain} support: 0.01626635746231572 confidence: 0.5018397383483238
{Burgundy, Pinot Noir} -> {(85, 90]} support: 0.005936723538181216 confidence: 0.5025238362310712
{Burgundy, France, Pinot Noir} -> {(85, 90]} support: 0.005936723538181216 confidence: 0.5025238362310712
{Burgundy, Pinot Noir} -> {(85, 90], France} support: 0.005936723538181216 confidence: 0.5025238362310712
{Nebbiolo} -> {(90, 95], Piedmont} support: 0.007467285075368561 confidence: 0.502900490852298
{Nebbiolo} -> {(90, 95], Italy, Piedmont} support: 0.007467285075368561 confidence: 0.502900490852298
{Pinot Noir, US} -> {(85, 90]} support: 0.03448070233559715 confidence: 0.5032882011605416
{Nebbiolo} -> {(90, 95], Italy} support: 0.007473910882888852 confidence: 0.5033467202141901
{Nebbiolo} -> {(90, 95]} support: 0.00750703992049031 confidence: 0.5055778670236502
{Red Blend, US} -> {(85, 90]} support: 0.011237369554414444 confidence: 0.5059665871121718

{Chardonnay, France} -> {(85, 90]} support: 0.009739937054828557 confidence: 0.508298755186722

{Chardonnay} -> {(85, 90]} support: 0.04902434984263707 confidence: 0.5109100952907057

{(85, 90], New Zealand} -> {Marlborough} support: 0.007884710949146927 confidence: 0.5118279569892473

{(80, 85], Red Blend} -> {US} support: 0.006579426867649495 confidence: 0.5123839009287926

{Spain} -> {(85, 90]} support: 0.02813980453867815 confidence: 0.5136671504596033

{Italy, Nebbiolo} -> {(90, 95], Piedmont} support: 0.007467285075368561 confidence: 0.5146118721461187

{Syrah} -> {(85, 90]} support: 0.019870796753354316 confidence: 0.5148497854077253

{Italy, Nebbiolo} -> {(90, 95]} support: 0.007473910882888852 confidence: 0.5150684931506849

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{Nebbiolo, Piedmont} -> {(90, 95], Italy} support: 0.007467285075368561 confidence: 0.5164986251145738

{Shiraz} -> {South Australia} support: 0.006758323670697366 confidence: 0.5177664974619289

{Shiraz} -> {Australia, South Australia} support: 0.006758323670697366 confidence: 0.5177664974619289

{Marlborough} -> {Sauvignon Blanc} support: 0.005698194467450721 confidence: 0.5196374622356495

{Marlborough, New Zealand} -> {Sauvignon Blanc} support: 0.005698194467450721 confidence: 0.5196374622356495

{Marlborough} -> {New Zealand, Sauvignon Blanc} support: 0.005698194467450721 confidence: 0.5196374622356495

{France, Pinot Noir} -> {(85, 90]} support: 0.007142620506874275 confidence: 0.5200192957067052

{Burgundy} -> {(85, 90]} support: 0.014921318535696539 confidence: 0.5227483751160631

{Burgundy, France} -> {(85, 90]} support: 0.014921318535696539 confidence: 0.5227483751160631

{Burgundy} -> {(85, 90], France} support: 0.014921318535696539 confidence: 0.5227483751160631

{Northern Spain, Tempranillo} -> {(85, 90]} support: 0.006188504223952294 confidence: 0.523542600896861

{Northern Spain, Spain, Tempranillo} -> {(85, 90]} support: 0.006188504223952294 confidence: 0.523542600896861

{Northern Spain, Tempranillo} -> {(85, 90], Spain} support: 0.006188504223952294 confidence: 0.523542600896861

{Pinot Noir} -> {(85, 90]} support: 0.04968693059466622 confidence: 0.5248460246360582

{Burgundy, Chardonnay} -> {(85, 90]} support: 0.008388272320689083 confidence: 0.5272802998750521

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{Burgundy, Chardonnay} -> {(85, 90], France} support: 0.008388272320689083 confidence: 0.5272802998750521

{(85, 90], Cabernet Sauvignon} -> {California} support: 0.021726022859035944 confidence: 0.5275945293644408

{(85, 90], Cabernet Sauvignon} -> {California, US} support: 0.021726022859035944 confidence: 0.5275945293644408

{Sangiovese} -> {(85, 90], Italy} support: 0.011721053503395727 confidence: 0.5288490284005979

{Argentina, Malbec} -> {(85, 90]} support: 0.007526917343051184 confidence:

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{California, Sauvignon Blanc} -> {(85, 90]} support: 0.007798575451383137
confidence: 0.5301801801801802
{California, Sauvignon Blanc, US} -> {(85, 90]} support: 0.00779857545138
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{California, Sauvignon Blanc} -> {(85, 90], US} support: 0.00779857545138
3137 confidence: 0.5301801801801802
{Red Blend, US} -> {California} support: 0.011813814808679808 confidence:
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{(80, 85], Merlot} -> {California} support: 0.007049859201590194 confiden
ce: 0.532
{(80, 85], Merlot} -> {California, US} support: 0.007049859201590194 conf
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{Piedmont} -> {Nebbiolo} support: 0.01445751200927613 confidence: 0.53310
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{Italy, Piedmont} -> {Nebbiolo} support: 0.01445751200927613 confidence:
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{Pinot Noir} -> {California} support: 0.05057478880238529 confidence: 0.5
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{Pinot Noir} -> {California, US} support: 0.05057478880238529 confidence:
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{France} -> {(85, 90]} support: 0.07501739274474077 confidence: 0.5366385
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{(85, 90], Italy, Red Blend} -> {Tuscany} support: 0.008381646513168792 c
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{(85, 90], Chardonnay} -> {US} support: 0.026417094583402353 confidence:
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{Sauvignon Blanc, US} -> {(85, 90]} support: 0.009282756335928441 confide
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{Malbec, Mendoza Province} -> {(85, 90]} support: 0.006811330130859699 co
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{Argentina, Malbec, Mendoza Province} -> {(85, 90]} support: 0.0068113301
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{Malbec, Mendoza Province} -> {(85, 90], Argentina} support: 0.0068113301
30859699 confidence: 0.5430533544638141
{Chile} -> {(85, 90]} support: 0.0210568162994865 confidence: 0.546423658
872077
{(90, 95], Burgundy} -> {Chardonnay} support: 0.005572304124565181 confid
ence: 0.548597521200261
{(90, 95], Burgundy, France} -> {Chardonnay} support: 0.00557230412456518
1 confidence: 0.548597521200261
{(90, 95], Burgundy} -> {Chardonnay, France} support: 0.00557230412456518
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{(85, 90], Rosé} -> {France} support: 0.005658439622328972 confidence: 0.
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{Portuguese Red} -> {(85, 90]} support: 0.00807023355971509 confidence:
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{Portugal, Portuguese Red} -> {(85, 90]} support: 0.00807023355971509 con
fidence: 0.5496389891696751
{Portuguese Red} -> {(85, 90], Portugal} support: 0.00807023355971509 con
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{Cabernet Sauvignon, Washington} -> {(85, 90]} support: 0.005400033129037
601 confidence: 0.550303848750844
{Cabernet Sauvignon, US, Washington} -> {(85, 90]} support: 0.00540003312
9037601 confidence: 0.550303848750844
{Cabernet Sauvignon, Washington} -> {(85, 90], US} support: 0.00540003312
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{(80, 85], Cabernet Sauvignon} -> {California} support: 0.011502401855226
106 confidence: 0.5511111111111111
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{(80, 85], Cabernet Sauvignon} -> {California, US} support: 0.01150240185
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{(85, 90], Merlot, US} -> {California} support: 0.006347523604439291 conf
idence: 0.553757225433526
{Shiraz} -> {(85, 90]} support: 0.007255259234719231 confidence: 0.555837
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{Oregon} -> {Pinot Noir} support: 0.016909060791784 confidence: 0.5561124
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{Oregon, US} -> {Pinot Noir} support: 0.016909060791784 confidence: 0.556
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{Oregon} -> {Pinot Noir, US} support: 0.016909060791784 confidence: 0.556
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{Malbec} -> {(85, 90]} support: 0.011933079344045056 confidence: 0.561408
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ence: 0.5621669626998224
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{(85, 90], Burgundy} -> {Chardonnay, France} support: 0.00838827232068908
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nfidence: 0.5707940033314826
{(85, 90], Malbec} -> {Argentina, Mendoza Province} support: 0.0068113301
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{(85, 90], Oregon, US} -> {Pinot Noir} support: 0.010495279112141792 conf
idence: 0.5708108108108109
{(85, 90], Oregon} -> {Pinot Noir, US} support: 0.010495279112141792 conf
idence: 0.5708108108108109
{Red Blend, Tuscany} -> {(85, 90]} support: 0.008381646513168792 confiden
ce: 0.5711060948081265
{Italy, Red Blend, Tuscany} -> {(85, 90]} support: 0.008381646513168792 c
onfidence: 0.5711060948081265
{Red Blend, Tuscany} -> {(85, 90], Italy} support: 0.008381646513168792 c
onfidence: 0.5711060948081265
{Alsace} -> {(85, 90]} support: 0.006360775219479874 confidence: 0.571428
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{Alsace, France} -> {(85, 90]} support: 0.006360775219479874 confidence:
0.5714285714285714
{Alsace} -> {(85, 90], France} support: 0.006360775219479874 confidence:
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{Rhône-style Red Blend} -> {France} support: 0.00573794931257247 confiden
ce: 0.5754152823920266
{Australia, Shiraz} -> {(85, 90]} support: 0.005472917011760808 confidenc
e: 0.5760111576011158
{Red Blend} -> {(85, 90]} support: 0.03845618684777207 confidence: 0.5768
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{Portugal} -> {(85, 90]} support: 0.020347854894815307 confidence: 0.5770
387072529124
{Tuscany} -> {(85, 90]} support: 0.027854894815305616 confidence: 0.57739
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{Italy, Tuscany} -> {(85, 90]} support: 0.027854894815305616 confidence:
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{(80, 85], Pinot Noir} -> {California} support: 0.009143614378002318 conf
idence: 0.5776475512766848
{(80, 85], Pinot Noir} -> {California, US} support: 0.009143614378002318
confidence: 0.5776475512766848
{(85, 90], Spain} -> {Northern Spain} support: 0.01626635746231572 confid
ence: 0.5780550977160348
{Sauvignon Blanc} -> {(85, 90]} support: 0.02436972005963227 confidence:
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{Cabernet Sauvignon} -> {California, US} support: 0.04937551764121252 con
fidence: 0.5821875
{(80, 85], Spain} -> {Northern Spain} support: 0.01126387278449561 confid
ence: 0.5851979345955249
{Germany, Riesling} -> {(85, 90]} support: 0.008123240019877423 confidenc
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{(90, 95], Chardonnay} -> {US} support: 0.011946330959085639 confidence: 0.5
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{New York} -> {(85, 90]} support: 0.009441775716415439 confidence: 0.5869028
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{Sparkling Blend} -> {(85, 90]} support: 0.007798575451383137 confidence: 0.
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{Malbec} -> {Mendoza Province} support: 0.012542653635911876 confidence: 0.5
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{Malbec} -> {Argentina, Mendoza Province} support: 0.012542653635911876 conf
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{(80, 85], Chardonnay} -> {US} support: 0.015000828225940037 confidence: 0.5
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{Spain} -> {Northern Spain} support: 0.03241345038926619 confidence: 0.59167
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{Washington} -> {(85, 90]} support: 0.03831704488984595 confidence: 0.593128
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{US, Washington} -> {(85, 90]} support: 0.03831704488984595 confidence: 0.59
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88 confidence: 0.6765375854214123
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7
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{Argentina, Malbec} -> {Mendoza Province} support: 0.012542653635911876 confidence: 0.8825174825174825
{Champagne Blend} -> {France} support: 0.007314891502401855 confidence: 0.8917609046849758
{Bordeaux-style White Blend, France} -> {Bordeaux} support: 0.00724863342719894 confidence: 0.9041322314049587
{(85, 90], Argentina, Malbec} -> {Mendoza Province} support: 0.006811330130859699 confidence: 0.9049295774647887
{(80, 85], Sauvignon Blanc, US} -> {California} support: 0.005254265363591188 confidence: 0.9052511415525114
{(85, 90], Spain, Tempranillo} -> {Northern Spain} support: 0.006188504223952294 confidence: 0.9085603112840467
{(90, 95], Piedmont} -> {Nebbiolo} support: 0.007467285075368561 confidence: 0.9118122977346278
{(90, 95], Italy, Piedmont} -> {Nebbiolo} support: 0.007467285075368561 confidence: 0.9118122977346278
{(90, 95], Piedmont} -> {Italy, Nebbiolo} support: 0.007467285075368561 confidence: 0.9118122977346278
{(85, 90], Italy, Sangiovese} -> {Tuscany} support: 0.010800066258075202 confidence: 0.9214245336348219
{Petite Sirah} -> {California} support: 0.005499420241841975 confidence: 0.9253065774804905
{Petite Sirah} -> {California, US} support: 0.005499420241841975 confidence: 0.9253065774804905
{Italy, Sangiovese} -> {Tuscany} support: 0.016776544641378167 confidence: 0.9301983835415136
{Petite Sirah, US} -> {California} support: 0.005499420241841975 confidence: 0.9453302961275627
{Grüner Veltliner} -> {Austria} support: 0.006579426867649495 confidence: 0.9529750479846449
{(85, 90], Bordeaux-style Red Blend, France} -> {Bordeaux} support: 0.01501407984098062 confidence: 0.9537037037037037
{Champagne Blend, France} -> {Champagne} support: 0.006976975318866987 confidence: 0.9538043478260869
{(85, 90], Zinfandel} -> {California} support: 0.011548782507868146 confidence: 0.9576923076923077
{(85, 90], Zinfandel} -> {California, US} support: 0.011548782507868146 confidence: 0.9576923076923077
{Bordeaux-style White Blend} -> {France} support: 0.008017227099552758 confidence: 0.9595559080095163
{(85, 90], US, Zinfandel} -> {California} support: 0.011548782507868146 confidence: 0.9613899613899614
{(85, 90], Nebbiolo} -> {Piedmont} support: 0.00655954944508862 confidence: 0.9639727361246349


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{(85, 90], Nebbiolo} -> {Italy, Piedmont} support: 0.00655954944508862 confidence: 0.9639727361246349
{Bordeaux-style Red Blend, France} -> {Bordeaux} support: 0.03175749544475733 confidence: 0.9663306451612903
{(85, 90], Nebbiolo} -> {Italy} support: 0.006605930097730661 confidence: 0.9707887049659202
{Zinfandel} -> {California} support: 0.02445585555739606 confidence: 0.9715714661753093
{Zinfandel} -> {California, US} support: 0.02445585555739606 confidence: 0.9715714661753093
{Nebbiolo} -> {Piedmont} support: 0.01445751200927613 confidence: 0.9736724676483712
{Nebbiolo} -> {Italy, Piedmont} support: 0.01445751200927613 confidence: 0.9736724676483712
{US, Zinfandel} -> {California} support: 0.02445585555739606 confidence: 0.9741356558458696
{Nebbiolo} -> {Italy} support: 0.014510518469438462 confidence: 0.9772423025435074
{Petite Sirah} -> {US} support: 0.0058174590028159685 confidence: 0.9788182831661093
{Mosel} -> {Riesling} support: 0.005128375020705648 confidence: 0.9859872611464968
{Germany, Mosel} -> {Riesling} support: 0.005128375020705648 confidence: 0.9859872611464968
{Mosel} -> {Germany, Riesling} support: 0.005128375020705648 confidence: 0.9859872611464968
{(80, 85], Zinfandel} -> {California} support: 0.009044227265197945 confidence: 0.9869848156182213
{(80, 85], Zinfandel} -> {California, US} support: 0.009044227265197945 confidence: 0.9869848156182213
{(90, 95], Bordeaux-style Red Blend, France} -> {Bordeaux} support: 0.011681298658273977 confidence: 0.9871220604703248
{(80, 85], US, Zinfandel} -> {California} support: 0.009044227265197945 confidence: 0.9891304347826086
{(85, 90], Barbera, Italy} -> {Piedmont} support: 0.006122246148749379 confidence: 0.9892933618843683
{Barbera, Italy} -> {Piedmont} support: 0.007228756004638065 confidence: 0.9909173478655767
{(85, 90], Italy, Nebbiolo} -> {Piedmont} support: 0.00655954944508862 confidence: 0.9929789368104313
{(90, 95], Nebbiolo} -> {Piedmont} support: 0.007467285075368561 confidence: 0.9947043248014121
{(90, 95], Nebbiolo} -> {Italy, Piedmont} support: 0.007467285075368561 confidence: 0.9947043248014121
{(90, 95], Nebbiolo} -> {Italy} support: 0.007473910882888852 confidence: 0.9955869373345102
{(85, 90], Zinfandel} -> {US} support: 0.012012589034288553 confidence: 0.9961538461538462
{Italy, Nebbiolo} -> {Piedmont} support: 0.01445751200927613 confidence: 0.9963470319634703
{Zinfandel} -> {US} support: 0.02510518469438463 confidence: 0.9973677283495657
{(80, 85], Zinfandel} -> {US} support: 0.009143614378002318 confidence: 0.9978308026030369
{(90, 95], Italy, Nebbiolo} -> {Piedmont} support: 0.007467285075368561 confidence: 0.999113475177305
{Sangiovese Grosso} -> {Italy} support: 0.00891171114792116 confidence: 0.9992570579494799
{Sangiovese Grosso} -> {Tuscany} support: 0.00891171114792116 confidence: 0.9992570579494799
{Sangiovese Grosso} -> {Italy, Tuscany} support: 0.00891171114792116 confid
```

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ence: 0.9992570579494799
{California} -> {US} support: 0.29490144111313565 confidence: 1.0
{Northern Spain} -> {Spain} support: 0.03241345038926619 confidence: 1.0
{Oregon} -> {US} support: 0.030405830710617858 confidence: 1.0
{Provence} -> {France} support: 0.0067649494782176574 confidence: 1.0
{Northeastern Italy} -> {Italy} support: 0.013132350505217823 confidence: 1.0
{Southwest France} -> {France} support: 0.010607917839986748 confidence: 1.0
{Washington} -> {US} support: 0.06460162332284247 confidence: 1.0
{Tuscany} -> {Italy} support: 0.04824250455524267 confidence: 1.0
{Rhône Valley} -> {France} support: 0.008732814311744243 confidence: 1.0
{Burgundy} -> {France} support: 0.028543978797415936 confidence: 1.0
{Loire Valley} -> {France} support: 0.011833692231240683 confidence: 1.0
{New York} -> {US} support: 0.01608746065926785 confidence: 1.0
{Mendoza Province} -> {Argentina} support: 0.03141957926122246 confidence: 1.0
{Alentejano} -> {Portugal} support: 0.005777704157694219 confidence: 1.0
{Portuguese Red} -> {Portugal} support: 0.014682789464966043 confidence: 1.0
{Piedmont} -> {Italy} support: 0.027119430180553256 confidence: 1.0
{Champagne} -> {France} support: 0.009077356302799404 confidence: 1.0
{Veneto} -> {Italy} support: 0.026251449395395064 confidence: 1.0
{Douro} -> {Portugal} support: 0.007122743084313401 confidence: 1.0
{Sicily & Sardinia} -> {Italy} support: 0.016862680139141956 confidence: 1.0
{Southern Italy} -> {Italy} support: 0.00953453702169952 confidence: 1.0
{Languedoc-Roussillon} -> {France} support: 0.0071691237369554415 confidence: 1.0
{Bordeaux} -> {France} support: 0.04049030975650157 confidence: 1.0
{Catalonia} -> {Spain} support: 0.008958091767434156 confidence: 1.0
{Colchagua Valley} -> {Chile} support: 0.007957594831870134 confidence: 1.0
{Alsace} -> {France} support: 0.01113135663408978 confidence: 1.0
{Portuguese White} -> {Portugal} support: 0.006234884876594335 confidence: 1.0
{Mosel} -> {Germany} support: 0.005201258903428855 confidence: 1.0
{Other} -> {Argentina} support: 0.005890342885539175 confidence: 1.0
{Burgenland} -> {Austria} support: 0.005062116945502733 confidence: 1.0
{South Australia} -> {Australia} support: 0.019903925790955772 confidence: 1.0
{Maipo Valley} -> {Chile} support: 0.005930097730660925 confidence: 1.0
{Casablanca Valley} -> {Chile} support: 0.0051615040583071065 confidence: 1.0
{Marlborough} -> {New Zealand} support: 0.010965711446082492 confidence: 1.0
{Central Italy} -> {Italy} support: 0.010137485506046049 confidence: 1.0
{Corvina, Rondinella, Molinara} -> {Italy} support: 0.011144608249130362 confidence: 1.0
{Corvina, Rondinella, Molinara} -> {Veneto} support: 0.011144608249130362 confidence: 1.0
{Cabernet Sauvignon, California} -> {US} support: 0.04937551764121252 confidence: 1.0
{California, Sauvignon Blanc} -> {US} support: 0.01470929269504721 confidence: 1.0
{Oregon, Pinot Noir} -> {US} support: 0.016909060791784 confidence: 1.0
{{90, 95], Oregon} -> {US} support: 0.007261885042239523 confidence: 1.0
{{90, 95], California} -> {US} support: 0.06621169455027331 confidence: 1.0
{California, Pinot Noir} -> {US} support: 0.05057478880238529 confidence: 1.0
{Northern Spain, Tempranillo} -> {Spain} support: 0.0118204406162001 confidence: 1.0
{California, Chardonnay} -> {US} support: 0.043306277952625476 confidence: 1.0
{{90, 95], Washington} -> {US} support: 0.01808845453039589 confidence: 1.0
{Syrah, Washington} -> {US} support: 0.009130362762961737 confidence: 1.0

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```
{(85, 90], California} -> {US} support: 0.13849925459665396 confidence: 1.0
{(85, 90], Tuscany} -> {Italy} support: 0.027854894815305616 confidence: 1.0
{Sangiovese, Tuscany} -> {Italy} support: 0.016776544641378167 confidence:
1.0
{(85, 90], Washington} -> {US} support: 0.03831704488984595 confidence: 1.0
{(85, 90], Rhône Valley} -> {France} support: 0.0054132847440781845 confiden
ce: 1.0
{Red Blend, Tuscany} -> {Italy} support: 0.014676163657445751 confidence: 1.
0
{Cabernet Sauvignon, Washington} -> {US} support: 0.009812820937551764 confi
dence: 1.0
{(85, 90], Burgundy} -> {France} support: 0.014921318535696539 confidence:
1.0
{Burgundy, Chardonnay} -> {France} support: 0.015908563856219977 confidence:
1.0
{(85, 90], Loire Valley} -> {France} support: 0.007685936723538182 confidenc
e: 1.0
{Loire Valley, Sauvignon Blanc} -> {France} support: 0.005174755673347689 co
nfidence: 1.0
{(85, 90], New York} -> {US} support: 0.009441775716415439 confidence: 1.0
{Malbec, Mendoza Province} -> {Argentina} support: 0.012542653635911876 conf
idence: 1.0
{(90, 95], Burgundy} -> {France} support: 0.010157362928606924 confidence:
1.0
{California, Syrah} -> {US} support: 0.017922809342388605 confidence: 1.0
{(90, 95], Piedmont} -> {Italy} support: 0.008189498095080338 confidence: 1.
0
{Nebbiolo, Piedmont} -> {Italy} support: 0.01445751200927613 confidence: 1.0
{(85, 90], Veneto} -> {Italy} support: 0.017942686764949478 confidence: 1.0
{(85, 90], Portuguese Red} -> {Portugal} support: 0.00807023355971509 confid
ence: 1.0
{(85, 90], Southwest France} -> {France} support: 0.006433659102203081 confi
dence: 1.0
{(85, 90], Mendoza Province} -> {Argentina} support: 0.014596653967202253 co
nfidence: 1.0
{California, Zinfandel} -> {US} support: 0.02445585555739606 confidence: 1.0
{(85, 90], Northern Spain} -> {Spain} support: 0.01626635746231572 confidenc
e: 1.0
{(85, 90], Sicily & Sardinia} -> {Italy} support: 0.01286069239688587 confid
ence: 1.0
{(85, 90], Southern Italy} -> {Italy} support: 0.007122743084313401 confiden
ce: 1.0
{(85, 90], Bordeaux} -> {France} support: 0.01877753851250621 confidence: 1.
0
{(85, 90], Oregon} -> {US} support: 0.018386615868809013 confidence: 1.0
{(85, 90], Catalonia} -> {Spain} support: 0.005525923471923141 confidence:
1.0
{Bordeaux-style Red Blend, California} -> {US} support: 0.007487162497929435
confidence: 1.0
{Bordeaux, Bordeaux-style Red Blend} -> {France} support: 0.0317574954447573
3 confidence: 1.0
{Merlot, Washington} -> {US} support: 0.006208381646513169 confidence: 1.0
{(90, 95], Bordeaux} -> {France} support: 0.014517144276958754 confidence:
1.0
{Bordeaux, Bordeaux-style White Blend} -> {France} support: 0.00724863342719
894 confidence: 1.0
{California, Merlot} -> {US} support: 0.01519297664402849 confidence: 1.0
{(85, 90], Piedmont} -> {Italy} support: 0.016405499420241842 confidence: 1.
0
{California, Red Blend} -> {US} support: 0.011813814808679808 confidence: 1.
0
```

```

{Burgundy, Pinot Noir} -> {France} support: 0.011813814808679808 confidence: 1.0
{Provence, Rosé} -> {France} support: 0.005777704157694219 confidence: 1.0
{Mosel, Riesling} -> {Germany} support: 0.005128375020705648 confidence: 1.0
{(85, 90], Alsace} -> {France} support: 0.006360775219479874 confidence: 1.0
{(85, 90], South Australia} -> {Australia} support: 0.012463143945668378 confidence: 1.0
{Barbera, Piedmont} -> {Italy} support: 0.007228756004638065 confidence: 1.0
{(80, 85], California} -> {US} support: 0.08510849759814477 confidence: 1.0
{(80, 85], Mendoza Province} -> {Argentina} support: 0.01303296339241345 confidence: 1.0
{(80, 85], Northern Spain} -> {Spain} support: 0.01126387278449561 confidence: 1.0
{Shiraz, South Australia} -> {Australia} support: 0.006758323670697366 confidence: 1.0
{(90, 95], Tuscany} -> {Italy} support: 0.015464634752360444 confidence: 1.0
{Red Blend, Washington} -> {US} support: 0.008772569156865993 confidence: 1.0
{Marlborough, Sauvignon Blanc} -> {New Zealand} support: 0.005698194467450721 confidence: 1.0
{Champagne, Champagne Blend} -> {France} support: 0.006976975318866987 confidence: 1.0
{(80, 85], Washington} -> {US} support: 0.007526917343051184 confidence: 1.0
{(80, 85], New York} -> {US} support: 0.006089117111147921 confidence: 1.0
{California, Petite Sirah} -> {US} support: 0.005499420241841975 confidence: 1.0
{(85, 90], Northeastern Italy} -> {Italy} support: 0.009998343548119928 confidence: 1.0
{(85, 90], Central Italy} -> {Italy} support: 0.006778201093258241 confidence: 1.0
{(80, 85], Bordeaux} -> {France} support: 0.005525923471923141 confidence: 1.0
{(85, 90], Marlborough} -> {New Zealand} support: 0.007884710949146927 confidence: 1.0
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy} support: 0.007440781845287394 confidence: 1.0
{(85, 90], Corvina, Rondinella, Molinara} -> {Veneto} support: 0.007440781845287394 confidence: 1.0
{Corvina, Rondinella, Molinara, Veneto} -> {Italy} support: 0.011144608249130362 confidence: 1.0
{Corvina, Rondinella, Molinara, Italy} -> {Veneto} support: 0.011144608249130362 confidence: 1.0
{Corvina, Rondinella, Molinara} -> {Italy, Veneto} support: 0.011144608249130362 confidence: 1.0
{Sangiovese Grosso, Tuscany} -> {Italy} support: 0.008911711114792116 confidence: 1.0
{Italy, Sangiovese Grosso} -> {Tuscany} support: 0.008911711114792116 confidence: 1.0
{(90, 95], California, Pinot Noir} -> {US} support: 0.016988570482027496 confidence: 1.0
{(90, 95], Cabernet Sauvignon, California} -> {US} support: 0.014961073380818287 confidence: 1.0
{(90, 95], California, Chardonnay} -> {US} support: 0.010091104853404009 confidence: 1.0
{(85, 90], California, Chardonnay} -> {US} support: 0.020864667881398045 confidence: 1.0
{(85, 90], Sangiovese, Tuscany} -> {Italy} support: 0.010800066258075202 confidence: 1.0
{(85, 90], Red Blend, Tuscany} -> {Italy} support: 0.008381646513168792 confidence: 1.0
{(85, 90], Cabernet Sauvignon, California} -> {US} support: 0.02172602285903

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5944 confidence: 1.0
{(85, 90], Cabernet Sauvignon, Washington} -> {US} support: 0.00540003312903
7601 confidence: 1.0
{(85, 90], Burgundy, Chardonnay} -> {France} support: 0.008388272320689083 c
onfidence: 1.0
{(90, 95], Burgundy, Chardonnay} -> {France} support: 0.005572304124565181 c
onfidence: 1.0
{(90, 95], Nebbiolo, Piedmont} -> {Italy} support: 0.007467285075368561 conf
idence: 1.0
{(85, 90], Malbec, Mendoza Province} -> {Argentina} support: 0.0068113301308
59699 confidence: 1.0
{(85, 90], California, Zinfandel} -> {US} support: 0.011548782507868146 conf
idence: 1.0
{(85, 90], Northern Spain, Tempranillo} -> {Spain} support: 0.00618850422395
2294 confidence: 1.0
{(85, 90], California, Sauvignon Blanc} -> {US} support: 0.00779857545138313
7 confidence: 1.0
{(85, 90], California, Pinot Noir} -> {US} support: 0.023422229584230576 con
fidence: 1.0
{(85, 90], California, Syrah} -> {US} support: 0.0083750207056485 confidenc
e: 1.0
{(85, 90], Oregon, Pinot Noir} -> {US} support: 0.010495279112141792 confide
nce: 1.0
{(85, 90], Bordeaux, Bordeaux-style Red Blend} -> {France} support: 0.015014
07984098062 confidence: 1.0
{(85, 90], California, Merlot} -> {US} support: 0.006347523604439291 confide
nce: 1.0
{(85, 90], Nebbiolo, Piedmont} -> {Italy} support: 0.00655954944508862 confi
dence: 1.0
{(85, 90], California, Red Blend} -> {US} support: 0.005174755673347689 conf
idence: 1.0
{(90, 95], Bordeaux, Bordeaux-style Red Blend} -> {France} support: 0.011681
298658273977 confidence: 1.0
{(85, 90], Burgundy, Pinot Noir} -> {France} support: 0.005936723538181216 c
onfidence: 1.0
{(85, 90], Barbera, Piedmont} -> {Italy} support: 0.006122246148749379 confi
dence: 1.0
{(80, 85], Cabernet Sauvignon, California} -> {US} support: 0.01150240185522
6106 confidence: 1.0
{(80, 85], California, Merlot} -> {US} support: 0.007049859201590194 confide
nce: 1.0
{(80, 85], California, Chardonnay} -> {US} support: 0.011906576113963889 con
fidence: 1.0
{(90, 95], Red Blend, Tuscany} -> {Italy} support: 0.005267516978631771 conf
idence: 1.0
{(85, 90], Red Blend, Washington} -> {US} support: 0.005327149246314395 conf
idence: 1.0
{(80, 85], California, Zinfandel} -> {US} support: 0.009044227265197945 conf
idence: 1.0
{(80, 85], California, Pinot Noir} -> {US} support: 0.009143614378002318 con
fidence: 1.0
{(80, 85], California, Sauvignon Blanc} -> {US} support: 0.00525426536359118
8 confidence: 1.0
{(85, 90], Corvina, Rondinella, Molinara, Veneto} -> {Italy} support: 0.0074
40781845287394 confidence: 1.0
{(85, 90], Corvina, Rondinella, Molinara, Italy} -> {Veneto} support: 0.0074
40781845287394 confidence: 1.0
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy, Veneto} support: 0.0074
40781845287394 confidence: 1.0

In [19]:

```
print("使用Lift、卡方对规则进行评价：")
for rule in sorted(rules, key=lambda rule: rule.confidence):
    print(repr(rule), 'lift:', rule.lift, 'conviction:', rule.conviction)
```

使用Lift、卡方对规则进行评价：

```
{Cabernet Sauvignon, US} -> {(90, 95]} lift: 1.4643272435218484 conviction: 1.1362213725908485
{(85, 90], Tuscany} -> {Red Blend} lift: 4.513857595215333 conviction: 1.3350635922594771
{(85, 90], Italy, Tuscany} -> {Red Blend} lift: 4.513857595215333 conviction: 1.3350635922594771
{(85, 90], Tuscany} -> {Italy, Red Blend} lift: 12.217896493263778 conviction: 1.395189979621004
{Piedmont} -> {(90, 95]} lift: 1.4715284399433435 conviction: 1.1386268826697599
{Italy, Piedmont} -> {(90, 95]} lift: 1.4715284399433435 conviction: 1.1386268826697599
{Piedmont} -> {(90, 95], Italy} lift: 9.05187265976668 conviction: 1.3848280235816637
{Cabernet Sauvignon, California} -> {(90, 95]} lift: 1.476532549719037 conviction: 1.1403044780744738
{Cabernet Sauvignon, California, US} -> {(90, 95]} lift: 1.476532549719037 conviction: 1.1403044780744738
{Cabernet Sauvignon, California} -> {(90, 95], US} lift: 3.292143555532216 conviction: 1.3026809154290218
{Rosé} -> {(85, 90], France} lift: 4.0411880275940915 conviction: 1.3273948043294928
{Tuscany} -> {Red Blend} lift: 4.563549178741991 conviction: 1.3414196904664089
{Italy, Tuscany} -> {Red Blend} lift: 4.563549178741991 conviction: 1.3414196904664089
{Tuscany} -> {Italy, Red Blend} lift: 12.35239932400408 conviction: 1.4018323332730798
{(85, 90], Pinot Noir, US} -> {Oregon} lift: 10.010620926390665 conviction: 1.3938585772730123
{Sauvignon Blanc, US} -> {(80, 85], California} lift: 3.6030620609762964 conviction: 1.3195256117116034
{(85, 90], Riesling} -> {US} lift: 0.7423630716247794 conviction: 0.8463174766133548
{Tempranillo} -> {(80, 85], Spain} lift: 15.955993659412972 conviction: 1.4154727176163375
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux} lift: 16.425220343033644 conviction: 1.418823344641709
{Bordeaux-style Red Blend} -> {(85, 90], Bordeaux, France} lift: 16.425220343033644 conviction: 1.418823344641709
{Rosé} -> {Provence} lift: 45.757794167703636 conviction: 1.4385311739164621
{Rosé} -> {France, Provence} lift: 45.757794167703636 conviction: 1.4385311739164621
{Italy} -> {Tuscany} lift: 6.4283584632421835 conviction: 1.379598842110378
{Germany} -> {Mosel, Riesling} lift: 61.55179445350734 conviction: 1.4537694999312198
{Sauvignon Blanc} -> {(80, 85]} lift: 1.3781864627680622 conviction: 1.1273200775354701
{Pinot Noir, US} -> {(90, 95]} lift: 1.547185112728012 conviction: 1.1645291128238335
{(85, 90], Sauvignon Blanc} -> {California} lift: 1.0851451734785977 conviction: 1.0851451734785977
```

```

iction: 1.036926227817702
{(85, 90], Sauvignon Blanc} -> {California, US} lift: 1.0851451734785977
conviction: 1.036926227817702
{Germany} -> {Mosel} lift: 61.55179445350734 conviction: 1.46325525469759
48
{Malbec} -> {(85, 90], Mendoza Province} lift: 21.95358460408217 convicti
on: 1.4500797841382385
{Malbec} -> {(85, 90], Argentina, Mendoza Province} lift: 21.953584604082
17 conviction: 1.4500797841382385
{Tuscany} -> {(90, 95]} lift: 1.5620745422809956 conviction: 1.1697661492
61766
{Italy, Tuscany} -> {(90, 95]} lift: 1.5620745422809956 conviction: 1.169
766149261766
{Tuscany} -> {(90, 95], Italy} lift: 9.608852576668717 conviction: 1.4227
004202962747
{Syrah, US} -> {Washington} lift: 4.990812665730775 conviction: 1.3804877
955863144
{(90, 95]} -> {California} lift: 1.0940816698664884 conviction: 1.0409606
050623639
{(90, 95]} -> {California, US} lift: 1.0940816698664884 conviction: 1.040
9606050623639
{Bordeaux-style Red Blend} -> {(85, 90], France} lift: 4.310964340268018
conviction: 1.36709861304774
{Austria} -> {Grüner Veltliner} lift: 47.04866179819514 conviction: 1.470
878967046139
{Cabernet Sauvignon} -> {(85, 90], US} lift: 1.5771062386222094 convictio
n: 1.1779497847531102
{(90, 95], Chardonnay} -> {France} lift: 2.347285644152299 conviction: 1.
2803203234965872
{Red Blend} -> {US} lift: 0.8058613663601086 conviction: 0.87963565531244
83
{US} -> {(85, 90], California} lift: 2.4187861595910056 conviction: 1.295
4899968693763
{California, Pinot Noir} -> {(90, 95]} lift: 1.6368718966847982 convictio
n: 1.1968036362354153
{California, Pinot Noir, US} -> {(90, 95]} lift: 1.6368718966847982 convi
ction: 1.1968036362354153
{California, Pinot Noir} -> {(90, 95], US} lift: 3.6496433938608863 convi
ction: 1.3672254090175644
{Argentina} -> {Malbec, Mendoza Province} lift: 26.802521754572897 convic
tion: 1.4875260323702304
{New Zealand} -> {Sauvignon Blanc} lift: 8.041699233643435 conviction: 1.
444584310395193
{(85, 90], New Zealand} -> {Sauvignon Blanc} lift: 8.042348917925684 conv
iction: 1.4446435674046951
{Sauvignon Blanc, US} -> {(80, 85]} lift: 1.473057482135667 conviction:
1.1645137540546728
{South Australia} -> {Shiraz} lift: 26.013285162929968 conviction: 1.4943
494262614876
{Australia, South Australia} -> {Shiraz} lift: 26.013285162929968 convict
ion: 1.4943494262614876
{South Australia} -> {Australia, Shiraz} lift: 35.73652145813949 convicti
on: 1.4997266965275153
{Italy, Red Blend} -> {(85, 90], Tuscany} lift: 12.217896493263778 convic
tion: 1.4736799961230997
{(90, 95], Tuscany} -> {Red Blend} lift: 5.10959305051525 conviction: 1.4
15471284244829
{(90, 95], Italy, Tuscany} -> {Red Blend} lift: 5.10959305051525 convicti
on: 1.415471284244829
{(90, 95], Tuscany} -> {Italy, Red Blend} lift: 13.830405079697051 convic
tion: 1.4792189403333198

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{Merlot} -> {(85, 90], US} lift: 1.6447594492788735 conviction: 1.2030462
429378936
{Pinot Noir, US} -> {(85, 90], California} lift: 2.4684335658925987 convi
ction: 1.3090253775070209
{Oregon} -> {(85, 90], Pinot Noir} lift: 6.946962435116285 conviction: 1.
451243483807428
{Oregon, US} -> {(85, 90], Pinot Noir} lift: 6.946962435116285 convictio
n: 1.451243483807428
{Oregon} -> {(85, 90], Pinot Noir, US} lift: 10.010620926390665 convictio
n: 1.4744652413363142
{Northern Spain} -> {(80, 85]} lift: 1.5111465422451016 conviction: 1.180
146106380471
{Northern Spain, Spain} -> {(80, 85]} lift: 1.5111465422451016 convictio
n: 1.180146106380471
{Northern Spain} -> {(80, 85], Spain} lift: 18.054169721755848 convictio
n: 1.503082368191135
{Tuscany} -> {Sangiovese} lift: 15.690534304224458 conviction: 1.49918484
1302832
{Italy, Tuscany} -> {Sangiovese} lift: 15.690534304224458 conviction: 1.4
99184841302832
{Tuscany} -> {Italy, Sangiovese} lift: 19.28171831286951 conviction: 1.50
55135589890472
{Chardonnay, France} -> {(90, 95]} lift: 1.7001404940955014 conviction:
1.2206689495753646
{Argentina} -> {(80, 85], Mendoza Province} lift: 26.8025217545729 convic
tion: 1.5168153314945778
{White Blend} -> {Italy} lift: 2.251291260675113 conviction: 1.2995621548
899343
{Burgundy, Chardonnay} -> {(90, 95]} lift: 1.7068516239332239 conviction:
1.2232563828898182
{Burgundy, Chardonnay, France} -> {(90, 95]} lift: 1.7068516239332239 con
viction: 1.2232563828898182
{Burgundy, Chardonnay} -> {(90, 95], France} lift: 8.601465749505339 conv
iction: 1.4764268993556227
{Sauvignon Blanc} -> {California} lift: 1.1911295565695488 conviction: 1.
0868836305599703
{Sauvignon Blanc} -> {California, US} lift: 1.1911295565695488 convictio
n: 1.0868836305599703
{Spain} -> {(80, 85]} lift: 1.527881869855867 conviction: 1.1871480491702
373
{Malbec} -> {(85, 90], Argentina} lift: 20.93410226880898 conviction: 1.5
220726218661307
{Bordeaux-style Red Blend, France} -> {(90, 95], Bordeaux} lift: 24.48439
86948072 conviction: 1.5289317975610834
{Burgundy} -> {(90, 95]} lift: 1.7340371364269351 conviction: 1.233850768
782344
{Burgundy, France} -> {(90, 95]} lift: 1.7340371364269351 conviction: 1.2
33850768782344
{Burgundy} -> {(90, 95], France} lift: 8.738463747057443 conviction: 1.48
92139459083056
{(90, 95], France} -> {Bordeaux} lift: 8.804378861972268 conviction: 1.49
10610738489205
{California, Sauvignon Blanc} -> {(80, 85]} lift: 1.5533321159347608 conv
iction: 1.1979569556927345
{California, Sauvignon Blanc, US} -> {(80, 85]} lift: 1.5533321159347608
conviction: 1.1979569556927345
{California, Sauvignon Blanc} -> {(80, 85], US} lift: 3.319469105827704 c
onviction: 1.388301593733503
{Cabernet Sauvignon, US} -> {(85, 90], California} lift: 2.57956174243892
8 conviction: 1.340371898459057
{Syrah} -> {(85, 90], US} lift: 1.7269937494028826 conviction: 1.23502986

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96015878
{New Zealand} -> {(85, 90], Marlborough} lift: 45.45933734939759 conviction: 1.5463956593966193
{Bordeaux} -> {(90, 95]} lift: 1.747117153741494 conviction: 1.2390138057780664
{Bordeaux, France} -> {(90, 95]} lift: 1.747117153741494 conviction: 1.2390138057780664
{Bordeaux} -> {(90, 95], France} lift: 8.804378861972268 conviction: 1.4954455477290496
{Red Blend, Tuscany} -> {(90, 95]} lift: 1.74898196842178 conviction: 1.23975342003911
{Italy, Red Blend, Tuscany} -> {(90, 95]} lift: 1.74898196842178 conviction: 1.23975342003911
{Red Blend, Tuscany} -> {(90, 95], Italy} lift: 10.758583818462636 conviction: 1.507820783552773
{Zinfandel} -> {(80, 85], California} lift: 4.221729796956462 conviction: 1.4279674659818404
{Zinfandel} -> {(80, 85], California, US} lift: 4.221729796956462 conviction: 1.4279674659818404
{Bordeaux-style Red Blend, France} -> {(90, 95]} lift: 1.7546548938062685 conviction: 1.2420088285028443
{US, Zinfandel} -> {(80, 85], California} lift: 4.232871865568118 conviction: 1.4300841159991917
{Bordeaux-style Red Blend} -> {(90, 95]} lift: 1.7695698873753662 conviction: 1.2479779829134239
{Zinfandel} -> {(80, 85], US} lift: 3.375656218223537 conviction: 1.4014843293323234
{Zinfandel} -> {(80, 85]} lift: 1.5830586141072696 conviction: 1.2108339119188607
{US, Zinfandel} -> {(80, 85]} lift: 1.5837936225350457 conviction: 1.211155811632596
{Pinot Noir} -> {(85, 90], US} lift: 1.7556182738908432 conviction: 1.2465656189531105
{Northern Spain} -> {Tempranillo} lift: 21.533208060939454 conviction: 1.5473459502044464
{Northern Spain, Spain} -> {Tempranillo} lift: 21.533208060939454 conviction: 1.5473459502044464
{Northern Spain} -> {Spain, Tempranillo} lift: 25.659151423664916 conviction: 1.5516322848534232
{Tempranillo} -> {(80, 85]} lift: 1.5890228247894862 conviction: 1.2134509102290663
{Tempranillo} -> {(85, 90], Northern Spain} lift: 22.464446101820243 conviction: 1.5501992517657288
{Tempranillo} -> {(85, 90], Northern Spain, Spain} lift: 22.464446101820243 conviction: 1.5501992517657288
{(90, 95], Red Blend} -> {Tuscany} lift: 7.580148998407596 conviction: 1.5004501753697779
{(90, 95], Red Blend} -> {Italy, Tuscany} lift: 7.580148998407596 conviction: 1.5004501753697779
{Spain, Tempranillo} -> {(80, 85]} lift: 1.5914260727987066 conviction: 1.2145086165061634
{Rosé} -> {(80, 85]} lift: 1.5930777023893283 conviction: 1.2152365936977256
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95]} lift: 1.7924077673220065 conviction: 1.2572299818676809
{Bordeaux, Bordeaux-style Red Blend, France} -> {(90, 95]} lift: 1.7924077673220065 conviction: 1.2572299818676809
{Bordeaux, Bordeaux-style Red Blend} -> {(90, 95], France} lift: 9.032615256995962 conviction: 1.5174318236711126
{Red Blend} -> {Italy} lift: 2.3749337449429677 conviction: 1.3392029781944494
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{Germany, Riesling} -> {Mosel} lift: 71.06500830398043 conviction: 1.5781125458724639
{California, Zinfandel} -> {(80, 85]} lift: 1.608172809467392 conviction: 1.2219306176523255
{California, US, Zinfandel} -> {(80, 85]} lift: 1.608172809467392 conviction: 1.2219306176523255
{California, Zinfandel} -> {(80, 85], US} lift: 3.4366636105033415 conviction: 1.4160844560041113
{(80, 85]} -> {California} lift: 1.2549896320489207 conviction: 1.1193786316181562
{(80, 85]} -> {California, US} lift: 1.2549896320489207 conviction: 1.1193786316181562
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend} lift: 15.93508186999134 conviction: 1.5523531918462254
{Bordeaux, France} -> {(85, 90], Bordeaux-style Red Blend} lift: 15.93508186999134 conviction: 1.5523531918462254
{Bordeaux} -> {(85, 90], Bordeaux-style Red Blend, France} lift: 23.553875221973733 conviction: 1.5643159985589123
{Chile} -> {(80, 85]} lift: 1.620237285891334 conviction: 1.2273339471408387
{(85, 90], Piedmont} -> {Barbera} lift: 41.26196097924693 conviction: 1.5809320163511484
{(85, 90], Italy, Piedmont} -> {Barbera} lift: 41.26196097924693 conviction: 1.5809320163511484
{(85, 90], Piedmont} -> {Barbera, Italy} lift: 51.155837181355174 conviction: 1.5837226425367374
{(85, 90], Riesling} -> {Germany} lift: 23.091340269277847 conviction: 1.5743910372600254
{(85, 90]} -> {US} lift: 0.9115536685357292 conviction: 0.9413187187338334
{New York} -> {(80, 85]} lift: 1.6459283954368957 conviction: 1.2390009939632183
{New York, US} -> {(80, 85]} lift: 1.6459283954368957 conviction: 1.2390009939632183
{New York} -> {(80, 85], US} lift: 3.5173472582001315 conviction: 1.4358671623237547
{Riesling} -> {Germany} lift: 23.332631713548942 conviction: 1.5843307392153212
{Australia} -> {(85, 90], South Australia} lift: 30.446842848497074 conviction: 1.5914239881575531
{Merlot, US} -> {(80, 85]} lift: 1.6531664010427791 conviction: 1.2423281300701408
{(85, 90], Northern Spain} -> {Tempranillo} lift: 22.464446101820243 conviction: 1.586734507844108
{(85, 90], Northern Spain, Spain} -> {Tempranillo} lift: 22.464446101820243 conviction: 1.586734507844108
{(85, 90], Northern Spain} -> {Spain, Tempranillo} lift: 26.768822487763426 conviction: 1.5911299535418206
{(85, 90], Sauvignon Blanc} -> {US} lift: 0.9213483984738987 conviction: 0.9474758778894637
{Argentina} -> {Malbec} lift: 17.921262208091918 conviction: 1.5809838671401804
{Chardonnay, US} -> {(85, 90], California} lift: 2.7976602019885 conviction: 1.406471785147167
{(85, 90], Tuscany} -> {Sangiovese} lift: 17.49403372686558 conviction: 1.597057253352282
{(85, 90], Italy, Tuscany} -> {Sangiovese} lift: 17.49403372686558 conviction: 1.597057253352282
{(85, 90], Tuscany} -> {Italy, Sangiovese} lift: 21.497995156636797 conviction: 1.6037991334772208
{Argentina} -> {(85, 90], Mendoza Province} lift: 26.802521754572897 conv
```

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iction: 1.6186715963815477
{Merlot} -> {(80, 85]} lift: 1.7154029202141863 conviction: 1.27169158058
8358
{Red Blend, US} -> {Washington} lift: 6.11421271648002 conviction: 1.5460
825214198046
{(80, 85], Sauvignon Blanc} -> {California} lift: 1.3425032420812477 conv
iction: 1.1672003397623858
{(80, 85], Sauvignon Blanc} -> {California, US} lift: 1.3425032420812477
conviction: 1.1672003397623858
{(85, 90], Portugal} -> {Portuguese Red} lift: 27.012134301671512 convict
ion: 1.6329784935446372
{(85, 90], Burgundy} -> {Pinot Noir} lift: 4.20270944925899 conviction:
1.5035429184188713
{(85, 90], Burgundy, France} -> {Pinot Noir} lift: 4.20270944925899 convi
ction: 1.5035429184188713
{(85, 90], Burgundy} -> {France, Pinot Noir} lift: 28.96686570719365 conv
iction: 1.637955828161375
{(85, 90], Merlot} -> {California} lift: 1.353559566070519 conviction: 1.
1735343540305077
{(85, 90], Merlot} -> {California, US} lift: 1.353559566070519 convictio
n: 1.1735343540305077
{Mendoza Province} -> {Malbec} lift: 18.78087790067219 conviction: 1.6290
649287486743
{Argentina, Mendoza Province} -> {Malbec} lift: 18.78087790067219 convict
ion: 1.6290649287486743
{Mendoza Province} -> {Argentina, Malbec} lift: 28.088138137695285 convic
tion: 1.6407879939291197
{(85, 90], Piedmont} -> {Nebbiolo} lift: 26.927986582841868 conviction:
1.6414773026480083
{(85, 90], Italy, Piedmont} -> {Nebbiolo} lift: 26.927986582841868 convic
tion: 1.6414773026480083
{(85, 90], Piedmont} -> {Italy, Nebbiolo} lift: 27.555076681346407 convic
tion: 1.642040344686392
{Tempranillo} -> {(85, 90], Spain} lift: 14.292598328637023 conviction:
1.6257033085365453
{(85, 90], Argentina} -> {Malbec, Mendoza Province} lift: 32.103536044830
06 conviction: 1.6531007219981317
{(85, 90], Red Blend} -> {Italy} lift: 2.608336350953712 conviction: 1.42
10280188287505
{Sauvignon Blanc} -> {US} lift: 0.9897121849212566 conviction: 0.99280106
02232858
{Burgundy} -> {Pinot Noir} lift: 4.371851397462571 conviction: 1.54461925
71438817
{Burgundy, France} -> {Pinot Noir} lift: 4.371851397462571 conviction: 1.
5446192571438817
{Burgundy} -> {France, Pinot Noir} lift: 30.13266414227941 conviction: 1.
6827042870114324
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara} lift: 37.2105671397
7346 conviction: 1.6894765907168785
{(85, 90], Italy, Veneto} -> {Corvina, Rondinella, Molinara} lift: 37.210
56713977346 conviction: 1.6894765907168785
{(85, 90], Veneto} -> {Corvina, Rondinella, Molinara, Italy} lift: 37.210
56713977346 conviction: 1.6894765907168785
{Mendoza Province} -> {(80, 85]} lift: 1.8037939211715326 conviction: 1.3
158632995823167
{Argentina, Mendoza Province} -> {(80, 85]} lift: 1.8037939211715326 conv
iction: 1.3158632995823167
{Mendoza Province} -> {(80, 85], Argentina} lift: 25.731309339128806 conv
iction: 1.6812814975440755
{Portugal} -> {Portuguese Red} lift: 28.358699736941002 conviction: 1.688
2994801939217
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{California, Merlot} -> {(85, 90]} lift: 0.7589452881304982 conviction:
0.7720763443549137
{California, Merlot, US} -> {(85, 90]} lift: 0.7589452881304982 convictio
n: 0.7720763443549137
{California, Merlot} -> {(85, 90], US} lift: 2.013843421600913 convictio
n: 1.3612679439531359
{Shiraz} -> {(85, 90], Australia} lift: 21.136019924790357 conviction: 1.
6878669504150954
{(85, 90], Syrah} -> {California} lift: 1.429202322705873 conviction: 1.2
18784192764595
{(85, 90], Syrah} -> {California, US} lift: 1.429202322705873 conviction:
1.218784192764595
{Veneto} -> {Corvina, Rondinella, Molinara} lift: 38.093134780413926 conv
iction: 1.718353094433698
{Italy, Veneto} -> {Corvina, Rondinella, Molinara} lift: 38.0931347804139
26 conviction: 1.718353094433698
{Veneto} -> {Corvina, Rondinella, Molinara, Italy} lift: 38.0931347804139
26 conviction: 1.718353094433698
{(85, 90], Chardonnay} -> {California} lift: 1.4431874330101253 convictio
n: 1.2275351124991476
{(85, 90], Chardonnay} -> {California, US} lift: 1.4431874330101253 convi
ction: 1.2275351124991476
{Argentina} -> {(80, 85]} lift: 1.8788871244669916 conviction: 1.35587383
50273354
{France, Pinot Noir} -> {(85, 90], Burgundy} lift: 28.96686570719365 conv
iction: 1.7349771479005043
{Spain, Tempranillo} -> {(85, 90], Northern Spain} lift: 26.7688224877634
26 conviction: 1.7424514116480383
{Loire Valley} -> {Sauvignon Blanc} lift: 10.44272125320708 conviction:
1.702697574186608
{France, Loire Valley} -> {Sauvignon Blanc} lift: 10.44272125320708 convi
ction: 1.702697574186608
{Loire Valley} -> {France, Sauvignon Blanc} lift: 70.96558959168682 convi
ction: 1.766163843851321
{(80, 85], Sauvignon Blanc} -> {US} lift: 1.0578415755375543 conviction:
1.042501049413556
{Chardonnay, France} -> {(85, 90], Burgundy} lift: 29.337845382251274 con
viction: 1.7520587587501917
{California, Red Blend} -> {(85, 90]} lift: 0.7956988041656496 convictio
n: 0.7998730766709398
{California, Red Blend, US} -> {(85, 90]} lift: 0.7956988041656496 convic
tion: 0.7998730766709398
{California, Red Blend} -> {(85, 90], US} lift: 2.1113680095332206 convic
tion: 1.410277087835232
{Cabernet Sauvignon, California} -> {(85, 90]} lift: 0.7993143044216905 c
onviction: 0.8027159985222382
{Cabernet Sauvignon, California, US} -> {(85, 90]} lift: 0.79931430442169
05 conviction: 0.8027159985222382
{Cabernet Sauvignon, California} -> {(85, 90], US} lift: 2.12096165418757
95 conviction: 1.4152895175147993
{Nebbiolo} -> {(85, 90], Piedmont} lift: 26.927986582841868 conviction:
1.7619786345728568
{Nebbiolo} -> {(85, 90], Italy, Piedmont} lift: 26.927986582841868 convic
tion: 1.7619786345728568
{Bordeaux-style Red Blend, US} -> {(85, 90]} lift: 0.8041635785690607 con
viction: 0.8065609367567337
{Nebbiolo} -> {(85, 90], Italy} lift: 4.358374980151975 conviction: 1.617
5602991248716
{(85, 90], Argentina} -> {Malbec} lift: 20.93410226880898 conviction: 1.7
633976520024544
{(90, 95]} -> {US} lift: 1.084830122138663 conviction: 1.063592890008633

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{Chardonnay} -> {California} lift: 1.5304058091556887 conviction: 1.285078946789461
{Chardonnay} -> {California, US} lift: 1.5304058091556887 conviction: 1.285078946789461
{Italy, Nebbiolo} -> {(85, 90], Piedmont} lift: 27.555076681346407 conviction: 1.7950599602820745
{Merlot} -> {California} lift: 1.5336250744275923 conviction: 1.2873063331039827
{Merlot} -> {California, US} lift: 1.5336250744275923 conviction: 1.2873063331039827
{Argentina} -> {(85, 90]} lift: 0.8235961392754788 conviction: 0.8223455924788741
{Nebbiolo, Piedmont} -> {(85, 90]} lift: 0.8241940273457727 conviction: 0.822841046927745
{Italy, Nebbiolo, Piedmont} -> {(85, 90]} lift: 0.8241940273457727 conviction: 0.822841046927745
{Nebbiolo, Piedmont} -> {(85, 90], Italy} lift: 4.444795039203481 conviction: 1.6436808442941109
{Sauvignon Blanc, US} -> {(85, 90], California} lift: 3.286249297430598 conviction: 1.581150407043434
{Italy, Nebbiolo} -> {(85, 90]} lift: 0.8269896192820768 conviction: 0.8251656263172936
{Cabernet Sauvignon, US} -> {(85, 90]} lift: 0.8289104872868561 conviction: 0.8267704862828404
{Bordeaux-style Red Blend, France} -> {(85, 90], Bordeaux} lift: 24.329857633118582 conviction: 1.8065565701623787
{Nebbiolo} -> {(85, 90]} lift: 0.832487271012456 conviction: 0.8297755369583935
{Zinfandel} -> {(85, 90], California} lift: 3.3126889383402296 conviction: 1.5918488938423534
{Zinfandel} -> {(85, 90], California, US} lift: 3.3126889383402296 conviction: 1.5918488938423534
{US, Zinfandel} -> {(85, 90], California} lift: 3.3214318492358226 conviction: 1.595418532887702
{(85, 90], Red Blend, US} -> {California} lift: 1.5615226608614774 conviction: 1.3069367799514289
{California, Pinot Noir} -> {(85, 90]} lift: 0.8412850481373492 conviction: 0.8372608139435361
{California, Pinot Noir, US} -> {(85, 90]} lift: 0.8412850481373492 conviction: 0.8372608139435361
{California, Pinot Noir} -> {(85, 90], US} lift: 2.232330032716789 conviction: 1.4761963827576154
{(90, 95], Italy} -> {Tuscany} lift: 9.608852576668717 conviction: 1.774194365283704
{Bordeaux} -> {(85, 90]} lift: 0.8424353394809594 conviction: 0.8382494932493247
{Bordeaux, France} -> {(85, 90]} lift: 0.8424353394809594 conviction: 0.8382494932493247
{Bordeaux} -> {(85, 90], France} lift: 6.181951537722712 conviction: 1.7249217889520576
{California, Merlot} -> {(80, 85]} lift: 2.0178165601912395 conviction: 1.436694350139433
{California, Merlot, US} -> {(80, 85]} lift: 2.0178165601912395 conviction: 1.436694350139433
{California, Merlot} -> {(80, 85], US} lift: 4.312071877012336 conviction: 1.6649722233576503
{Syrah} -> {California} lift: 1.5746877351653232 conviction: 1.3164099672589413
{Syrah} -> {California, US} lift: 1.5746877351653232 conviction: 1.3164099672589413
{Mendoza Province} -> {(85, 90]} lift: 0.8439213269288526 conviction: 0.8
```

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395301663090988
{Argentina, Mendoza Province} -> {(85, 90]} lift: 0.8439213269288526 conv
iction: 0.8395301663090988
{Mendoza Province} -> {(85, 90], Argentina} lift: 27.463970076470762 conv
iction: 1.8360716051356625
{(85, 90], Mendoza Province} -> {Malbec} lift: 21.95358460408217 convicti
on: 1.83504164257925
{(85, 90], Argentina, Mendoza Province} -> {Malbec} lift: 21.953584604082
17 conviction: 1.83504164257925
{(85, 90], Mendoza Province} -> {Argentina, Malbec} lift: 32.833146578039
91 conviction: 1.8482469558882244
{California, Syrah} -> {(85, 90]} lift: 0.8488458293593807 conviction: 0.
8438023796834436
{California, Syrah, US} -> {(85, 90]} lift: 0.8488458293593807 convictio
n: 0.8438023796834436
{California, Syrah} -> {(85, 90], US} lift: 2.2523923873611644 convictio
n: 1.4877299879640258
{(80, 85]} -> {US} lift: 1.1318611812578883 conviction: 1.102462210937937
{(80, 85], Chardonnay} -> {California} lift: 1.59017778441651 conviction:
1.3277335000327222
{(80, 85], Chardonnay} -> {California, US} lift: 1.59017778441651 convict
ion: 1.3277335000327222
{California} -> {(85, 90]} lift: 0.8531385291391073 conviction: 0.8475621
06768653
{California, US} -> {(85, 90]} lift: 0.8531385291391073 conviction: 0.847
562106768653
{California} -> {(85, 90], US} lift: 2.263782964979223 conviction: 1.4943
588608682774
{(85, 90], Pinot Noir} -> {California} lift: 1.5984872246768997 convictio
n: 1.3338885174293051
{(85, 90], Pinot Noir} -> {California, US} lift: 1.5984872246768997 convi
ction: 1.3338885174293051
{California, Zinfandel} -> {(85, 90]} lift: 0.8578322246704798 convictio
n: 0.8517115757603675
{California, US, Zinfandel} -> {(85, 90]} lift: 0.8578322246704798 convic
tion: 0.8517115757603675
{California, Zinfandel} -> {(85, 90], US} lift: 2.276237575366404 convict
ion: 1.5016748978951182
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90]} lift: 0.85881869796162
49 conviction: 0.8525888412650449
{Bordeaux, Bordeaux-style Red Blend, France} -> {(85, 90]} lift: 0.858818
6979616249 conviction: 0.8525888412650449
{Bordeaux, Bordeaux-style Red Blend} -> {(85, 90], France} lift: 6.302175
753642968 conviction: 1.7544288200100835
{Merlot} -> {(85, 90]} lift: 0.8599086092491668 conviction: 0.85356019737
6762
{(85, 90], Red Blend, US} -> {Washington} lift: 7.338153120464442 convict
ion: 1.7785152957714097
{Rosé} -> {France} lift: 3.40788997828246 conviction: 1.6428528404849494
{Merlot, US} -> {(85, 90]} lift: 0.8657420113160429 conviction: 0.8587969
260769167
{Zinfandel} -> {(85, 90], US} lift: 2.3003438430589385 conviction: 1.5160
407601621375
{Bordeaux-style Red Blend} -> {(85, 90]} lift: 0.8683473476086149 convict
ion: 0.8611565887718651
{US, Zinfandel} -> {(85, 90]} lift: 0.8692049952102037 conviction: 0.8619
362028191121
{Bordeaux-style Red Blend, France} -> {(85, 90]} lift: 0.8701893714524884
conviction: 0.8628327567054088
{Zinfandel} -> {(85, 90]} lift: 0.8702641814716331 conviction: 0.86290096
87196549
```

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{Spain, Tempranillo} -> {(85, 90]} lift: 0.8705923222731716 conviction:
0.8632002959995135
{Argentina, Malbec} -> {(85, 90], Mendoza Province} lift: 32.833146578039
91 conviction: 1.8922920082196821
{California, Chardonnay} -> {(85, 90]} lift: 0.8752046809570662 convictio
n: 0.8674297322682305
{California, Chardonnay, US} -> {(85, 90]} lift: 0.8752046809570662 convi
ction: 0.8674297322682305
{California, Chardonnay} -> {(85, 90], US} lift: 2.3223349783767984 convi
ction: 1.5293879896750115
{(90, 95], Red Blend} -> {Italy} lift: 3.1077298734441285 conviction: 1.6
347382147497644
{Cabernet Sauvignon} -> {(85, 90]} lift: 0.8820235440387926 conviction:
0.8737589705920425
{Sangiovese} -> {(85, 90], Tuscany} lift: 17.49403372686558 conviction:
1.8961080877552896
{Sangiovese} -> {(85, 90], Italy, Tuscany} lift: 17.49403372686558 convic
tion: 1.8961080877552896
{Tempranillo} -> {(85, 90]} lift: 0.8855359716550962 conviction: 0.877055
3680378802
{Syrah, US} -> {(85, 90]} lift: 0.8870272175011958 conviction: 0.87846242
92047682
{Chardonnay, US} -> {(85, 90]} lift: 0.891179095357937 conviction: 0.8824
038124283058
{(90, 95], Chardonnay} -> {California} lift: 1.6794918023324208 convictio
n: 1.3970219486348363
{(90, 95], Chardonnay} -> {California, US} lift: 1.6794918023324208 convi
ction: 1.3970219486348363
{New Zealand} -> {Marlborough} lift: 45.45933734939759 conviction: 1.9721
28427298222
{Germany} -> {(85, 90], Riesling} lift: 23.091340269277847 conviction: 1.
9566937181339872
{US} -> {(85, 90]} lift: 0.9115536685357292 conviction: 0.902269598153403
1
{Northern Spain} -> {(85, 90]} lift: 0.9116204579784164 conviction: 0.902
3361907650259
{Northern Spain, Spain} -> {(85, 90]} lift: 0.9116204579784164 convictio
n: 0.9023361907650259
{Northern Spain} -> {(85, 90], Spain} lift: 17.8338032753051 conviction:
1.9508986732265041
{Burgundy, Pinot Noir} -> {(85, 90]} lift: 0.9128631607329349 conviction:
0.903577026650933
{Burgundy, France, Pinot Noir} -> {(85, 90]} lift: 0.9128631607329349 con
viction: 0.903577026650933
{Burgundy, Pinot Noir} -> {(85, 90], France} lift: 6.698764351101787 conv
iction: 1.8593506036312346
{Nebbiolo} -> {(90, 95], Piedmont} lift: 61.40797458081156 conviction: 1.
9951950900338353
{Nebbiolo} -> {(90, 95], Italy, Piedmont} lift: 61.40797458081156 convict
ion: 1.9951950900338353
{Pinot Noir, US} -> {(85, 90]} lift: 0.9142516731479933 conviction: 0.904
9674961152588
{Nebbiolo} -> {(90, 95], Italy} lift: 15.087905411782845 conviction: 1.94
63055949331614
{Nebbiolo} -> {(90, 95]} lift: 2.463655546317461 conviction: 1.6075038613
047776
{Red Blend, US} -> {(85, 90]} lift: 0.9191171137284947 conviction: 0.9098
737477171543
{Chardonnay, France} -> {(85, 90]} lift: 0.9233536298226596 conviction:
0.9141893326874293
{Chardonnay} -> {(85, 90]} lift: 0.9280972778035189 conviction: 0.9190703
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560723196
{(85, 90], New Zealand} -> {Marlborough} lift: 46.67530779975961 conviction: 2.0259953446497083
{(80, 85], Red Blend} -> {US} lift: 1.2393470879638127 conviction: 1.2029329795933958
{Spain} -> {(85, 90]} lift: 0.9331056254963787 conviction: 0.9242806306260004
{Italy, Nebbiolo} -> {(90, 95], Piedmont} lift: 62.838023303926356 conviction: 2.043334896234121
{Syrah} -> {(85, 90]} lift: 0.9352539492153744 conviction: 0.9265337195467507
{Italy, Nebbiolo} -> {(90, 95]} lift: 2.5099028906356424 conviction: 1.6389644240821277
{Nebbiolo, Piedmont} -> {(90, 95]} lift: 2.51687185184738 conviction: 1.6438122601534608
{Italy, Nebbiolo, Piedmont} -> {(90, 95]} lift: 2.51687185184738 conviction: 1.6438122601534608
{Nebbiolo, Piedmont} -> {(90, 95], Italy} lift: 15.482136046756118 conviction: 1.999247794000887
{Shiraz} -> {South Australia} lift: 26.013285162929968 conviction: 2.032409749671547
{Shiraz} -> {Australia, South Australia} lift: 26.013285162929968 conviction: 2.032409749671547
{Marlborough} -> {Sauvignon Blanc} lift: 12.409222149986615 conviction: 1.9945870444776315
{Marlborough, New Zealand} -> {Sauvignon Blanc} lift: 12.409222149986615 conviction: 1.9945870444776315
{Marlborough} -> {New Zealand, Sauvignon Blanc} lift: 70.1487334417848 conviction: 2.066340039224512
{France, Pinot Noir} -> {(85, 90]} lift: 0.9446446590100801 conviction: 0.9365127156870692
{Burgundy} -> {(85, 90]} lift: 0.9496021871428793 conviction: 0.941867998792181
{Burgundy, France} -> {(85, 90]} lift: 0.9496021871428793 conviction: 0.941867998792181
{Burgundy} -> {(85, 90], France} lift: 6.9683623489128985 conviction: 1.93814448623839
{Northern Spain, Tempranillo} -> {(85, 90]} lift: 0.9510449434945627 conviction: 0.9434380360013571
{Northern Spain, Spain, Tempranillo} -> {(85, 90]} lift: 0.9510449434945627 conviction: 0.9434380360013571
{Northern Spain, Tempranillo} -> {(85, 90], Spain} lift: 18.605054636298267 conviction: 2.0397630412518364
{Pinot Noir} -> {(85, 90]} lift: 0.9534126869299026 conviction: 0.9460260381938167
{Burgundy, Chardonnay} -> {(85, 90]} lift: 0.9578346865019586 conviction: 0.9508976095599739
{Burgundy, Chardonnay, France} -> {(85, 90]} lift: 0.9578346865019586 conviction: 0.9508976095599739
{Burgundy, Chardonnay} -> {(85, 90], France} lift: 7.028774002706432 conviction: 1.9567253174641235
{(85, 90], Cabernet Sauvignon} -> {California} lift: 1.7890537508836215 conviction: 1.4925706860373074
{(85, 90], Cabernet Sauvignon} -> {California, US} lift: 1.7890537508836215 conviction: 1.4925706860373074
{Sangiovese} -> {(85, 90], Italy} lift: 5.180873660350529 conviction: 1.9058069739056884
{Argentina, Malbec} -> {(85, 90]} lift: 0.9620553288933102 conviction: 0.9555943810042331
{California, Sauvignon Blanc} -> {(85, 90]} lift: 0.9631024841868215 conviction: 0.9567668579993962

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{California, Sauvignon Blanc, US} -> {(85, 90]} lift: 0.9631024841868215
conviction: 0.9567668579993962
{California, Sauvignon Blanc} -> {(85, 90], US} lift: 2.5555697260928647
conviction: 1.6869006065967953
{Red Blend, US} -> {California} lift: 1.803725471948622 conviction: 1.506
367345021941
{(80, 85], Merlot} -> {California} lift: 1.8039925406668462 conviction:
1.5066208491030844
{(80, 85], Merlot} -> {California, US} lift: 1.8039925406668462 convictio
n: 1.5066208491030844
{Piedmont} -> {Nebbiolo} lift: 35.903131487864755 conviction: 2.110008031
5693965
{Italy, Piedmont} -> {Nebbiolo} lift: 35.903131487864755 conviction: 2.11
00080315693965
{Piedmont} -> {Italy, Nebbiolo} lift: 36.73923181018489 conviction: 2.110
731784021645
{Pinot Noir} -> {California} lift: 1.811535820441103 conviction: 1.513816
4068739457
{Pinot Noir} -> {California, US} lift: 1.811535820441103 conviction: 1.51
38164068739457
{France} -> {(85, 90]} lift: 0.9748344696726717 conviction: 0.97010234006
4274
{(85, 90], Italy, Red Blend} -> {Tuscany} lift: 11.134475590279326 convic
tion: 2.056320088926394
{(85, 90], Chardonnay} -> {US} lift: 1.303378891510926 conviction: 1.2719
893415760626
{Sauvignon Blanc, US} -> {(85, 90]} lift: 0.9841439554491296 conviction:
0.9809517070450496
{Malbec, Mendoza Province} -> {(85, 90]} lift: 0.986487338233467 convicti
on: 0.9837210475206353
{Argentina, Malbec, Mendoza Province} -> {(85, 90]} lift: 0.9864873382334
67 conviction: 0.9837210475206353
{Malbec, Mendoza Province} -> {(85, 90], Argentina} lift: 32.103536044830
06 conviction: 2.1514203482021714
{Chile} -> {(85, 90]} lift: 0.9926096880862298 conviction: 0.991030598471
6519
{(90, 95], Burgundy} -> {Chardonnay} lift: 5.717240773867517 conviction:
2.0027472066440795
{(90, 95], Burgundy, France} -> {Chardonnay} lift: 5.717240773867517 conv
iction: 2.0027472066440795
{(90, 95], Burgundy} -> {Chardonnay, France} lift: 28.62969601906963 conv
iction: 2.1728683570512453
{(85, 90], Rosé} -> {France} lift: 3.9261616313245984 conviction: 1.90667
34392635551
{Portuguese Red} -> {(85, 90]} lift: 0.9984505186432028 conviction: 0.998
1060126958149
{Portugal, Portuguese Red} -> {(85, 90]} lift: 0.9984505186432028 convict
ion: 0.9981060126958149
{Portuguese Red} -> {(85, 90], Portugal} lift: 27.012134301671512 convict
ion: 2.175259668068852
{Cabernet Sauvignon, Washington} -> {(85, 90]} lift: 0.9996582739275318 c
onviction: 0.9995816765240334
{Cabernet Sauvignon, US, Washington} -> {(85, 90]} lift: 0.99965827392753
18 conviction: 0.9995816765240334
{Cabernet Sauvignon, Washington} -> {(85, 90], US} lift: 2.65256965196643
8 conviction: 1.7623885300513802
{(80, 85], Cabernet Sauvignon} -> {California} lift: 1.868797619404252 co
nviction: 1.5707641128328964
{(80, 85], Cabernet Sauvignon} -> {California, US} lift: 1.86879761940425
2 conviction: 1.5707641128328964
{Rosé} -> {(85, 90]} lift: 1.0033946020704556 conviction: 1.0041745665045
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{(85, 90], Merlot, US} -> {California} lift: 1.8777704962828012 conviction: 1.5800783732393

{Shiraz} -> {(85, 90]} lift: 1.009710581755105 conviction: 1.012035228086604

{Oregon} -> {Pinot Noir} lift: 5.874249050202088 conviction: 2.0395490826937657

{Oregon, US} -> {Pinot Noir} lift: 5.874249050202088 conviction: 2.0395490826937657

{Oregon} -> {Pinot Noir, US} lift: 8.11714414209743 conviction: 2.098479970948594

{Burgundy} -> {Chardonnay} lift: 5.808300897845589 conviction: 2.0422790195373275

{Burgundy, France} -> {Chardonnay} lift: 5.808300897845589 conviction: 2.0422790195373275

{Burgundy} -> {Chardonnay, France} lift: 29.08568935082981 conviction: 2.21575815614703

{Chardonnay} -> {US} lift: 1.3573729539425567 conviction: 1.3366954064708911

{Malbec} -> {(85, 90]} lift: 1.0198313726954475 conviction: 1.024891093898835

{(85, 90], Burgundy} -> {Chardonnay} lift: 5.85865549271307 conviction: 2.064816896872287

{(85, 90], Burgundy, France} -> {Chardonnay} lift: 5.85865549271307 conviction: 2.064816896872287

{(85, 90], Burgundy} -> {Chardonnay, France} lift: 29.337845382251274 conviction: 2.240210488590072

{(85, 90], Malbec} -> {Mendoza Province} lift: 18.1668251692965 conviction: 2.2566796037338404

{(85, 90], Malbec} -> {Argentina, Mendoza Province} lift: 18.1668251692965 conviction: 2.2566796037338404

{(85, 90], Oregon} -> {Pinot Noir} lift: 6.0295087921067765 conviction: 2.1093971676010748

{(85, 90], Oregon, US} -> {Pinot Noir} lift: 6.0295087921067765 conviction: 2.1093971676010748

{(85, 90], Oregon} -> {Pinot Noir, US} lift: 8.331684876365728 conviction: 2.1703462518000034

{Red Blend, Tuscany} -> {(85, 90]} lift: 1.0374467383088777 conviction: 1.0480634658178674

{Italy, Red Blend, Tuscany} -> {(85, 90]} lift: 1.0374467383088777 conviction: 1.0480634658178674

{Red Blend, Tuscany} -> {(85, 90], Italy} lift: 5.594845343302381 conviction: 2.0935779137432795

{Alsace} -> {(85, 90]} lift: 1.0380325354507798 conviction: 1.0488520763997877

{Alsace, France} -> {(85, 90]} lift: 1.0380325354507798 conviction: 1.0488520763997877

{Alsace} -> {(85, 90], France} lift: 7.617281146692911 conviction: 2.158292745226255

{Rhône-style Red Blend} -> {France} lift: 4.116245686558755 conviction: 2.0260001720201686

{Australia, Shiraz} -> {(85, 90]} lift: 1.0463570641520936 conviction: 1.0601883535145897

{Red Blend} -> {(85, 90]} lift: 1.0479372291594842 conviction: 1.0623679392269174

{Portugal} -> {(85, 90]} lift: 1.048223666002167 conviction: 1.0627639938618223

{Tuscany} -> {(85, 90]} lift: 1.048867650502869 conviction: 1.0636555041573925

{Italy, Tuscany} -> {(85, 90]} lift: 1.048867650502869 conviction: 1.0636555041573925

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{Tuscany} -> {(85, 90], Italy} lift: 5.656437167774234 conviction: 2.1247
240686876223
{(80, 85], Pinot Noir} -> {California} lift: 1.9587817173639268 convictio
n: 1.6694553549974132
{(80, 85], Pinot Noir} -> {California, US} lift: 1.9587817173639268 convi
ction: 1.6694553549974132
{(85, 90], Spain} -> {Northern Spain} lift: 17.8338032753051 conviction:
2.2931585192286503
{Sauvignon Blanc} -> {(85, 90]} lift: 1.057167154181795 conviction: 1.075
2803810625493
{Cabernet Sauvignon} -> {California} lift: 1.974176517423834 conviction:
1.6875956492428268
{Cabernet Sauvignon} -> {California, US} lift: 1.974176517423834 convicti
on: 1.6875956492428268
{(80, 85], Spain} -> {Northern Spain} lift: 18.054169721755848 convictio
n: 2.3326464065085837
{Germany, Riesling} -> {(85, 90]} lift: 1.0635619889253336 conviction: 1.
0844122355862782
{(90, 95], Chardonnay} -> {US} lift: 1.4182346165016533 conviction: 1.418
004065817981
{New York} -> {(85, 90]} lift: 1.0661423539046055 conviction: 1.088141080
163552
{New York, US} -> {(85, 90]} lift: 1.0661423539046055 conviction: 1.08814
1080163552
{New York} -> {(85, 90], US} lift: 2.8289835900947384 conviction: 1.91852
9924864879
{Sparkling Blend} -> {(85, 90]} lift: 1.0669099375722273 conviction: 1.08
92552569958107
{Malbec} -> {Mendoza Province} lift: 18.78087790067219 conviction: 2.3628
942830036754
{Malbec} -> {Argentina, Mendoza Province} lift: 18.78087790067219 convict
ion: 2.3628942830036754
{(80, 85], Chardonnay} -> {US} lift: 1.4290532007604482 conviction: 1.433
5040007155733
{Riesling} -> {(85, 90]} lift: 1.074675610109162 conviction: 1.1006570800
464848
{Spain} -> {Northern Spain} lift: 18.254112239961298 conviction: 2.369669
8970939325
{Cabernet Franc} -> {(85, 90]} lift: 1.0755403141528714 conviction: 1.101
941454237463
{Washington} -> {(85, 90]} lift: 1.0774511555790516 conviction: 1.1047903
500621556
{US, Washington} -> {(85, 90]} lift: 1.0774511555790516 conviction: 1.104
7903500621556

{Washington} -> {(85, 90], US} lift: 2.8589912286089345 conviction: 1.947884
6869540212
{Italy, Red Blend} -> {Tuscany} lift: 12.35239932400408 conviction: 2.355314
6483445127
{Italy, Sangiovese} -> {(85, 90], Tuscany} lift: 21.497995156636797 convicti
on: 2.4232408147588615
{Germany} -> {(85, 90]} lift: 1.0905268398536743 conviction: 1.1246874449993
003
{White Blend} -> {(85, 90]} lift: 1.0954661698927715 conviction: 1.132391332
943494
{Australia} -> {(85, 90]} lift: 1.097190129008344 conviction: 1.135105103351
1645
{Oregon} -> {(85, 90]} lift: 1.0984845282812923 conviction: 1.13715124688608
{Oregon, US} -> {(85, 90]} lift: 1.0984845282812923 conviction: 1.1371512468
8608
{Oregon} -> {(85, 90], US} lift: 2.9148027869820385 conviction: 2.0049410283

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457383
{Piedmont} -> {(85, 90]} lift: 1.0988993344999338 conviction: 1.137808520502
1913
{Italy, Piedmont} -> {(85, 90]} lift: 1.0988993344999338 conviction: 1.13780
85205021913
{Piedmont} -> {(85, 90], Italy} lift: 5.926252979894716 conviction: 2.272849
7522174536
{(85, 90], Syrah, US} -> {California} lift: 2.053750726303264 conviction: 1.
7880202778436056
{Australia} -> {South Australia} lift: 30.446842848497077 conviction: 2.4876
273566426335
{Southwest France} -> {(85, 90]} lift: 1.1017344071609854 conviction: 1.1423
212067801976
{France, Southwest France} -> {(85, 90]} lift: 1.1017344071609854 convictio
n: 1.1423212067801976
{Southwest France} -> {(85, 90], France} lift: 8.084737656788214 conviction:
2.35063039754335
{Riesling, US} -> {(85, 90]} lift: 1.1029095689164536 conviction: 1.14420226
4920695
{Red Blend, Washington} -> {(85, 90]} lift: 1.1031055720387064 conviction:
1.1445166062014667
{Red Blend, US, Washington} -> {(85, 90]} lift: 1.1031055720387064 convictio
n: 1.1445166062014667
{Red Blend, Washington} -> {(85, 90], US} lift: 2.927064617600583 convictio
n: 2.017927085495449
{Rhône-style Red Blend} -> {(85, 90]} lift: 1.1068323662887967 conviction:
1.15052651211708
{(90, 95], Pinot Noir} -> {California} lift: 2.0805049568779244 conviction:
1.8245243776863893
{(90, 95], Pinot Noir} -> {California, US} lift: 2.0805049568779244 convicti
on: 1.8245243776863893
{Bordeaux-style Red Blend, US} -> {California} lift: 2.0915877004398995 conv
iction: 1.8400862628343266
{Catalonia} -> {(85, 90]} lift: 1.1205684064278203 conviction: 1.17323332065
64796
{Catalonia, Spain} -> {(85, 90]} lift: 1.1205684064278203 conviction: 1.1732
333206564796
{Catalonia} -> {(85, 90], Spain} lift: 21.921399790732895 conviction: 2.5365
926270931154
{Rhône Valley} -> {(85, 90]} lift: 1.126044778118932 conviction: 1.182538097
7620112
{France, Rhône Valley} -> {(85, 90]} lift: 1.126044778118932 conviction: 1.1
825380977620112
{Rhône Valley} -> {(85, 90], France} lift: 8.263131805374954 conviction: 2.4
333873715673193
{Oregon, Pinot Noir} -> {(85, 90]} lift: 1.1275180988517093 conviction: 1.18
50666314172726
{Oregon, Pinot Noir, US} -> {(85, 90]} lift: 1.1275180988517093 conviction:
1.1850666314172726
{Oregon, Pinot Noir} -> {(85, 90], US} lift: 2.9918426817059998 conviction:
2.0894218927853787
{Pinot Gris} -> {US} lift: 1.5097478446677928 conviction: 1.5607550666725398
{South Australia} -> {(85, 90]} lift: 1.137464580083257 conviction: 1.202423
980318735
{Australia, South Australia} -> {(85, 90]} lift: 1.137464580083257 convictio
n: 1.202423980318735
{South Australia} -> {(85, 90], Australia} lift: 31.56445213996568 convictio
n: 2.621912411670216
{(85, 90], Australia} -> {South Australia} lift: 31.56445213996568 convictio
n: 2.6364848502140545
{Sangiovese} -> {(85, 90]} lift: 1.1420685317168109 conviction: 1.2106315370
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23672
{(85, 90], Malbec} -> {Argentina} lift: 16.905977075621774 conviction: 2.607
2253015309315
{Merlot, US} -> {California} lift: 2.1420052692418436 conviction: 1.91436631
3994142
{Syrah, US} -> {California} lift: 2.1461291664337874 conviction: 1.920708242
494169
{Italy, Red Blend} -> {(85, 90]} lift: 1.1509259044192968 conviction: 1.2267
410844667022
{France, Rosé} -> {(85, 90]} lift: 1.1559907781156413 conviction: 1.23614708
95275457
{(80, 85], Cabernet Sauvignon} -> {US} lift: 1.54034445591732 conviction: 1.
6151170302490767
{Austria} -> {(85, 90]} lift: 1.1640938958649447 conviction: 1.2514991397769
986
{Sangiovese, Tuscany} -> {(85, 90]} lift: 1.169426464207484 conviction: 1.26
18119050614962
{Italy, Sangiovese, Tuscany} -> {(85, 90]} lift: 1.169426464207484 convictio
n: 1.2618119050614962
{Sangiovese, Tuscany} -> {(85, 90], Italy} lift: 6.306598658039102 convictio
n: 2.5205549300142818
{(85, 90], Bordeaux-style Red Blend} -> {Bordeaux} lift: 15.93508186999134 c
onviction: 2.704492795053762
{(85, 90], Bordeaux-style Red Blend} -> {Bordeaux, France} lift: 15.93508186
999134 conviction: 2.704492795053762
{Loire Valley} -> {(85, 90]} lift: 1.179846610842712 conviction: 1.282462214
1555153
{France, Loire Valley} -> {(85, 90]} lift: 1.179846610842712 conviction: 1.2
824622141555153
{Loire Valley} -> {(85, 90], France} lift: 8.657939937170555 conviction: 2.6
39007878346046
{France, Rosé} -> {Provence} lift: 96.05045169181903 conviction: 2.836003051
051735
{Italy, Sangiovese} -> {(85, 90]} lift: 1.180561800742745 conviction: 1.2839
043698698815
{Bordeaux-style Red Blend} -> {Bordeaux} lift: 16.111882645982405 convictio
n: 2.7601870297337077
{Bordeaux-style Red Blend} -> {Bordeaux, France} lift: 16.111882645982405 co
nviction: 2.7601870297337077
{Italy} -> {(85, 90]} lift: 1.192004266633476 conviction: 1.3074268566233704
{Pinot Gris} -> {(85, 90]} lift: 1.196399037654168 conviction: 1.31669198353
70694
{(90, 95], Bordeaux-style Red Blend} -> {Bordeaux} lift: 16.3198208823914 co
nviction: 2.8286981724007587
{(90, 95], Bordeaux-style Red Blend} -> {Bordeaux, France} lift: 16.31982088
23914 conviction: 2.8286981724007587
{(85, 90], US} -> {California} lift: 2.263782964979223 conviction: 2.1211895
57156999
{Corvina, Rondinella, Molinara} -> {(85, 90]} lift: 1.212837954990871 convic
tion: 1.3525447416145286
{Corvina, Rondinella, Molinara, Italy} -> {(85, 90]} lift: 1.212837954990871
conviction: 1.3525447416145286
{Corvina, Rondinella, Molinara} -> {(85, 90], Italy} lift: 6.540712437654585
5 conviction: 2.7017999298201607
{Corvina, Rondinella, Molinara, Veneto} -> {(85, 90]} lift: 1.21283795499087
1 conviction: 1.3525447416145286
{Corvina, Rondinella, Molinara} -> {(85, 90], Veneto} lift: 37.2105671397734
6 conviction: 2.9549559854939513
{Corvina, Rondinella, Molinara, Italy, Veneto} -> {(85, 90]} lift: 1.2128379
54990871 conviction: 1.3525447416145286
{Corvina, Rondinella, Molinara, Veneto} -> {(85, 90], Italy} lift: 6.5407124

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376545855 conviction: 2.7017999298201607
{Corvina, Rondinella, Molinara, Italy} -> {(85, 90], Veneto} lift: 37.210567
13977346 conviction: 2.9549559854939513
{Corvina, Rondinella, Molinara} -> {(85, 90], Italy, Veneto} lift: 37.210567
13977346 conviction: 2.9549559854939513
{Central Italy} -> {(85, 90]} lift: 1.2145998343730449 conviction: 1.3565035
29833778
{Central Italy, Italy} -> {(85, 90]} lift: 1.2145998343730449 conviction: 1.
356503529833778
{Central Italy} -> {(85, 90], Italy} lift: 6.550214074984791 conviction: 2.7
09707878003947
{Malbec} -> {Argentina} lift: 17.921262208091918 conviction: 2.9052772910941
287
{(90, 95], Bordeaux-style Red Blend} -> {France} lift: 4.788676793937849 con
viction: 2.6020825840966713
{(85, 90], Cabernet Sauvignon} -> {US} lift: 1.6299077130116062 conviction:
1.7984851296074238
{Bordeaux-style Red Blend} -> {France} lift: 4.8293817119466205 conviction:
2.6476553810201087
{(85, 90], Bordeaux-style Red Blend} -> {France} lift: 4.8396262716715635 co
nviction: 2.659377632477659
{Barbera} -> {(85, 90], Piedmont} lift: 41.26196097924693 conviction: 3.0444
591590378303
{Barbera} -> {(85, 90], Italy, Piedmont} lift: 41.26196097924693 conviction:
3.0444591590378303
{(85, 90], Pinot Noir, US} -> {California} lift: 2.3034311487033188 convicti
on: 2.1985218028796494
{Veneto} -> {(85, 90]} lift: 1.241604287102788 conviction: 1.420215968305818
2
{Italy, Veneto} -> {(85, 90]} lift: 1.241604287102788 conviction: 1.42021596
83058182
{Veneto} -> {(85, 90], Italy} lift: 6.695846357611381 conviction: 2.83697779
8544208
{Barbera} -> {(85, 90], Italy} lift: 6.703251527995135 conviction: 2.8437694
45175441
{(80, 85], Merlot} -> {US} lift: 1.668962450117794 conviction: 1.89215963311
03523
{South Africa} -> {(85, 90]} lift: 1.2590396839972644 conviction: 1.46463078
93136183
{(85, 90], Pinot Noir} -> {US} lift: 1.6785388951208953 conviction: 1.916638
160048689
{(85, 90], Syrah} -> {US} lift: 1.683229981682704 conviction: 1.928861720609
9716
{Tempranillo} -> {Northern Spain} lift: 21.533208060939454 conviction: 3.203
5637469128577
{Tempranillo} -> {Northern Spain, Spain} lift: 21.533208060939454 convictio
n: 3.2035637469128577
{New Zealand} -> {(85, 90]} lift: 1.2721370116311326 conviction: 1.499865997
1945907
{New Zealand, Sauvignon Blanc} -> {(85, 90]} lift: 1.2722397868528004 convic
tion: 1.5001491943339176
{(80, 85], Pinot Noir} -> {US} lift: 1.7039837197955894 conviction: 1.984864
7343678805
{Australia, Shiraz} -> {South Australia} lift: 35.73652145813949 conviction:
3.394825520646351
{(90, 95], Cabernet Sauvignon} -> {California} lift: 2.416155067077052 convi
ction: 2.4527522780896827
{(90, 95], Cabernet Sauvignon} -> {California, US} lift: 2.416155067077052 c
onviction: 2.4527522780896827
{US} -> {California} lift: 2.4187861595910056 conviction: 2.459390386573038
{Merlot} -> {US} lift: 1.7317936408906018 conviction: 2.0652133989459434
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{Cabernet Sauvignon} -> {US} lift: 1.7343452634942385 conviction: 2.07291259
57670465
{Marlborough} -> {(85, 90]} lift: 1.3061648066925975 conviction: 1.599861921
0265737
{Marlborough, New Zealand} -> {(85, 90]} lift: 1.3061648066925975 convictio
n: 1.5998619210265737
{Marlborough} -> {(85, 90], New Zealand} lift: 46.67530779975961 conviction:
3.5043112152434905
{(90, 95], US} -> {California} lift: 2.439413827593757 conviction: 2.5127049
888644035
{(85, 90], Merlot} -> {US} lift: 1.7435416900385168 conviction: 2.1011444276
60506
{Pinot Noir} -> {US} lift: 1.7504373523355963 conviction: 2.122822901835691
{Shiraz} -> {Australia} lift: 22.162828753677566 conviction: 3.5546586960401
014
{Syrah} -> {US} lift: 1.7747454156381048 conviction: 2.2029447167496428
{Pinot Noir, US} -> {California} lift: 2.503213133700433 conviction: 2.69328
3735146517
{Cabernet Franc} -> {US} lift: 1.794125317202133 conviction: 2.2712903672197
786
{Southern Italy} -> {(85, 90]} lift: 1.3570526110610006 conviction: 1.777038
6210686264
{Italy, Southern Italy} -> {(85, 90]} lift: 1.3570526110610006 conviction:
1.7770386210686264
{Southern Italy} -> {(85, 90], Italy} lift: 7.318447493494814 conviction: 3.
5497552679549425
{(85, 90], Tempranillo} -> {Northern Spain} lift: 23.126162345835372 convict
ion: 3.8641437051290093
{(85, 90], Tempranillo} -> {Northern Spain, Spain} lift: 23.126162345835372
conviction: 3.8641437051290093
{(85, 90], Shiraz} -> {Australia} lift: 22.967207482062634 conviction: 3.936
9355972585596
{(90, 95], Italy, Red Blend} -> {Tuscany} lift: 15.679585083290307 convictio
n: 3.9074106390849654
{Viognier} -> {US} lift: 1.830846847639748 conviction: 2.413150685647182
{Sangiovese} -> {Tuscany} lift: 15.690534304224458 conviction: 3.91590259429
7686
{Sangiovese} -> {Italy, Tuscany} lift: 15.690534304224458 conviction: 3.9159
02594297686
{Northeastern Italy} -> {(85, 90]} lift: 1.3830395650815575 conviction: 1.88
3562197128472
{Italy, Northeastern Italy} -> {(85, 90]} lift: 1.3830395650815575 convictio
n: 1.883562197128472
{Northeastern Italy} -> {(85, 90], Italy} lift: 7.4585925084818285 convictio
n: 3.76254334177432
{Sicily & Sardinia} -> {(85, 90]} lift: 1.3854369409793463 conviction: 1.894
0363264558706
{Italy, Sicily & Sardinia} -> {(85, 90]} lift: 1.3854369409793463 convictio
n: 1.8940363264558706
{Sicily & Sardinia} -> {(85, 90], Italy} lift: 7.471521314253344 conviction:
3.7834661260719487
{Champagne} -> {Champagne Blend} lift: 93.70188849451081 conviction: 4.28631
6173580066
{Champagne, France} -> {Champagne Blend} lift: 93.70188849451081 conviction:
4.286316173580066
{Champagne} -> {Champagne Blend, France} lift: 105.07512496033007 convictio
n: 4.29015328947697
{New Zealand, Sauvignon Blanc} -> {Marlborough} lift: 70.1487334417848 convi
ction: 4.285815231828444
{(80, 85], Merlot, US} -> {California} lift: 2.61448194299543 conviction: 3.
079227870299172
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{(90, 95], Syrah} -> {US} lift: 1.8718088922395484 conviction: 2.59386676193
50313
{(85, 90], Sangiovese} -> {Tuscany} lift: 16.06639666827391 conviction: 4.23
1598317169712
{(85, 90], Sangiovese} -> {Italy, Tuscany} lift: 16.06639666827391 convictio
n: 4.231598317169712
{(80, 85], Syrah} -> {US} lift: 1.882685213224413 conviction: 2.646490670843
782
{(90, 95], Pinot Noir, US} -> {California} lift: 2.6483186764522832 convicti
on: 3.2195251157939837
{(85, 90], Cabernet Sauvignon, US} -> {California} lift: 2.6549591837969695
conviction: 3.2485728834028222
{Bordeaux} -> {Bordeaux-style Red Blend} lift: 16.111882645982405 convictio
n: 4.410863176983458
{Bordeaux, France} -> {Bordeaux-style Red Blend} lift: 16.111882645982405 co
nviction: 4.410863176983458
{Bordeaux} -> {Bordeaux-style Red Blend, France} lift: 23.86572616936144 con
viction: 4.484194261156936
{(90, 95], Pinot Noir} -> {US} lift: 1.9001854419567534 conviction: 2.735796
7405943877
{(85, 90], Chardonnay, US} -> {California} lift: 2.6782402349741448 convicti
on: 3.354687280318366
{(80, 85], US} -> {California} lift: 2.681911530048758 conviction: 3.3720570
2005771
{Barbera} -> {(85, 90]} lift: 1.4399374402022356 conviction: 2.1681217779719
88
{(80, 85], Chardonnay, US} -> {California} lift: 2.6915023276873082 convicti
on: 3.4182936393594088
{Barbera} -> {Piedmont} lift: 29.4721310125659 conviction: 4.846649529882732
{Barbera} -> {Italy, Piedmont} lift: 29.4721310125659 conviction: 4.84664952
9882732
{(85, 90], Bordeaux} -> {Bordeaux-style Red Blend} lift: 16.425220343033644
conviction: 4.746551780100157
{(85, 90], Bordeaux, France} -> {Bordeaux-style Red Blend} lift: 16.42522034
3033644 conviction: 4.746551780100157
{(85, 90], Bordeaux} -> {Bordeaux-style Red Blend, France} lift: 24.32985763
3118582 conviction: 4.825463724124305
{Chardonnay, US} -> {California} lift: 2.7271240221721036 conviction: 3.6017
1964726736
{(90, 95], Bordeaux} -> {Bordeaux-style Red Blend} lift: 16.529551861473216
conviction: 4.869959183007251
{(90, 95], Bordeaux, France} -> {Bordeaux-style Red Blend} lift: 16.52955186
1473216 conviction: 4.869959183007251
{(90, 95], Bordeaux} -> {Bordeaux-style Red Blend, France} lift: 24.48439869
48072 conviction: 4.950922788642086
{Barbera} -> {Italy} lift: 5.185071551670069 conviction: 4.366134948136017
{(80, 85], Argentina} -> {Mendoza Province} lift: 25.731309339128806 convict
ion: 5.056987449257073
{Cabernet Sauvignon, US} -> {California} lift: 2.753264264875253 conviction:
3.749359524363859
{Sangiovese} -> {Italy} lift: 5.231088710596481 conviction: 4.53394769399365
3
{(90, 95], Cabernet Sauvignon, US} -> {California} lift: 2.776212983164314 c
onviction: 3.889323629366435
{(80, 85], Pinot Noir, US} -> {California} lift: 2.780469116329424 convictio
n: 3.916438508301078
{(85, 90], Tempranillo} -> {Spain} lift: 15.060375106484925 conviction: 5.40
248349198442
{Chardonnay, France} -> {Burgundy} lift: 29.08568935082981 conviction: 5.721
895716436153
{(85, 90], France, Pinot Noir} -> {Burgundy} lift: 29.118884829191234 convic

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tion: 5.754008706887717
{Spain, Tempranillo} -> {Northern Spain} lift: 25.659151423664916 conviction: 5.749233065326645
{(85, 90], Germany} -> {Riesling} lift: 22.755698700138527 conviction: 5.7647291760242325
{(90, 95], Chardonnay, France} -> {Burgundy} lift: 29.20050211973391 conviction: 5.834518568490344
{Tempranillo} -> {Spain} lift: 15.318885271798505 conviction: 5.878288909105382
{Barbera, Italy} -> {(85, 90], Piedmont} lift: 51.155837181355174 conviction: 6.1182911774128526
{France, Sauvignon Blanc} -> {Loire Valley} lift: 70.96558959168682 conviction: 6.167749399254628
{(85, 90], Sauvignon Blanc, US} -> {California} lift: 2.848796536798203 conviction: 4.410013726884232
{(80, 85], Tempranillo} -> {Spain} lift: 15.342053649218007 conviction: 5.925056654646709
{(85, 90], Sangiovese} -> {Italy} lift: 5.407401864705385 conviction: 5.316933586445075
{Argentina} -> {Mendoza Province} lift: 26.8025217545729 conviction: 6.135068970341376
{(90, 95], Chardonnay, US} -> {California} lift: 2.864357899152631 conviction: 4.540331048167142
{Barbera, Piedmont} -> {(85, 90]} lift: 1.5384955177121091 conviction: 2.936606357262383
{Barbera, Italy, Piedmont} -> {(85, 90]} lift: 1.5384955177121091 conviction: 2.936606357262383
{Barbera, Piedmont} -> {(85, 90], Italy} lift: 8.296950739846498 conviction: 5.866070530494987
{Barbera, Italy} -> {(85, 90]} lift: 1.541021052855858 conviction: 2.963523005639119
{Champagne Blend} -> {Champagne} lift: 93.70188849451081 conviction: 6.6311471604744545
{Champagne Blend} -> {Champagne, France} lift: 93.70188849451081 conviction: 6.6311471604744545
{(85, 90], Barbera} -> {Piedmont} lift: 31.48938293728122 conviction: 6.662384616050263
{(85, 90], Barbera} -> {Italy, Piedmont} lift: 31.48938293728122 conviction: 6.662384616050263
{Germany} -> {Riesling} lift: 23.332631713548942 conviction: 6.598476056091984
{Provence} -> {Rosé} lift: 45.757794167703636 conviction: 6.724450539961051
{France, Provence} -> {Rosé} lift: 45.757794167703636 conviction: 6.724450539961051
{Provence} -> {France, Rosé} lift: 96.05045169181903 conviction: 6.791418999101966
{Sauvignon Blanc, US} -> {California} lift: 2.9110358845783244 conviction: 4.981925848082434
{France, Pinot Noir} -> {Burgundy} lift: 30.13266414227941 conviction: 6.944235577784675
{(85, 90], Chardonnay, France} -> {Burgundy} lift: 30.17184450381824 conviction: 7.000197749399548
{(85, 90], Argentina} -> {Mendoza Province} lift: 27.463970076470762 conviction: 7.065102274596836
{(85, 90], Barbera} -> {Italy} lift: 5.549063590266359 conviction: 6.173535852864829
{(80, 85], Cabernet Sauvignon, US} -> {California} lift: 2.934552592783347 conviction: 5.238621105993985
{Bordeaux-style White Blend} -> {Bordeaux} lift: 21.42649511657908 conviction: 7.245159941682066
{Bordeaux-style White Blend} -> {Bordeaux, France} lift: 21.42649511657908 c

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onviction: 7.245159941682066
{(90, 95], Cabernet Sauvignon} -> {US} lift: 2.105084325702744 conviction:
4.522721882323667
{Port} -> {Portugal} lift: 24.78384953491834 conviction: 7.653103759265008
{Argentina, Malbec} -> {Mendoza Province} lift: 28.088138137695285 convictio
n: 8.244464225398024
{Champagne Blend} -> {France} lift: 6.379230947937244 conviction: 7.94730131
9232166
{Bordeaux-style White Blend, France} -> {Bordeaux} lift: 22.329595323972082
conviction: 10.008678561070104
{(85, 90], Argentina, Malbec} -> {Mendoza Province} lift: 28.801454339703344
conviction: 10.188030985052299
{(80, 85], Sauvignon Blanc, US} -> {California} lift: 3.06967350900541 convi
ction: 7.4417630248904665
{(85, 90], Spain, Tempranillo} -> {Northern Spain} lift: 28.03034852423237 c
onviction: 10.58169108640272
{(90, 95], Piedmont} -> {Nebbiolo} lift: 61.40797458081156 conviction: 11.17
1076339096093
{(90, 95], Italy, Piedmont} -> {Nebbiolo} lift: 61.40797458081156 convictio
n: 11.171076339096093
{(90, 95], Piedmont} -> {Italy, Nebbiolo} lift: 62.838023303926356 convictio
n: 11.17490812256502
{(85, 90], Italy, Sangiovese} -> {Tuscany} lift: 19.099848611294533 convicti
on: 12.112654590032296
{Petite Sirah} -> {California} lift: 3.137680758655591 conviction: 9.4399014
75431723
{Petite Sirah} -> {California, US} lift: 3.137680758655591 conviction: 9.439
901475431723
{Italy, Sangiovese} -> {Tuscany} lift: 19.28171831286951 conviction: 13.6351
78239398293
{Petite Sirah, US} -> {California} lift: 3.2055804561663614 conviction: 12.8
97427570390127
{Grüner Veltliner} -> {Austria} lift: 47.04866179819514 conviction: 20.83457
491367514
{(85, 90], Bordeaux-style Red Blend, France} -> {Bordeaux} lift: 23.55387522
1973733 conviction: 20.725408861590743
{Champagne Blend, France} -> {Champagne} lift: 105.07512496033007 convictio
n: 21.45056029333902
{(85, 90], Zinfandel} -> {California} lift: 3.247499585208536 conviction: 1
6.66596554340308
{(85, 90], Zinfandel} -> {California, US} lift: 3.247499585208536 convictio
n: 16.66596554340308
{Bordeaux-style White Blend} -> {France} lift: 6.864203972714772 conviction:
21.26908157241385
{(85, 90], US, Zinfandel} -> {California} lift: 3.260038193645635 convictio
n: 18.26205220218262
{(85, 90], Nebbiolo} -> {Piedmont} lift: 35.54546425595175 conviction: 27.00
400858030959
{(85, 90], Nebbiolo} -> {Italy, Piedmont} lift: 35.54546425595175 convictio
n: 27.00400858030959
{Bordeaux-style Red Blend, France} -> {Bordeaux} lift: 23.86572616936144 con
viction: 28.498011510524623
{(85, 90], Nebbiolo} -> {Italy} lift: 6.2405777875875925 conviction: 28.9079
7074027174
{Zinfandel} -> {California} lift: 3.2945633039567843 conviction: 24.80249380
5430796
{Zinfandel} -> {California, US} lift: 3.2945633039567843 conviction: 24.8024
93805430796
{Nebbiolo} -> {Piedmont} lift: 35.903131487864755 conviction: 36.95297074836
898
{Nebbiolo} -> {Italy, Piedmont} lift: 35.903131487864755 conviction: 36.9529

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7074836898
{US, Zinfandel} -> {California} lift: 3.3032583773375093 conviction: 27.2614
1159519221
{Nebbiolo} -> {Italy} lift: 6.282063826193834 conviction: 37.10565427575932
{Petite Sirah} -> {US} lift: 2.367552116076815 conviction: 27.69225294927965
2
{Mosel} -> {Riesling} lift: 26.938835515665282 conviction: 68.7516538043101
{Germany, Mosel} -> {Riesling} lift: 26.938835515665282 conviction: 68.75165
38043101
{Mosel} -> {Germany, Riesling} lift: 71.06500830398043 conviction: 70.373500
783002
{(80, 85], Zinfandel} -> {California} lift: 3.3468294081329204 conviction: 5
4.17506844535636
{(80, 85], Zinfandel} -> {California, US} lift: 3.3468294081329204 convictio
n: 54.17506844535636
{(90, 95], Bordeaux-style Red Blend, France} -> {Bordeaux} lift: 24.37921730
9193873 conviction: 74.50800755233017
{(80, 85], US, Zinfandel} -> {California} lift: 3.3541051242375577 convictio
n: 64.86906144963758
{(85, 90], Barbera, Italy} -> {Piedmont} lift: 36.47913526567268 conviction:
90.86703673415535
{Barbera, Italy} -> {Piedmont} lift: 36.53901801285418 conviction: 107.11413
894385412
{(85, 90], Italy, Nebbiolo} -> {Piedmont} lift: 36.61503690156715 convictio
n: 138.56596999424443
{(90, 95], Nebbiolo} -> {Piedmont} lift: 36.67865873947059 conviction: 183.7
1224624324134
{(90, 95], Nebbiolo} -> {Italy, Piedmont} lift: 36.67865873947059 convictio
n: 183.71224624324134
{(90, 95], Nebbiolo} -> {Italy} lift: 6.399989714507664 conviction: 191.3498
9998946062
{(85, 90], Zinfandel} -> {US} lift: 2.4094831359002713 conviction: 152.50802
72685694
{Italy, Nebbiolo} -> {Piedmont} lift: 36.73923181018489 conviction: 266.3259
830813341
{Zinfandel} -> {US} lift: 2.412419257354652 conviction: 222.83766389457506
{(80, 85], Zinfandel} -> {US} lift: 2.4135393349498107 conviction: 270.40840
93818142
{(90, 95], Italy, Nebbiolo} -> {Piedmont} lift: 36.8412414466491 conviction:
1097.408044880077
{Sangiovese Grosso} -> {Italy} lift: 6.4235825654240255 conviction: 1136.613
755855838
{Sangiovese Grosso} -> {Tuscany} lift: 20.713208552537466 conviction: 1281.0
638645566862
{Sangiovese Grosso} -> {Italy, Tuscany} lift: 20.713208552537466 conviction:
1281.0638645566862
{California} -> {US} lift: 2.4187861595910056 conviction: 586569488.156369
{Northern Spain} -> {Spain} lift: 18.254112239961298 conviction: 945217823.4
222295
{Oregon} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{Provence} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Northeastern Italy} -> {Italy} lift: 6.428358463242184 conviction: 84443929
1.0385953
{Southwest France} -> {France} lift: 7.15352166082093 conviction: 860208712.
936889
{Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{Tuscany} -> {Italy} lift: 6.4283584632421835 conviction: 844439291.0385953
{Rhône Valley} -> {France} lift: 7.153521660820931 conviction: 860208712.936
889
{Burgundy} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Loire Valley} -> {France} lift: 7.153521660820932 conviction: 860208712.936
```

889

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{New York} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{Mendoza Province} -> {Argentina} lift: 26.8025217545729 conviction: 9626900
77.8532383
{Alentejano} -> {Portugal} lift: 28.358699736941 conviction: 964737452.37700
84
{Portuguese Red} -> {Portugal} lift: 28.358699736941002 conviction: 96473745
2.3770084
{Piedmont} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{Champagne} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Veneto} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{Douro} -> {Portugal} lift: 28.358699736941002 conviction: 964737452.3770084
{Sicily & Sardinia} -> {Italy} lift: 6.4283584632421835 conviction: 84443929
1.0385953
{Southern Italy} -> {Italy} lift: 6.428358463242184 conviction: 844439291.03
85953
{Languedoc-Roussillon} -> {France} lift: 7.153521660820931 conviction: 86020
8712.936889
{Bordeaux} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Catalonia} -> {Spain} lift: 18.254112239961295 conviction: 945217823.422229
5
{Colchagua Valley} -> {Chile} lift: 25.949965612104535 conviction: 96146430
3.4619844
{Alsace} -> {France} lift: 7.15352166082093 conviction: 860208712.936889
{Portuguese White} -> {Portugal} lift: 28.358699736941 conviction: 96473745
2.3770084
{Mosel} -> {Germany} lift: 61.55179445350734 conviction: 983753519.9602451
{Other} -> {Argentina} lift: 26.8025217545729 conviction: 962690077.8532383
{Burgenland} -> {Austria} lift: 49.37029767746156 conviction: 979744906.4104
687
{South Australia} -> {Australia} lift: 30.446842848497077 conviction: 967155
872.1219149
{Maipo Valley} -> {Chile} lift: 25.949965612104542 conviction: 961464303.461
9844
{Casablanca Valley} -> {Chile} lift: 25.94996561210454 conviction: 96146430
3.4619844
{Marlborough} -> {New Zealand} lift: 45.45933734939759 conviction: 97800231
9.0326321
{Central Italy} -> {Italy} lift: 6.428358463242184 conviction: 844439291.038
5953
{Corvina, Rondinella, Molinara} -> {Italy} lift: 6.428358463242184 convictio
n: 844439291.0385953
{Corvina, Rondinella, Molinara} -> {Veneto} lift: 38.093134780413926 convict
ion: 973748550.604605
{Cabernet Sauvignon, California} -> {US} lift: 2.4187861595910056 convictio
n: 586569488.156369
{California, Sauvignon Blanc} -> {US} lift: 2.418786159591006 conviction: 58
6569488.156369
{Oregon, Pinot Noir} -> {US} lift: 2.418786159591006 conviction: 586569488.1
56369
{(90, 95], Oregon} -> {US} lift: 2.4187861595910056 conviction: 586569488.15
6369
{(90, 95], California} -> {US} lift: 2.418786159591006 conviction: 58656948
8.156369
{California, Pinot Noir} -> {US} lift: 2.418786159591006 conviction: 5865694
88.156369
{Northern Spain, Tempranillo} -> {Spain} lift: 18.254112239961298 convictio
n: 945217823.4222295
{California, Chardonnay} -> {US} lift: 2.418786159591006 conviction: 5865694
88.156369
{(90, 95], Washington} -> {US} lift: 2.4187861595910056 conviction: 58656948

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8.156369
{Syrah, Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.15
6369
{(85, 90], California} -> {US} lift: 2.4187861595910056 conviction: 58656948
8.156369
{(85, 90], Tuscany} -> {Italy} lift: 6.428358463242184 conviction: 84443929
1.0385953
{Sangiovese, Tuscany} -> {Italy} lift: 6.4283584632421835 conviction: 844439
291.0385953
{(85, 90], Washington} -> {US} lift: 2.4187861595910056 conviction: 58656948
8.156369
{(85, 90], Rhône Valley} -> {France} lift: 7.153521660820931 conviction: 860
208712.936889
{Red Blend, Tuscany} -> {Italy} lift: 6.4283584632421835 conviction: 8444392
91.0385953
{Cabernet Sauvignon, Washington} -> {US} lift: 2.418786159591006 conviction:
586569488.156369
{(85, 90], Burgundy} -> {France} lift: 7.153521660820932 conviction: 8602087
12.936889
{Burgundy, Chardonnay} -> {France} lift: 7.153521660820932 conviction: 86020
8712.936889
{(85, 90], Loire Valley} -> {France} lift: 7.153521660820932 conviction: 860
208712.936889
{Loire Valley, Sauvignon Blanc} -> {France} lift: 7.15352166082093 convictio
n: 860208712.936889
{(85, 90], New York} -> {US} lift: 2.418786159591006 conviction: 586569488.1
56369
{Malbec, Mendoza Province} -> {Argentina} lift: 26.802521754572897 convictio
n: 962690077.8532383
{(90, 95], Burgundy} -> {France} lift: 7.15352166082093 conviction: 86020871
2.936889
{California, Syrah} -> {US} lift: 2.418786159591006 conviction: 586569488.15
6369
{(90, 95], Piedmont} -> {Italy} lift: 6.4283584632421835 conviction: 8444392
91.0385953
{Nebbiolo, Piedmont} -> {Italy} lift: 6.4283584632421835 conviction: 8444392
91.0385953
{(85, 90], Veneto} -> {Italy} lift: 6.4283584632421835 conviction: 84443929
1.0385953
{(85, 90], Portuguese Red} -> {Portugal} lift: 28.358699736941 conviction: 9
64737452.3770084
{(85, 90], Southwest France} -> {France} lift: 7.15352166082093 conviction:
860208712.936889
{(85, 90], Mendoza Province} -> {Argentina} lift: 26.802521754572897 convict
ion: 962690077.8532383
{California, Zinfandel} -> {US} lift: 2.418786159591006 conviction: 58656948
8.156369
{(85, 90], Northern Spain} -> {Spain} lift: 18.254112239961295 conviction: 9
45217823.4222295
{(85, 90], Sicily & Sardinia} -> {Italy} lift: 6.4283584632421835 convictio
n: 844439291.0385953
{(85, 90], Southern Italy} -> {Italy} lift: 6.428358463242184 conviction: 84
4439291.0385953
{(85, 90], Bordeaux} -> {France} lift: 7.15352166082093 conviction: 86020871
2.936889
{(85, 90], Oregon} -> {US} lift: 2.418786159591006 conviction: 586569488.156
369
{(85, 90], Catalonia} -> {Spain} lift: 18.254112239961295 conviction: 945217
823.4222295
{Bordeaux-style Red Blend, California} -> {US} lift: 2.418786159591006 convi
ction: 586569488.156369
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{Bordeaux, Bordeaux-style Red Blend} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Merlot, Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(90, 95], Bordeaux} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Bordeaux, Bordeaux-style White Blend} -> {France} lift: 7.153521660820932 conviction: 860208712.936889
{California, Merlot} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(85, 90], Piedmont} -> {Italy} lift: 6.4283584632421835 conviction: 844439291.0385953
{California, Red Blend} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{Burgundy, Pinot Noir} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Provence, Rosé} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{Mosel, Riesling} -> {Germany} lift: 61.55179445350734 conviction: 983753519.9602451
{(85, 90], Alsace} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{(85, 90], South Australia} -> {Australia} lift: 30.446842848497074 conviction: 967155872.1219149
{Barbera, Piedmont} -> {Italy} lift: 6.4283584632421835 conviction: 844439291.0385953
{(80, 85], California} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(80, 85], Mendoza Province} -> {Argentina} lift: 26.8025217545729 conviction: 962690077.8532383
{(80, 85], Northern Spain} -> {Spain} lift: 18.254112239961295 conviction: 945217823.4222295
{Shiraz, South Australia} -> {Australia} lift: 30.44684284849707 conviction: 967155872.1219149
{(90, 95], Tuscany} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{Red Blend, Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{Marlborough, Sauvignon Blanc} -> {New Zealand} lift: 45.459337349397586 conviction: 978002319.0326321
{Champagne, Champagne Blend} -> {France} lift: 7.153521660820932 conviction: 860208712.936889
{(80, 85], Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(80, 85], New York} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{California, Petite Sirah} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(85, 90], Northeastern Italy} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{(85, 90], Central Italy} -> {Italy} lift: 6.4283584632421835 conviction: 844439291.0385953
{(80, 85], Bordeaux} -> {France} lift: 7.153521660820931 conviction: 860208712.936889
{(85, 90], Marlborough} -> {New Zealand} lift: 45.45933734939759 conviction: 978002319.0326321
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{(85, 90], Corvina, Rondinella, Molinara} -> {Veneto} lift: 38.09313478041393 conviction: 973748550.604605
{Corvina, Rondinella, Molinara, Veneto} -> {Italy} lift: 6.428358463242184 c

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onviction: 844439291.0385953
{Corvina, Rondinella, Molinara, Italy} -> {Veneto} lift: 38.093134780413926
conviction: 973748550.604605
{Corvina, Rondinella, Molinara} -> {Italy, Veneto} lift: 38.093134780413926
conviction: 973748550.604605
{Sangiovese Grosso, Tuscany} -> {Italy} lift: 6.428358463242184 conviction:
844439291.0385953
{Italy, Sangiovese Grosso} -> {Tuscany} lift: 20.72860870759511 conviction:
951757495.4447572
{(90, 95], California, Pinot Noir} -> {US} lift: 2.4187861595910056 convicti
on: 586569488.156369
{(90, 95], Cabernet Sauvignon, California} -> {US} lift: 2.4187861595910056
conviction: 586569488.156369
{(90, 95], California, Chardonnay} -> {US} lift: 2.418786159591006 convictio
n: 586569488.156369
{(85, 90], California, Chardonnay} -> {US} lift: 2.418786159591006 convictio
n: 586569488.156369
{(85, 90], Sangiovese, Tuscany} -> {Italy} lift: 6.4283584632421835 convicti
on: 844439291.0385953
{(85, 90], Red Blend, Tuscany} -> {Italy} lift: 6.4283584632421835 convictio
n: 844439291.0385953
{(85, 90], Cabernet Sauvignon, California} -> {US} lift: 2.418786159591006 c
onviction: 586569488.156369
{(85, 90], Cabernet Sauvignon, Washington} -> {US} lift: 2.418786159591006 c
onviction: 586569488.156369
{(85, 90], Burgundy, Chardonnay} -> {France} lift: 7.15352166082093 convicti
on: 860208712.936889
{(90, 95], Burgundy, Chardonnay} -> {France} lift: 7.15352166082093 convicti
on: 860208712.936889
{(90, 95], Nebbiolo, Piedmont} -> {Italy} lift: 6.428358463242184 convictio
n: 844439291.0385953
{(85, 90], Malbec, Mendoza Province} -> {Argentina} lift: 26.802521754572904
conviction: 962690077.8532383
{(85, 90], California, Zinfandel} -> {US} lift: 2.418786159591006 convictio
n: 586569488.156369
{(85, 90], Northern Spain, Tempranillo} -> {Spain} lift: 18.254112239961298
conviction: 945217823.4222295
{(85, 90], California, Sauvignon Blanc} -> {US} lift: 2.4187861595910056 con
viction: 586569488.156369
{(85, 90], California, Pinot Noir} -> {US} lift: 2.418786159591006 convictio
n: 586569488.156369
{(85, 90], California, Syrah} -> {US} lift: 2.4187861595910056 conviction: 5
86569488.156369
{(85, 90], Oregon, Pinot Noir} -> {US} lift: 2.418786159591006 conviction: 5
86569488.156369
{(85, 90], Bordeaux, Bordeaux-style Red Blend} -> {France} lift: 7.153521660
820931 conviction: 860208712.936889
{(85, 90], California, Merlot} -> {US} lift: 2.418786159591006 conviction: 5
86569488.156369
{(85, 90], Nebbiolo, Piedmont} -> {Italy} lift: 6.4283584632421835 convictio
n: 844439291.0385953
{(85, 90], California, Red Blend} -> {US} lift: 2.4187861595910056 convictio
n: 586569488.156369
{(90, 95], Bordeaux, Bordeaux-style Red Blend} -> {France} lift: 7.153521660
820931 conviction: 860208712.936889
{(85, 90], Burgundy, Pinot Noir} -> {France} lift: 7.153521660820931 convict
ion: 860208712.936889
{(85, 90], Barbera, Piedmont} -> {Italy} lift: 6.428358463242184 conviction:
844439291.0385953
{(80, 85], Cabernet Sauvignon, California} -> {US} lift: 2.4187861595910056
conviction: 586569488.156369
```



```
{(80, 85], California, Merlot} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(80, 85], California, Chardonnay} -> {US} lift: 2.4187861595910056 conviction: 586569488.156369
{(90, 95], Red Blend, Tuscany} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{(85, 90], Red Blend, Washington} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(80, 85], California, Zinfandel} -> {US} lift: 2.4187861595910056 conviction: 586569488.156369
{(80, 85], California, Pinot Noir} -> {US} lift: 2.4187861595910056 conviction: 586569488.156369
{(80, 85], California, Sauvignon Blanc} -> {US} lift: 2.418786159591006 conviction: 586569488.156369
{(85, 90], Corvina, Rondinella, Molinara, Veneto} -> {Italy} lift: 6.428358463242184 conviction: 844439291.0385953
{(85, 90], Corvina, Rondinella, Molinara, Italy} -> {Veneto} lift: 38.09313478041393 conviction: 973748550.604605
{(85, 90], Corvina, Rondinella, Molinara} -> {Italy, Veneto} lift: 38.09313478041393 conviction: 973748550.604605
```

In [20]:

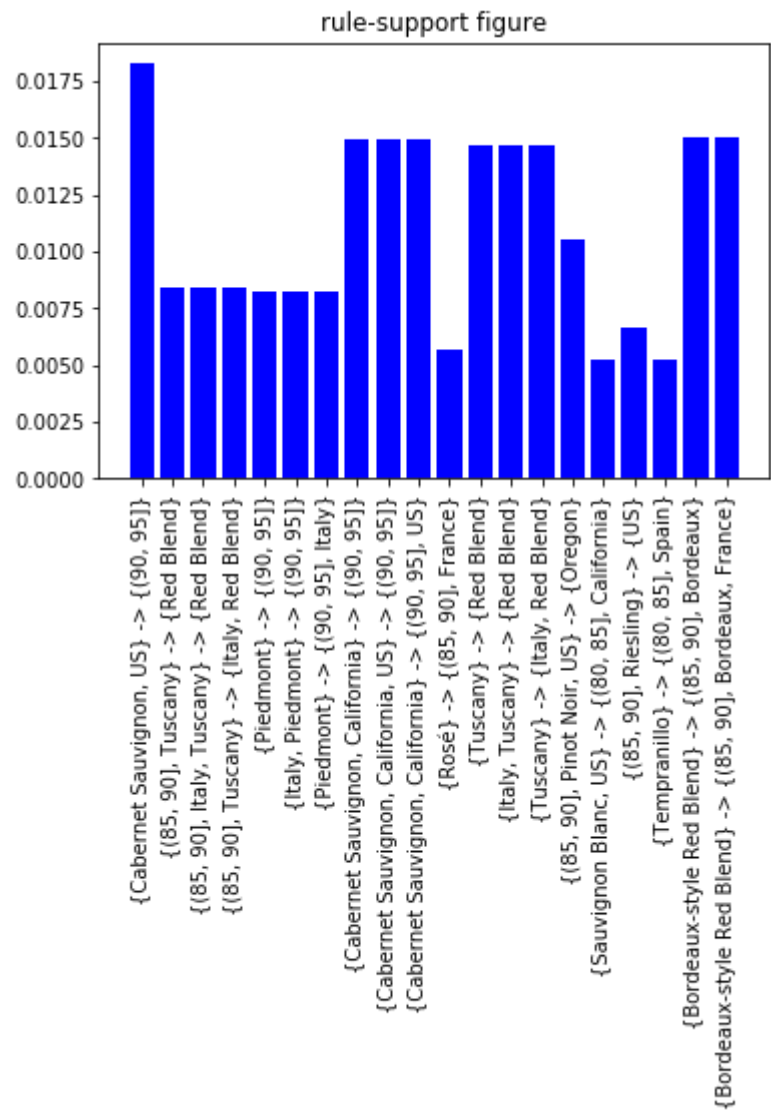
```
print("挖掘规则可视化：")

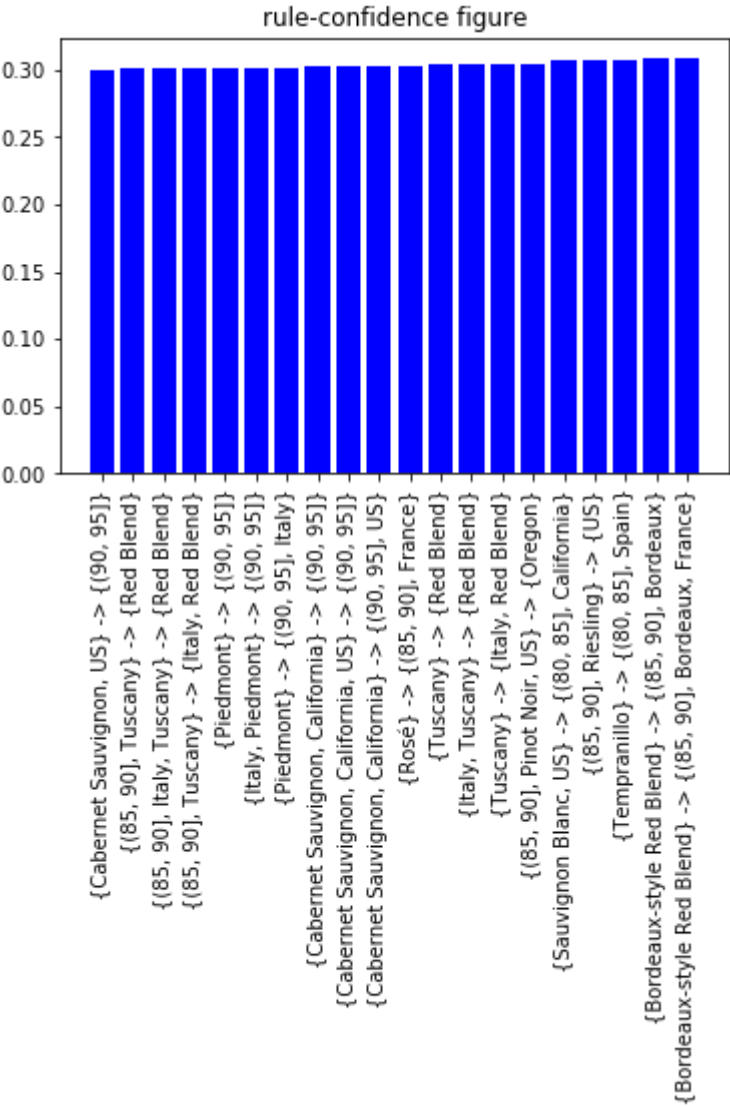
def plot_bar(rules, data, title):
    plt.title(title)
    plt.xticks(range(len(data)), rules, rotation=90)
    plt.bar(range(len(data)), data, color = 'B')
    # plt.savefig('figures\\'+title+'.png')
    plt.show()

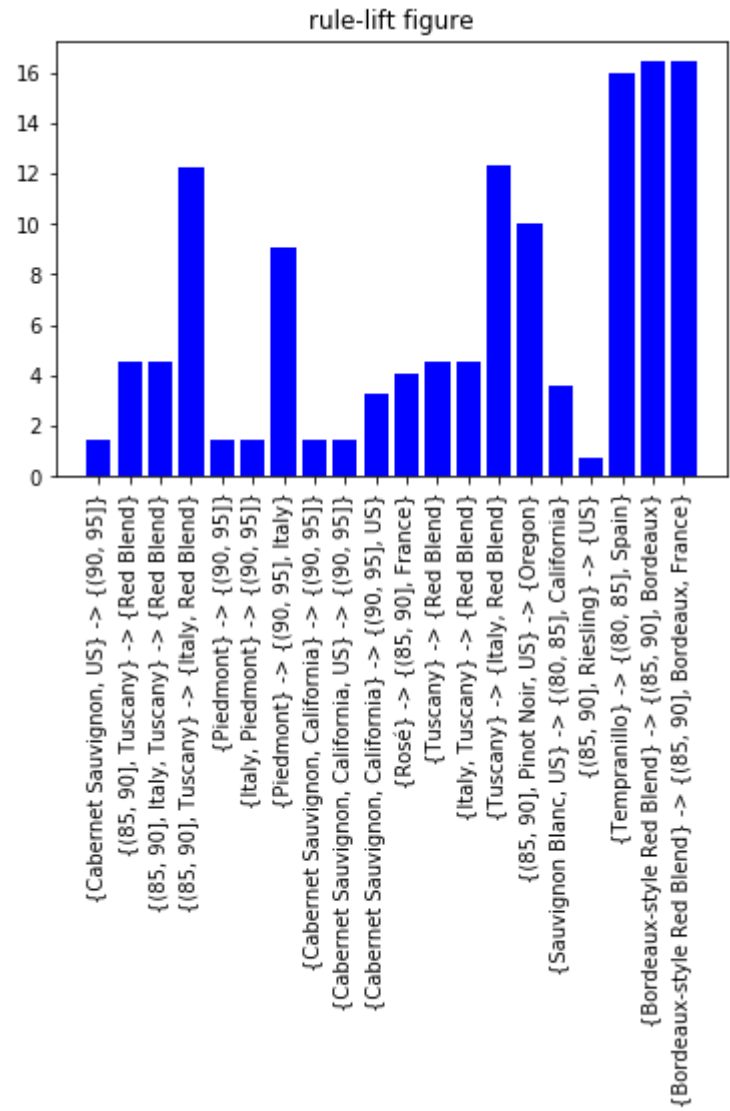
def visualization(big_rule_list):
    rules = []
    conf = []
    support = []
    lift = []
    for rule in big_rule_list:
        rules.append(repr(rule))
        conf.append(rule.confidence)
        support.append(rule.support)
        lift.append(rule.lift)
    plot_bar(rules, support, 'rule-support figure')
    plot_bar(rules, conf, 'rule-confidence figure')
    plot_bar(rules, lift, 'rule-lift figure')

visualization(sorted(rules, key=lambda rule: rule.confidence)[:20])
```

挖掘规则可视化：







In []: