

# BIT数据挖掘作业2—Wine Reviews

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## 对数据集进行处理，转换成适合进行关联规则挖掘的形式

### 数据描述:

```
id: 编号  
country: 葡萄酒来源的国家  
description: 葡萄酒描述  
designation: 葡萄园名称  
points: 葡萄酒评分  
price: 葡萄酒价格  
province: 葡萄酒来源的省或州  
region_1: 葡萄酒产区  
region_2: 葡萄酒具体产区  
variety: 葡萄的品种  
winery: 酒厂  
taster_name: 品鉴师  
taster_twitter_handle: 品鉴师推特  
title: 品鉴师头衔
```

```
%matplotlib inline  
import warnings  
warnings.filterwarnings('ignore')  
  
import os  
import math  
import scipy  
import numpy as np  
import pandas as pd  
import matplotlib.pyplot as plt  
import seaborn as sns
```

### 加载并剔除重复数据

```
def loadData(file_path, file_name):  
    path = os.path.join(file_path, file_name)  
    df = pd.read_csv(path)  
    return df
```

```
file_path = 'D:/Dataset/DataMining/Wine_Reviews'  
file_name = 'winemag-data-130k-v2.csv'  
  
#删除重复数据  
wine_data_130k = loadData(file_path, file_name).drop('Unnamed: 0', axis=1).drop_duplicates()  
  
print('wine_130k数据量为: ', len(wine_data_130k))  
  
display(wine_data_130k.head(5))
```

```
wine_130k数据量为: 119988
```

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
0	Italy	Aromas include tropical fruit, broom, brimston...	Vulkà Bianco	87	NaN	Sicily & Sardinia	Etna	NaN	Kerin O'Keefe	@kerinookeefe
1	Portugal	This is ripe and fruity, a wine that is smooth...	Avidagos	87	15.0	Douro	NaN	NaN	Roger Voss	@vossroger
2	US	Tart and snappy, the flavors of lime flesh and...	NaN	87	14.0	Oregon	Willamette Valley	Willamette Valley	Paul Gregutt	@paulgwine
3	US	Pineapple rind, lemon pith and orange blossom ...	Reserve Late Harvest	87	13.0	Michigan	Lake Michigan Shore	NaN	Alexander Peartree	NaN
4	US	Much like the regular bottling from 2012, this...	Vintner's Reserve Wild Child Block	87	65.0	Oregon	Willamette Valley	Willamette Valley	Paul Gregutt	@paulgwine

```

print('wine_130k的数据缺失情况为：')
print(wine_data_130k.isnull().sum())
for column in wine_data_130k.columns:
    idx = wine_data_130k[column].isnull()
    if idx.any():
        print('-' * 50, column, '-' * 50)
        display(wine_data_130k[idx].head(1))
    
```

wine\_130k的数据缺失情况为：

country	59
description	0
designation	34545
points	0
price	8395
province	59
region_1	19560
region_2	73219
taster_name	24917
taster_twitter_handle	29446
title	0
variety	1
winery	0
dtype: int64	

----- country -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
913	NaN	Amber in color, this wine has aromas of peach ...	Asureti Valley	87	30.0	NaN	NaN	NaN	Mike DeSimone	@worldwineguys

----- designation -----

---

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
2	US	Tart and snappy, the flavors of lime flesh and...	NaN	87	14.0	Oregon	Willamette Valley	Willamette Valley	Paul Gregutt	@paulgwine

----- price -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
0	Italy	Aromas include tropical fruit, broom, brimston...	Vulkà Bianco	87	NaN	Sicily & Sardinia	Etna	NaN	Kerin O'Keefe	@kerinokeefe

----- province -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
913	NaN	Amber in color, this wine has aromas of peach ...	Asureti Valley	87	30.0	NaN	NaN	NaN	Mike DeSimone	@worldwineguys

----- region\_1 -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
1	Portugal	This is ripe and fruity, a wine that is smooth...	Avidagos	87	15.0	Douro	NaN	NaN	Roger Voss	@vossroger

----- region\_2 -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
0	Italy	Aromas include tropical fruit, broom, brimston...	Vulkà Bianco	87	NaN	Sicily & Sardinia	Etna	NaN	Kerin O'Keefe	@kerinokeefe

----- taster\_name -----

---

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter_handle
31	Italy	Merlot and Nero d'Avola form the base for this...	Calanica Nero d'Avola-Merlot	86	NaN	Sicily & Sardinia	Sicilia	NaN	NaN	NaN

----- taster\_twitter\_handle -----

-----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter han
3	US	Pineapple rind, lemon pith and orange blossom ...	Reserve Late Harvest	87	13.0	Michigan	Lake Michigan Shore	NaN	Alexander Peartree	NaN

----- variety -----

	country	description	designation	points	price	province	region_1	region_2	taster_name	taster_twitter
86909	Chile	A chalky, dusty mouthfeel nicely balances this...	NaN	88	17.0	Maipo Valley	NaN	NaN	NaN	NaN

通过观察数据集各属性的缺失情况，应当选择具有代表性（属性间的冗余性低）且数据缺失较少的部分属性进行挖掘，在这里选择 Country、points、price、province、taster\_name、variety、winery 7个属性进行挖掘

```
# 选择数据集中的Country、points、price、province、taster_name、variety、winery属性，构成新的数据集
mine_col = ['country', 'points', 'price', 'province', 'variety', 'winery', 'taster_name']
mine_col_nominal = ['country', 'province', 'variety', 'winery', 'taster_name']
mine_col_numeric = ['points', 'price']

wine_data_130k_sub = wine_data_130k[mine_col]
wine_data_130k_sub.head(5)
```

	country	points	price	province	variety	winery	taster_name
0	Italy	87	NaN	Sicily & Sardinia	White Blend	Nicosia	Kerin O'Keefe
1	Portugal	87	15.0	Douro	Portuguese Red	Quinta dos Avidagos	Roger Voss
2	US	87	14.0	Oregon	Pinot Gris	Rainstorm	Paul Gregutt
3	US	87	13.0	Michigan	Riesling	St. Julian	Alexander Peartree
4	US	87	65.0	Oregon	Pinot Noir	Sweet Cheeks	Paul Gregutt

频繁模式和关联规则的挖掘应当尽量来自于真实数据。由于缺失较多，且不恰当的填补缺失值方式会影响数据集的真实分布，这里选择剔除缺失的数据。

```
# 剔除缺失的数据
wine_data_130k_new = wine_data_130k_sub.dropna()
print('剔除缺失数据后wine_130k的数据量为：', len(wine_data_130k_new))
wine_data_130k_new.head(5)
```

剔除缺失数据后wine\_130k的数据量为： 88265

	country	points	price	province	variety	winery	taster_name
1	Portugal	87	15.0	Douro	Portuguese Red	Quinta dos Avidagos	Roger Voss
2	US	87	14.0	Oregon	Pinot Gris	Rainstorm	Paul Gregutt
3	US	87	13.0	Michigan	Riesling	St. Julian	Alexander Peartree
4	US	87	65.0	Oregon	Pinot Noir	Sweet Cheeks	Paul Gregutt
5	Spain	87	15.0	Northern Spain	Tempranillo-Merlot	Tandem	Michael Schachner

针对标称属性，这里不做处理。针对数值属性，尤其是针对价格、评分这类取值较多但一定区间内具有相似性的属性，这里选择使用区间划分进行离散化处理。

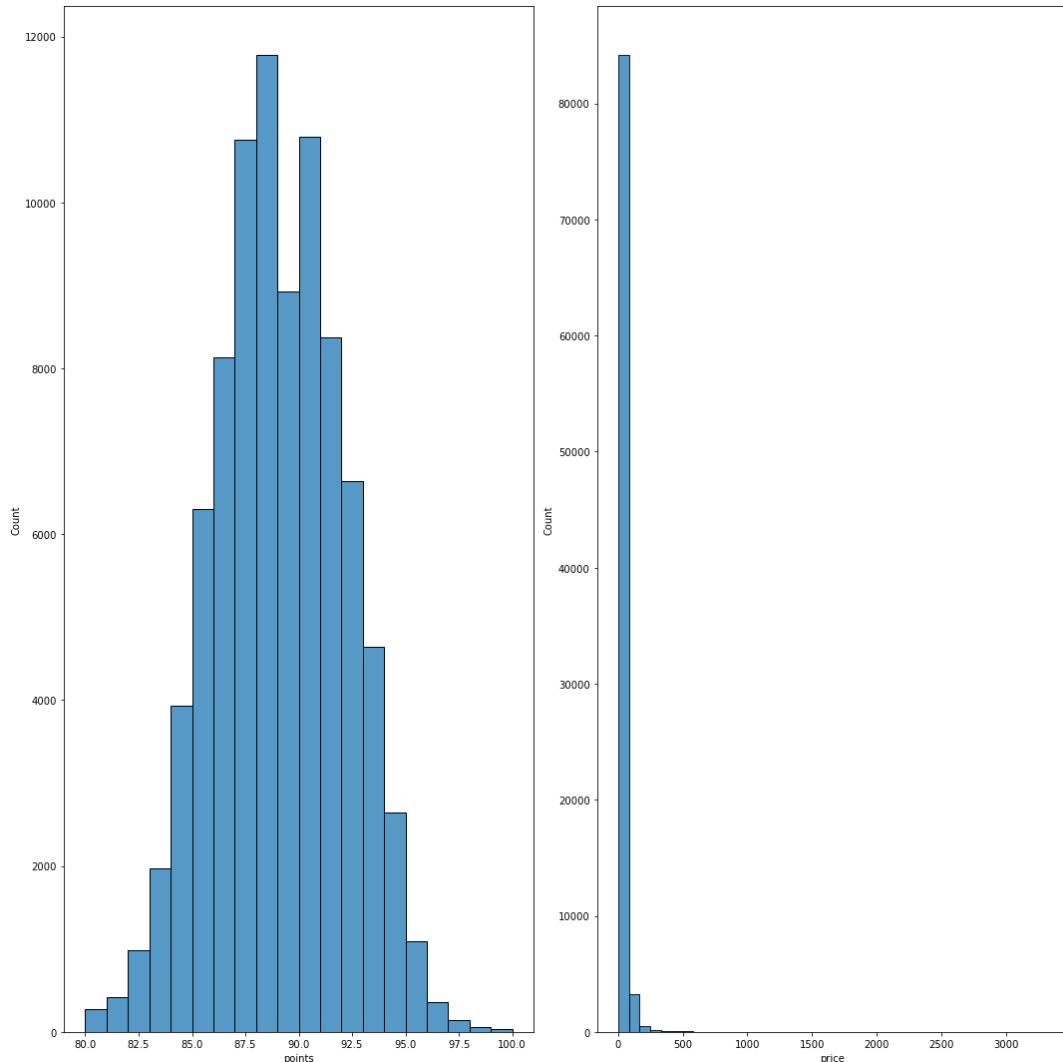
```
# 观察Points、Price的五数概括
def calStatisticalFeature(df, columns):
    df_desc = df[columns].describe()
    display(df_desc)

calStatisticalFeature(wine_data_130k_new, mine_col_numeric)
```

	points	price
count	88265.000000	88265.000000
mean	88.581386	35.293842
std	3.008537	44.405889
min	80.000000	4.000000
25%	87.000000	17.000000
50%	88.000000	25.000000
75%	91.000000	42.000000
max	100.000000	3300.000000

```
# 观察Points、Price的数据分布情况
def drawHistogramForNumerical(df, columns, figsize=(15, 15), bins=[20, 40]):
    fig, ax = plt.subplots(1, 2, figsize=figsize)
    for idx, column in enumerate(columns):
        sns.histplot(data=df[column], ax=ax[idx % 2], bins=bins[idx])
    fig.tight_layout()

drawHistogramForNumerical(wine_data_130k_new, mine_col_numeric)
```



观察上述结果，决定将Points大致划分为4个区间，分别对应低分 (0-85) , 中低分 (85-89) , 中高分 (89-93) , 高分 (93-100)  
 Price大致划分为3个区间，分别对应低价 (0-25) , 中价 (25-60) , 高价 (60-3500)

处理后的结果如下：

```
points_bin = [0., 85., 89., 93., 100.]
price_bin = [0., 25., 60., 3500.]
wine_data_130k_new['points'] = pd.cut(wine_data_130k_new['points'], points_bin).astype('str')
wine_data_130k_new['price'] = pd.cut(wine_data_130k_new['price'], price_bin).astype('str')
wine_data_130k_new.head(5)
```

	country	points	price	province	variety	winery	taster_name
1	Portugal	(85.0, 89.0]	(0.0, 25.0]	Douro	Portuguese Red	Quinta dos Avidagos	Roger Voss
2	US	(85.0, 89.0]	(0.0, 25.0]	Oregon	Pinot Gris	Rainstorm	Paul Gregutt
3	US	(85.0, 89.0]	(0.0, 25.0]	Michigan	Riesling	St. Julian	Alexander Peartree
4	US	(85.0, 89.0]	(60.0, 3500.0]	Oregon	Pinot Noir	Sweet Cheeks	Paul Gregutt
5	Spain	(85.0, 89.0]	(0.0, 25.0]	Northern Spain	Tempranillo-Merlot	Tandem	Michael Schachner

```
# 为每个值添加上对应的列名前缀，方便分析
for column in wine_data_130k_new.columns:
    wine_data_130k_new[column] = str(column) + ':' + wine_data_130k_new[column].astype(str)

wine_data_130k_new.head(5)
```

	country	points	price	province	variety	winery	taster_name
1	country: Portugal	points: (85.0, 89.0]	price: (0.0, 25.0]	province: Douro	variety: Portuguese Red	winery: Quinta dos Avidagos	taster_name: Roger Voss
2	country: US	points: (85.0, 89.0]	price: (0.0, 25.0]	province: Oregon	variety: Pinot Gris	winery: Rainstorm	taster_name: Paul Gregutt
3	country: US	points: (85.0, 89.0]	price: (0.0, 25.0]	province: Michigan	variety: Riesling	winery: St. Julian	taster_name: Alexander Peartree
4	country: US	points: (85.0, 89.0]	price: (60.0, 3500.0]	province: Oregon	variety: Pinot Noir	winery: Sweet Cheeks	taster_name: Paul Gregutt
5	country: Spain	points: (85.0, 89.0]	price: (0.0, 25.0]	province: Northern Spain	variety: Tempranillo-Merlot	winery: Tandem	taster_name: Michael Schachner

## 找出频繁模式

### 使用Apriori算法找出所有的频繁项集

```
def createC1(dataSet):
    C1 = []
    for transaction in np.array(dataSet):
        for item in transaction:
            if [item] not in C1:
                C1.append([item])
    C1.sort()
    return list(map(frozenset, C1))

def scan(D, Ck, minSupport):
    ssCnt = {}
    for tid in D:
        if Ck is not None:
            for can in Ck:
                if can.issubset(tid):
                    ssCnt[can] = ssCnt.get(can, 0) + 1
    numItems = float(len(D))
    retList = []
    supportData = {}
    for key in ssCnt:
        support = ssCnt[key] / numItems
        if support >= minSupport:
            retList.insert(0, key)
            supportData[key] = support
    return retList, supportData
```

```
def aprioriGen( Lk, k ):
    retList = []
    lenLk = len(Lk)
    for i in range(lenLk):
```

```

        for j in range(i + 1, lenLk):
            L1 = list(Lk[ i ])[ : k - 2];
            L2 = list(Lk[ j ])[ : k - 2];
            L1.sort(); L2.sort()
            if L1==L2:
                retList.append(Lk[i] | Lk[j])
    return retList

def apriori(dataSet, minSupport=0.01):
    C1 = createC1(dataSet)
    D = list(map(set, dataSet))
    L1, suppData = scanD(D, C1, minSupport)
    L = [L1]
    k = 2

    while (len(L[k - 2]) > 0):
        Ck = apriorigen(L[k - 2], k)
        Lk, supK = scanD(D, Ck, minSupport)
        suppData.update(supK)
        L.append(Lk)
        k += 1
    return L, suppData

```

```
L, suppData = apriori(wine_data_130k_new.values.tolist())
L
```

```
[[frozenset({'province': 'Loire Valley'}),  
 frozenset({'variety': 'Tempranillo'}),  
 frozenset({'province': 'Veneto'}),  
 frozenset({'variety': 'Nebbiolo'}),  
 frozenset({'province': 'Piedmont'}),  
 frozenset({'points': (93.0, 100.0)}),  
 frozenset({'variety': 'Sparkling Blend'}),  
 frozenset({'province': 'Provence'}),  
 frozenset({'province': 'Catalonia'}),  
 frozenset({'taster_name': 'Susan Kostrzewa'}),  
 frozenset({'province': 'Rhône Valley'}),  
 frozenset({'province': 'Northeastern Italy'}),  
 frozenset({'taster_name': 'Lauren Buzzeo'}),  
 frozenset({'country': 'New Zealand'}),  
 frozenset({'province': 'Southwest France'}),  
 frozenset({'variety': 'Portuguese White'}),  
 frozenset({'variety': 'Rhône-style Red Blend'}),  
 frozenset({'country': 'South Africa'}),  
 frozenset({'points': (89.0, 93.0)}),  
 frozenset({'variety': 'Syrah'}),  
 frozenset({'province': 'New York'}),  
 frozenset({'variety': 'Grüner Veltliner'}),  
 frozenset({'taster_name': 'Anne Krebiehl\xa0Mw'}),  
 frozenset({'country': 'Austria'}),  
 frozenset({'province': 'Tuscany'}),  
 frozenset({'variety': 'Zinfandel'}),  
 frozenset({'variety': 'Rosé'}),  
 frozenset({'taster_name': 'Joe Czerwinski'}),  
 frozenset({'province': 'South Australia'}),  
 frozenset({'country': 'Australia'}),  
 frozenset({'taster_name': 'Jim Gordon'}),  
 frozenset({'variety': 'Bordeaux-style Red Blend'}),  
 frozenset({'province': 'Burgundy'}),  
 frozenset({'variety': 'Sauvignon Blanc'}),  
 frozenset({'variety': 'Champagne Blend'}),  
 frozenset({'province': 'Champagne'}),  
 frozenset({'variety': 'Cabernet Franc'}),  
 frozenset({'variety': 'Sangiovese'}),  
 frozenset({'taster_name': 'Sean P. Sullivan'}),  
 frozenset({'province': 'Washington'}),  
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 frozenset({'points': (0.0, 85.0)}),  
 frozenset({'country': 'Chile'}),  
 frozenset({'variety': 'Merlot'}),  
 frozenset({'variety': 'White Blend'}),  
 frozenset({'variety': 'Red Blend'}),  
 frozenset({'province': 'Mendoza Province'}),  
 frozenset({'variety': 'Malbec'}),  
 frozenset({'country': 'Argentina'}),  
 frozenset({'province': 'Mosel'}),  
 frozenset({'variety': 'Chardonnay'}),  
 frozenset({'taster_name': 'Matt Kettmann'}),  
 frozenset({'variety': 'Cabernet Sauvignon'}),  
 frozenset({'taster_name': 'Virginie Boone'}),  
 frozenset({'province': 'California'}),  
 frozenset({'price': (25.0, 60.0)}),  
 frozenset({'taster_name': 'Anna Lee C. Iijima'})],
```

```
frozenset({'country': 'Germany'}),
frozenset({'province': 'Alsace'}),
frozenset({'country': 'France'}),
frozenset({'taster_name': 'Kerin O'Keefe'}),
frozenset({'country': 'Italy'}),
frozenset({'taster_name': 'Michael Schachner'}),
frozenset({'province': 'Northern Spain'}),
frozenset({'country': 'Spain'}),
frozenset({'variety': 'Pinot Noir'}),
frozenset({'price': (60.0, 3500.0]})),
frozenset({'variety': 'Riesling'}),
frozenset({'variety': 'Pinot Gris'}),
frozenset({'taster_name': 'Paul Gregutt'}),
frozenset({'province': 'Oregon'}),
frozenset({'country': 'US'}),
frozenset({'variety': 'Portuguese Red'}),
frozenset({'taster_name': 'Roger Voss'}),
frozenset({'province': 'Douro'}),
frozenset({'price': (0.0, 25.0]})),
frozenset({'points': (85.0, 89.0]}),
frozenset({'country': 'Portugal']),
[frozenset({'points': (0.0, 85.0]', 'variety': 'Cabernet Sauvignon'}),
frozenset({'country': 'Portugal', 'points': (0.0, 85.0]})),
frozenset({'country': 'Austria', 'price': (25.0, 60.0]})),
frozenset({'price': (25.0, 60.0]', 'taster_name': 'Anne Krebiehl\xa0MW'}),
frozenset({'points': (89.0, 93.0]', 'taster_name': 'Anne Krebiehl\xa0MW'}),
frozenset({'points': (89.0, 93.0]', 'province': 'Washington'}),
frozenset({'province': 'Veneto', 'taster_name': 'Kerin O'Keefe'}),
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frozenset({'points': (89.0, 93.0]', 'taster_name': 'Sean P. Sullivan'}),
frozenset({'price': (0.0, 25.0]', 'province': 'Loire Valley'}),
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frozenset({'country': 'France', 'province': 'Loire Valley'}),
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frozenset({'province': 'Northern Spain', 'variety': 'Tempranillo'}),
frozenset({'taster_name': 'Michael Schachner', 'variety': 'Tempranillo'}),
frozenset({'points': (85.0, 89.0]', 'province': 'Bordeaux'}),
frozenset({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}),
frozenset({'country': 'Italy', 'province': 'Veneto'}),
frozenset({'points': (93.0, 100.0]', 'price': (25.0, 60.0]})),
frozenset({'price': (25.0, 60.0]', 'province': 'Piedmont'}),
frozenset({'price': (60.0, 3500.0]', 'taster_name': 'Roger Voss'}),
frozenset({'country': 'France', 'price': (60.0, 3500.0]})),
frozenset({'price': (60.0, 3500.0]', 'province': 'Burgundy'}),
frozenset({'points': (93.0, 100.0]', 'taster_name': 'Roger Voss'}),
frozenset({'country': 'France', 'points': (93.0, 100.0]}),
frozenset({'country': 'US', 'points': (93.0, 100.0]}),
frozenset({'points': (93.0, 100.0]', 'province': 'California'}),
frozenset({'country': 'Italy', 'province': 'Piedmont'}),
frozenset({'province': 'Piedmont', 'taster_name': 'Kerin O'Keefe'}),
frozenset({'country': 'Italy', 'variety': 'Nebbiolo'}),
frozenset({'taster_name': 'Kerin O'Keefe', 'variety': 'Nebbiolo'}),
frozenset({'province': 'Piedmont', 'variety': 'Nebbiolo'}),
frozenset({'points': (93.0, 100.0]', 'price': (60.0, 3500.0]}),
frozenset({'country': 'France', 'taster_name': 'Anne Krebiehl\xa0MW'}),
frozenset({'province': 'Alsace', 'taster_name': 'Anne Krebiehl\xa0MW'}),
frozenset({'taster_name': 'Roger Voss', 'variety': 'Rosé'}),
frozenset({'province': 'Provence', 'taster_name': 'Roger Voss'}),
frozenset({'country': 'France', 'province': 'Provence'}),
frozenset({'country': 'France', 'variety': 'Rosé'}),
frozenset({'taster_name': 'Roger Voss', 'variety': 'Pinot Noir'}),
frozenset({'country': 'France', 'variety': 'Pinot Noir'}),
frozenset({'province': 'Burgundy', 'variety': 'Pinot Noir'}),
frozenset({'province': 'Washington', 'taster_name': 'Paul Gregutt'}),
frozenset({'country': 'Spain', 'province': 'Catalonia'}),
frozenset({'province': 'Catalonia', 'taster_name': 'Michael Schachner'}),
frozenset({'price': (60.0, 3500.0]', 'taster_name': 'Michael Schachner'}),
frozenset({'country': 'Austria', 'points': (89.0, 93.0]}),
frozenset({'country': 'Spain', 'points': (0.0, 85.0]}),
frozenset({'points': (0.0, 85.0]', 'province': 'Northern Spain'}),
frozenset({'points': (0.0, 85.0]', 'taster_name': 'Paul Gregutt'}),
frozenset({'points': (0.0, 85.0]', 'price': (25.0, 60.0]}),
frozenset({'country': 'Argentina', 'points': (0.0, 85.0]}),
frozenset({'points': (0.0, 85.0]', 'province': 'Mendoza Province'}),
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[]]

```

## 导出关联规则，计算支持度和置信度

```

# 关联规则生成函数
def generateRules(L, supportData, minConf=0.5):

```

```

bigRuleList = []
for i in range(1, len(L)):
    for freqSet in L[i]:
        H1 = [frozenset([item]) for item in freqSet]
        if (i > 1):
            rulesFromConseq(freqSet, H1, supportData, bigRuleList, minConf)
        else:
            calcConf(freqSet, H1, supportData, bigRuleList, minConf)
    return bigRuleList

def calcConf(freqSet, H, supportData, brl, minConf=0.5):
    prunedH = []
    for conseq in H:
        conf = supportData[freqSet]/supportData[freqSet-conseq]
        if conf >= minConf:
            print(f'{freqSet-conseq} --> {conseq} conf:{conf}'+ ' support: '+ str(supportData[freqSet]))
            brl.append((freqSet-conseq, conseq, conf, supportData[freqSet]))
            prunedH.append(conseq)
    return prunedH

def rulesFromConseq(freqSet, H, supportData, brl, minConf=0.5):
    m = len(H[0])
    if (len(freqSet) > (m + 1)):
        Hmp1 = aprioriGen(H, m+1)
        Hmp1 = calcConf(freqSet, Hmp1, supportData, brl, minConf)
    if (len(Hmp1) > 1):
        rulesFromConseq(freqSet, Hmp1, supportData, brl, minConf)

rules = generateRules(L, suppData)

frozenset({'taster_name: Anne Krebiehl\xa0MW'}) --> frozenset({'points: (89.0, 93.0)'})
conf:0.5449141347424042 support: 0.018693706452161105
frozenset({'province: Veneto'}) --> frozenset({'taster_name: Kerin O'Keefe'}) conf:0.9600420609884333 support: 0.010343850903529146
frozenset({'province: Loire Valley'}) --> frozenset({'price: (0.0, 25.0)'}) conf:0.6434054431263085 support: 0.010445816575086388
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frozenset({'province: Loire Valley'}) --> frozenset({'country: France'}) conf:1.0 support: 0.01623520081572537
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frozenset({'province: Alsace'}) --> frozenset({'taster_name: Anne Krebiehl\xa0MW'}) conf:0.6587855991402473 support: 0.01388990369908798
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frozenset({'province: Northeastern Italy'}) --> frozenset({'country: Italy'}) conf:1.0 support: 0.01220189202968334

```

```
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support: 0.01304027644026511
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```

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0.018455786551860875
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'price: (25.0, 60.0]'}) conf:0.6331738437001595
support: 0.04048037160822523
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support: 0.010400498498838725
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support: 0.010400498498838725
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frozenset({'variety: Sangiovese'}) --> frozenset({'taster_name: Kerin O'Keefe'}) conf:0.7754108338405357
support: 0.014433807284880756
frozenset({'province: washington'}) --> frozenset({'country: US'}) conf:1.0 support: 0.0895598481844457
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support: 0.025684019713363166
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0.04978190675805812
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'price: (25.0, 60.0]'}) conf:0.5209134071896903
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support: 0.04581657508638758
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support: 0.04581657508638758
frozenset({'province: Bordeaux'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.6529891304347826 support:
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frozenset({'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss'}) conf:0.9959239130434783 support:
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frozenset({'points: (0.0, 85.0]'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.8544604316546763 support:
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support: 0.045261428652353705
frozenset({'province: Oregon'}) --> frozenset({'price: (25.0, 60.0]'}) conf:0.5212046711739398 support:
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support: 0.0504503483827115
frozenset({'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]'}) conf:0.5700499168053245 support:
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frozenset({'variety: Merlot'}) --> frozenset({'points: (85.0, 89.0]'}) conf:0.5170068027210885 support:
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frozenset({'variety: Merlot'}) --> frozenset({'country: US'}) conf:0.6875981161695447 support:
0.01488698804735739
frozenset({'variety: White Blend'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.7382992748846408 support:
0.01268906134934572
frozenset({'variety: Red Blend'}) --> frozenset({'points: (85.0, 89.0]'}) conf:0.5130295763389289 support:
0.03635642666968787
frozenset({'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.764218348099457 support:
0.03029513397156291
frozenset({'variety: Malbec'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.6076493339063171 support:
0.016019939953548973
frozenset({'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]'}) conf:0.7519173057685896
support: 0.02554806548462018
frozenset({'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner'}) conf:1.0 support:
0.033977227666685546
frozenset({'province: Mendoza Province'}) --> frozenset({'country: Argentina'}) conf:1.0 support:
0.033977227666685546
frozenset({'country: Argentina'}) --> frozenset({'province: Mendoza Province'}) conf:0.8571020291511859
support: 0.033977227666685546
frozenset({'variety: Malbec'}) --> frozenset({'province: Mendoza Province'}) conf:0.5384615384615384 support:
0.014195887384580524
frozenset({'country: Argentina'}) --> frozenset({'taster_name: Michael Schachner'}) conf:1.0 support:
0.03964198719764346
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner'}) conf:0.6540610227761066
support: 0.01724352801223588
frozenset({'variety: Malbec'}) --> frozenset({'country: Argentina'}) conf:0.5973356252685861 support:
0.015748031496062992
```

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frozenset({'country: Germany'}) --> frozenset({'variety: Riesling'}) conf:0.8295218295218295 support:  
0.01808191242281765  
frozenset({'province: Mosel'}) --> frozenset({'variety: Riesling'}) conf:0.9748908296943231 support:  
0.010117260522290828  
frozenset({'province: Mosel'}) --> frozenset({'country: Germany'}) conf:1.0 support: 0.010377839460714893  
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'country: US'}) conf:0.9998227892964736 support:  
0.06392114654732907  
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'province: California'}) conf:0.999645578592947  
support: 0.06390981702826715  
frozenset({'variety: Chardonnay'}) --> frozenset({'country: US'}) conf:0.5132463424278371 support:  
0.04411714722710021  
frozenset({'price: (25.0, 60.0]'} --> frozenset({'country: US'}) conf:0.5244660967613446 support:  
0.19392737778281313  
frozenset({'province: California'}) --> frozenset({'price: (25.0, 60.0]'} conf:0.5268215011255696 support:  
0.10870673539908231  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'price: (25.0, 60.0]'} conf:0.5322506334945865  
support: 0.05235370758511301  
frozenset({'province: California'}) --> frozenset({'country: US'}) conf:1.0 support: 0.20634453067467287  
frozenset({'country: US'}) --> frozenset({'province: California'}) conf:0.5315181229206793 support:  
0.20634453067467287  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'country: US'}) conf:1.0 support:  
0.09836288449555317  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'province: California'}) conf:0.9994240958304538  
support: 0.09830623690024358  
frozenset({'variety: Cabernet Sauvignon'}) --> frozenset({'country: US'}) conf:0.6802518803568305 support:  
0.04406049963179063  
frozenset({'taster_name: Anna Lee C. Iijima'}) --> frozenset({'points: (85.0, 89.0]'} conf:0.5372420734776043  
support: 0.024188523197190278  
frozenset({'taster_name: Anna Lee C. Iijima'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.6401610468042275  
support: 0.028822296493513852  
frozenset({'country: Germany'}) --> frozenset({'taster_name: Anna Lee C. Iijima'}) conf:0.8212058212058212  
support: 0.017900640117826997  
frozenset({'country: France'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.5426719032479272 support:  
0.09862346343397722  
frozenset({'taster_name: Roger Voss'}) --> frozenset({'country: France'}) conf:0.7111039206169444 support:  
0.14939103835042203  
frozenset({'country: France'}) --> frozenset({'taster_name: Roger Voss'}) conf:0.8220185773954243 support:  
0.14939103835042203  
frozenset({'province: Alsace'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.5212251477700162 support:  
0.010989633490058347  
frozenset({'province: Alsace'}) --> frozenset({'country: France'}) conf:1.0 support: 0.021084234974225343  
frozenset({'country: Italy'}) --> frozenset({'points: (85.0, 89.0]'} conf:0.5714129244249727 support:  
0.059106100946014845  
frozenset({'taster_name: Kerin O'Keefe'}) --> frozenset({'points: (85.0, 89.0]'} conf:0.5743387732132808  
support: 0.057814535772956435  
frozenset({'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy'}) conf:1.0 support:  
0.10066277686512208  
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0.10066277686512208  
frozenset({'country: Spain'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.6984126984126984 support:  
0.047357389678808134  
frozenset({'province: Northern Spain'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.663021582733813 support:  
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frozenset({'taster_name: Michael Schachner'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.7528130409694173  
support: 0.11824619044921543  
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support: 0.0677391944711947  
frozenset({'province: Northern Spain'}) --> frozenset({'taster_name: Michael Schachner'})  
conf:0.9997122302158273 support: 0.039358749221095564  
frozenset({'variety: Pinot Noir'}) --> frozenset({'country: US'}) conf:0.7072656683305601 support:  
0.07223701353877528  
frozenset({'province: Oregon'}) --> frozenset({'variety: Pinot Noir'}) conf:0.5189510346240525 support:  
0.028697671783832777  
frozenset({'variety: Riesling'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.5862387439390441 support:  
0.028765648898204273  
frozenset({'province: Oregon'}) --> frozenset({'country: US'}) conf:1.0 support: 0.055299382541211126  
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0.09785305613776696  
frozenset({'province: Oregon'}) --> frozenset({'taster_name: Paul Gregutt'}) conf:0.9465273509526736 support:  
0.0523423780660511  
frozenset({'taster_name: Paul Gregutt'}) --> frozenset({'province: Oregon'}) conf:0.5228018558334276 support:  
0.0523423780660511  
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0.010389168979776809  
frozenset({'country: Portugal'}) --> frozenset({'price: (0.0, 25.0]'} conf:0.7280409161663332 support:  
0.037092845408712403  
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frozenset({'points: (85.0, 89.0]'} --> frozenset({'price: (0.0, 25.0]'} conf:0.6571962522413315 support:  
0.29482807454823545  
frozenset({'province: Douro'}) --> frozenset({'country: Portugal'}) conf:1.0 support: 0.011828017900640118  
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```

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frozense({{'variety': 'Tempranillo'}}) --> frozense({{'province': 'Northern Spain', 'taster_name': 'Michael Schachner'}}) conf:0.6775203506574828 support: 0.012258539624992919
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frozense({{'variety': 'Tempranillo'}}) --> frozense({{'province': 'Northern Spain', 'country': 'Spain'}}) conf:0.678146524733876 support: 0.012269869144054835
frozense({{'variety': 'Bordeaux-style Red Blend'}}) --> frozense({{'country': 'France', 'taster_name': 'Roger Voss'}}) conf:0.6570145903479236 support: 0.03316150229422761
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frozense({{'province': 'Northeastern Italy'}}) --> frozense({{'country': 'Italy', 'taster_name': 'Kerin O'Keefe'}}) conf:0.8932219127205199 support: 0.01089899733756302
frozense({{'province': 'Southwest France'}}) --> frozense({{'country': 'France', 'price': (0.0, 25.0]'}}) conf:0.7510204081632653 support: 0.010423157536962557
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frozense({{'variety': 'Portuguese White'}}) --> frozense({{'taster_name': 'Roger Voss', 'country': 'Portugal'}}) conf:1.0 support: 0.010253214751033819
frozense({{'taster_name': 'Matt Kettmann'}}) --> frozense({{'points': (89.0, 93.0]}, 'province': 'California'}}) conf:0.519404572036151 support: 0.03320682037047527
frozense({{'taster_name': 'Matt Kettmann'}}) --> frozense({{'points': (89.0, 93.0]}, 'country': 'US'}}) conf:0.519404572036151 support: 0.03320682037047527
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frozene({{'variety': 'Syrah'}}) --> frozene({{'price': (25.0, 60.0]}, 'country': 'US'}}) conf:0.5216168717047451 support: 0.01681300628788308
frozene({{'variety': 'Sangiovese'}}) --> frozene({{'country': 'Italy', 'province': 'Tuscany'}}) conf:0.7961046865489958 support: 0.014819010932985984
frozene({{'variety': 'Sangiovese'}}) --> frozene({{'province': 'Tuscany', 'taster_name': 'Kerin O'Keefe'}}) conf:0.7528910529519174 support: 0.014014615079598972
frozene({{'taster_name': 'Anna Lee C. Iijima'}}) --> frozene({{'province': 'New York', 'country': 'US'}}) conf:0.5334675390035228 support: 0.024018580411261543
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frozene({{'province': 'New York'}}) --> frozene({{'points': (85.0, 89.0]}, 'taster_name': 'Anna Lee C. Iijima'}}) conf:0.5799745439117523 support: 0.015487452557638929
frozene({{'province': 'New York'}}) --> frozene({{'points': (85.0, 89.0]}, 'country': 'US'}}) conf:0.6126431904963937 support: 0.016359825525406445
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frozenset({'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'})  
conf:0.9695225194717235 support: 0.032436413074264994  
frozenset({'province: Tuscany'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'}))  
conf:0.5882153741957331 support: 0.019679374610547782  
frozenset({'province: Tuscany'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'})  
conf:0.5773789366745683 support: 0.019316830000566478  
frozenset({'variety: zinfandel'}) --> frozenset({'country: US', 'province: California'})  
conf:0.9515235457063713 support: 0.01556675919107234  
frozenset({'country: Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'province: South Australia'})  
conf:0.5808161102278749 support: 0.012417152891859741  
frozenset({'province: South Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'country: Australia'})  
conf:0.9990884229717412 support: 0.012417152891859741  
frozenset({'country: Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'price: (0.0, 25.0]'}))  
conf:0.575516693163752 support: 0.012303857701240583  
frozenset({'taster_name: Jim Gordon'}) --> frozenset({'country: US', 'province: California'})  
conf:0.9989364530709918 support: 0.04256500311561774  
frozenset({'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'province: California'})  
conf:0.596649827173624 support: 0.025423440774939104  
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conf:0.5969157139058762 support: 0.02543477029400102  
frozenset({'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'})  
conf:0.9954481792771078 support: 0.032209822693026684  
frozenset({'province: Burgundy'}) --> frozenset({'country: France', 'variety: Chardonnay'})  
conf:0.5703781512605042 support: 0.018455786551860875  
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conf:0.5686274509803921 support: 0.018399138956551295  
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'})  
conf:0.6328194222931065 support: 0.040457712570101396  
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frozenset({'variety: Champagne Blend'}) --> frozenset({'country: France', 'taster_name: Roger Voss'})  
conf:0.898019801980198 support: 0.01027587378915765  
frozenset({'province: Champagne'}) --> frozenset({'variety: Champagne Blend', 'taster_name: Roger Voss'})  
conf:0.723076923076923 support: 0.010117260522290828  
frozenset({'variety: Champagne Blend'}) --> frozenset({'province: Champagne', 'taster_name: Roger Voss'})  
conf:0.884158415841 support: 0.010117260522290828  
frozenset({'province: Champagne'}) --> frozenset({'country: France', 'taster_name: Roger Voss'})  
conf:0.9789473684210526 support: 0.013697388545856228  
frozenset({'variety: Champagne Blend'}) --> frozenset({'country: France', 'province: Champagne'})  
conf:0.908910891089 support: 0.010400498498838725  
frozenset({'province: Champagne'}) --> frozenset({'country: France', 'variety: Champagne Blend'})  
conf:0.7433198380566801 support: 0.010400498498838725  
frozenset({'variety: Sangiovese'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'})  
conf:0.7754108338405357 support: 0.014433807284880756  
frozenset({'province: Washington'}) --> frozenset({'taster_name: Sean P. Sullivan', 'country: US'})  
conf:0.5115749525616698 support: 0.04581657508638758  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'province: Washington', 'country: US'})  
conf:0.9143115532444043 support: 0.04581657508638758  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'})  
conf:0.5179742256387068 support: 0.025955928170849147  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'points: (85.0, 89.0]', 'country: US'})  
conf:0.5102871354284423 support: 0.02557072452274401  
frozenset({'province: Washington'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'})  
conf:0.513472485768501 support: 0.04598651787231632  
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss'})  
conf:0.9959239130434783 support: 0.04152268736192149  
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}))  
conf:0.6529891304347826 support: 0.02722483430578372  
frozenset({'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}))  
conf:0.6497282608695653 support: 0.02708888007704073  
frozenset({'country: Chile'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'})  
conf:0.8335406817616323 support: 0.03795388857418  
frozenset({'province: Oregon'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) conf:0.5212046711739398  
support: 0.028822296493513852  
frozenset({'variety: Malbec'}) --> frozenset({'country: Argentina', 'province: Mendoza Province'})  
conf:0.5384615384615384 support: 0.014195887384580524  
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'})  
conf:0.5384615384615384 support: 0.014195887384580524  
frozenset({'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) conf:1.0 support: 0.033977227666685546  
frozenset({'country: Argentina'}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'}) conf:0.857102029151859 support: 0.033977227666685546  
frozenset({'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.7519173057685896 support: 0.02554806548462018  
frozenset({'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]', 'province: Mendoza Province'}) conf:0.6444698485281509 support: 0.02554806548462018  
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'})  
conf:0.5973356252685861 support: 0.015748031496062992  
frozenset({'province: Mosel'}) --> frozenset({'variety: Riesling', 'country: Germany'})  
conf:0.9748908296943231 support: 0.010117260522290828  
frozenset({'country: Germany'}) --> frozenset({'variety: Riesling', 'taster_name: Anna Lee C. Iijima'})  
conf:0.6730769230769231 support: 0.01467172718518099
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frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'country: US', 'province: California'})
conf:0.999645578592947 support: 0.06390981702826715
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'})
conf:0.532020271826768 support: 0.05233104854698918
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'})
conf:0.5322506334945865 support: 0.05235370758511301
frozensest({'province: California'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'})
conf:0.5268215011255696 support: 0.10870673539908231
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'country: US', 'province: California'})
conf:0.9994240958304538 support: 0.09830623690024358
frozensest({'province: Alsace'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})
conf:0.5212251477700162 support: 0.010989633490058347
frozensest({'taster_name: Kerin O'Keefe'}) --> frozensest({'country: Italy', 'points: (85.0, 89.0]'})
conf:0.5743387732132808 support: 0.057814535772956435
frozensest({'country: Italy'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'})
conf:0.5589266155531216 support: 0.057814535772956435
frozensest({'country: Spain'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'})
conf:0.5804511278195489 support: 0.039358749221095564
frozensest({'province: Northern Spain'}) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'})
conf:0.9997122302158273 support: 0.039358749221095564
frozensest({'province: Northern Spain'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.6627338129496403 support: 0.026091882399592137
frozensest({'province: Northern Spain'}) --> frozensest({'price: (0.0, 25.0]', 'country: Spain'}) conf:0.663021582733813 support: 0.026103211918654053
frozensest({'country: Spain'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.6974101921470343 support: 0.04728941256443664
frozensest({'province: Oregon'}) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'})
conf:0.5017414464249129 support: 0.027745992182631848
frozensest({'province: Oregon'}) --> frozensest({'variety: Pinot Noir', 'country: US'}) conf:0.5189510346240525 support: 0.028697671783832777
frozensest({'province: Oregon'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) conf:0.9465273509526736 support: 0.0523423780660511
frozensest({'taster_name: Paul Gregutt'}) --> frozensest({'province: Oregon', 'country: US'}) conf:0.5228018558334276 support: 0.0523423780660511
frozensest({'variety: Portuguese Red'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.7189349112426036 support: 0.016518438792273268
frozensest({'variety: Portuguese Red'}) --> frozensest({'taster_name: Roger Voss', 'country: Portugal'}) conf:0.9980276134122288 support: 0.022930946581317623
frozensest({'variety: Portuguese Red'}) --> frozensest({'price: (0.0, 25.0]', 'country: Portugal'}) conf:0.7199211045364892 support: 0.0165410978303971
frozensest({'province: Douro'}) --> frozensest({'taster_name: Roger Voss', 'country: Portugal'}) conf:0.9904214559386972 support: 0.011714722710020959
frozensest({'country: Portugal'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.723815877251501 support: 0.036877584546536
frozensest({'country: Portugal', 'points: (0.0, 85.0]'} --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.9648562300319489 support: 0.010264544270095734
frozensest({'price: (25.0, 60.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9967602591792658 support: 0.010457146094148304
frozensest({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]', 'country: US'}) conf:0.6904176904176904 support: 0.012734379425593384
frozensest({'province: Washington', 'price: (25.0, 60.0]'} --> frozensest({'points: (89.0, 93.0]', 'country: US'}) conf:0.5112096575511209 support: 0.02350875205347533
frozensest({'province: Washington', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]', 'country: US'}) conf:0.6715210355987055 support: 0.02350875205347533
frozensest({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'} --> frozensest({'province: Washington', 'country: US'}) conf:0.9576167076167076 support: 0.017662720217526767
frozensest({'province: Washington', 'points: (89.0, 93.0]'} --> frozensest({'taster_name: Sean P. Sullivan', 'country: US'}) conf:0.5045307443365696 support: 0.017662720217526767
frozensest({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'} --> frozensest({'province: Washington', 'price: (25.0, 60.0]'}) conf:0.6726044226044225 support: 0.012405823372797825
frozensest({'points: (89.0, 93.0]', 'province: Burgundy'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9947368421052631 support: 0.012847674616212541
frozensest({'province: Loire Valley', 'price: (0.0, 25.0]'} --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:1.0 support: 0.010445816575086388
frozensest({'taster_name: Roger Voss', 'province: Loire Valley'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}) conf:0.6434054431263085 support: 0.010445816575086388
frozensest({'country: France', 'province: Loire Valley'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.6434054431263085 support: 0.010445816575086388
frozensest({'province: Loire Valley'}) --> frozensest({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.6434054431263085 support: 0.010445816575086388
frozensest({'variety: Tempranillo', 'taster_name: Michael Schachner'}) --> frozensest({'province: Northern Spain', 'country: Spain'}) conf:0.826585179526356 support: 0.012258539624992919
frozensest({'variety: Tempranillo', 'province: Northern Spain'}) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'}) conf:0.9990766389658357 support: 0.012258539624992919
frozensest({'variety: Tempranillo', 'country: Spain'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'}) conf:0.8407148407148407 support: 0.012258539624992919
frozensest({'variety: Tempranillo'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'}) conf:0.6775203506574828 support: 0.012258539624992919
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) conf:0.569284064665127 support: 0.011170905795049
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) conf:0.5219692959237692 support: 0.011170905795049
frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) conf:0.5513940907199334 support: 0.015011612757038464
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) conf:0.7650115473441109 support: 0.015011612757038464

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frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) conf:0.8484261501210655 support: 0.01984931739647652
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) conf:0.5971370143149284 support: 0.01984931739647652
frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) conf:0.7290886392009988 support: 0.01984931739647652
frozensest({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) conf:0.6145212206243423 support: 0.01984931739647652
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) conf:0.5394388565378507 support: 0.011544779924092223
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.72578036421387 support: 0.015532770633886592
frozensest({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) conf:0.6173272535952297 support: 0.0199399535348971847
frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) conf:0.7324178110694964 support: 0.019939953548971847
frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'province: Bordeaux'}) conf:0.8523002421307507 support: 0.019939953548971847
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) conf:0.5986394557823129 support: 0.019939953548971847
frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.8808716707021792 support: 0.02060839517362488
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) conf:0.619972733469666 support: 0.02060839517362488
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) conf:0.6187074829931972 support: 0.02060839517362488
frozensest({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9961417046650298 support: 0.032175834135840936
frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) conf:0.7748976807639837 support: 0.032175834135840936
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'province: Bordeaux'}) conf:0.9679618268575324 support: 0.032175834135840936
frozensest({'country: France', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) conf:0.7717391304347826 support: 0.032175834135840936
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) conf:0.9659863945578232 support: 0.032175834135840936
frozensest({'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) conf:0.7717391304347826 support: 0.032175834135840936
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss', 'province: Bordeaux'}) conf:0.6374859708193042 support: 0.032175834135840936
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) conf:0.5378507146638433 support: 0.011510791366906475
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) conf:0.7696304849884527 support: 0.01510224890953379
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) conf:0.7056643726839598 support: 0.01510224890953379
frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'points: (85.0, 89.0]'})) conf:0.55264253017062 support: 0.015045601314224211
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) conf:0.7667436489607391 support: 0.015045601314224211
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9971131639722863 support: 0.019566079419928623
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) conf:0.7725173210161663 support: 0.01515889650484337
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'province: Bordeaux'}) conf:0.7083112758073055 support: 0.01515889650484337
frozensest({'province: Piedmont', 'price: (25.0, 60.0]'})) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) conf:0.9989281886387996 support: 0.010559111765705545
frozensest({'province: Burgundy', 'price: (60.0, 3500.0]'})) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9970501474926253 support: 0.011488132328782643
frozensest({'variety: Nebbiolo', 'country: Italy'}) --> frozensest({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) conf:0.9652509652509651 support: 0.01699427859287373
frozensest({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) --> frozensest({'country: Italy', 'province: Piedmont'}) conf:0.9652509652509651 support: 0.01699427859287373
frozensest({'country: Italy', 'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) conf:0.7869884575026231 support: 0.01699427859287373
frozensest({'variety: Nebbiolo', 'province: Piedmont'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) conf:1.0 support: 0.01699427859287373
frozensest({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) --> frozensest({'variety: Nebbiolo', 'country: Italy'}) conf:0.78781512605042 support: 0.01699427859287373
frozensest({'variety: Nebbiolo'}) --> frozensest({'country: Italy', 'province: Piedmont', 'taster_name: Kerin O'Keefe'}) conf:0.9380863039399624 support: 0.01699427859287373
frozensest({'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'country: Italy', 'taster_name: Kerin O'Keefe'}) conf:0.7869884575026231 support: 0.01699427859287373
frozensest({'taster_name: Roger Voss', 'variety: Rosé'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) conf:0.7320028510334997 support: 0.01163541607658755
frozensest({'country: France', 'variety: Rosé'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) conf:0.6805831676607026 support: 0.01163541607658755
frozensest({'taster_name: Roger Voss', 'variety: Pinot Noir'}) --> frozensest({'country: France', 'province: Burgundy'}) conf:0.8157319737800437 support: 0.01268906134934572
frozensest({'country: France', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Roger Voss', 'province: Burgundy'}) conf:0.7713498622589532 support: 0.01268906134934572
frozensest({'variety: Pinot Noir', 'province: Burgundy'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) conf:0.9929078014184397 support: 0.01268906134934572
frozensest({'province: Washington', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) conf:0.537910447761194 support: 0.02041579334957231

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frozenset({'country: Spain', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.9147597254004577 support: 0.0181159009800034
frozenset({'province: Northern Spain', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'country: Spain'}) conf:0.9165829145728644 support: 0.01033252138446723
frozenset({'country: Spain', 'points: (0.0, 85.0]}) --> frozenset({'province: Northern Spain', 'price: (0.0, 25.0]}) conf:0.5217391304347826 support: 0.01033252138446723
frozenset({'province: Northern Spain', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.9155778894472363 support: 0.010321191865405314
frozenset({'province: Northern Spain', 'points: (0.0, 85.0]}) --> frozenset({'taster_name: Michael Schachner', 'country: Spain'}) conf:0.9989949748743718 support: 0.01261541947544326
frozenset({'country: Spain', 'points: (0.0, 85.0]}) --> frozenset({'province: Northern Spain', 'taster_name: Michael Schachner'}) conf:0.568649885583524 support: 0.011261541947544326
frozenset({'country: Argentina', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.9532505478451424 support: 0.014785022375800148
frozenset({'province: Mendoza Province', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) conf:0.9562171628721542 support: 0.012371834815612078
frozenset({'province: Mendoza Province', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'country: Argentina'}) conf:0.9562171628721542 support: 0.012371834815612078
frozenset({'country: Argentina', 'points: (0.0, 85.0]}) --> frozenset({'price: (0.0, 25.0]', 'province: Mendoza Province'}) conf:0.7976625273922572 support: 0.012371834815612078
frozenset({'province: Mendoza Province', 'points: (0.0, 85.0]}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) conf:1.0 support: 0.012938310768707868
frozenset({'country: Argentina', 'points: (0.0, 85.0]}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'}) conf:0.8341855368882395 support: 0.012938310768707868
frozenset({'variety: Chardonnay', 'province: California'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) conf:0.5770161290322581 support: 0.01621254177760154
frozenset({'taster_name: Jim Gordon', 'price: (25.0, 60.0]}) --> frozenset({'country: US', 'province: California'}) conf:0.9978134110787172 support: 0.01551011159576276
frozenset({'taster_name: Jim Gordon', 'points: (89.0, 93.0]}) --> frozenset({'country: US', 'province: California'}) conf:0.998576512455516 support: 0.015895315243867898
frozenset({'price: (25.0, 60.0]', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) conf:0.991394148020654 support: 0.0130516050959327027
frozenset({'province: Oregon', 'points: (89.0, 93.0]}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) conf:0.6043788187372708 support: 0.01344813912649408
frozenset({'province: Oregon', 'points: (89.0, 93.0]}) --> frozenset({'variety: Pinot Noir', 'country: US'}) conf:0.5840122199592668 support: 0.012994958364017447
frozenset({'taster_name: Paul Gregutt', 'points: (89.0, 93.0]}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) conf:0.599163179916318 support: 0.024335806944995184
frozenset({'province: Oregon', 'points: (89.0, 93.0]}) --> frozenset({'taster_name: Paul Gregutt', 'country: US'}) conf:0.9725050916496946 support: 0.02163938140825922
frozenset({'taster_name: Paul Gregutt', 'points: (89.0, 93.0]}) --> frozenset({'province: Oregon', 'country: US'}) conf:0.5327754532775454 support: 0.02163938140825922
frozenset({'province: Oregon', 'points: (89.0, 93.0]}) --> frozenset({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) conf:0.5758655804480652 support: 0.012813686059026795
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frozenset({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) conf:0.5542099192618224 support: 0.010887667818501104
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frozensest({'taster_name: Matt Kettmann', 'variety: Pinot Noir', 'province: California'}) -->
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frozensest({'province': 'Oregon', 'price': (0.0, 25.0]', 'country': US'}) --> frozensest({'taster_name': Paul Gregutt', 'points': (85.0, 89.0]}) conf:0.5109769484083424 support: 0.01054778224664363
frozensest({'province': 'Oregon', 'points': (85.0, 89.0]', 'price': (0.0, 25.0]}) --> frozensest({'taster_name': Paul Gregutt', 'country': US'}) conf:0.9254473161033797 support: 0.01054778224664363
frozensest({'taster_name': Paul Gregutt', 'province': Oregon', 'price': (0.0, 25.0]}) --> frozensest({'points': (85.0, 89.0]', 'country': US'}) conf:0.5499113998818664 support: 0.01054778224664363
frozensest({'province': 'Oregon', 'price': (0.0, 25.0]}) --> frozensest({'taster_name': Paul Gregutt', 'points': (85.0, 89.0]', 'country': US'}) conf:0.5109769484083424 support: 0.01054778224664363
frozensest({'points': (85.0, 89.0]', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux'}) --> frozensest({'country': France', 'taster_name': Roger Voss'}) conf:0.9969574036511156 support: 0.011136917237863253
frozensest({'province': 'Bordeaux', 'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'price': (0.0, 25.0]}) --> frozensest({'country': France', 'variety': Bordeaux-style Red Blend'}) conf:0.7418867924528302 support: 0.011136917237863253
frozensest({'province': 'Bordeaux', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) --> frozensest({'country': France', 'points': (85.0, 89.0]}) conf:0.5610730593607306 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux'}) --> frozensest({'country': France', 'price': (0.0, 25.0]}) conf:0.7374343585896475 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) --> frozensest({'country': France', 'province': Bordeaux'}) conf:0.9675196850393701 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'price': (0.0, 25.0]', 'province': Bordeaux}) --> frozensest({'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend}) conf:0.740210843373494 support: 0.011136917237863253
frozensest({'country': France', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'points': (85.0, 89.0]', 'taster_name': Roger Voss'}) conf:0.5585227272727272 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'taster_name': Roger Voss', 'price': (0.0, 25.0]}) conf:0.7346786248131539 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) --> frozensest({'taster_name': Roger Voss', 'province': Bordeaux}) conf:0.9646712463199215 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'province': Bordeaux}) --> frozensest({'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) conf:0.569195136074117 support: 0.011136917237863253
frozensest({'country': France', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) --> frozensest({'points': (85.0, 89.0]', 'province': Bordeaux}) conf:0.5404068169323805 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend}) --> frozensest({'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) conf:0.7169948942377826 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'price': (0.0, 25.0]', 'province': Bordeaux}) --> frozensest({'country': France', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend}) conf:0.740210843373494 support: 0.011136917237863253
frozensest({'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'country': France', 'points': (85.0, 89.0]', 'taster_name': Roger Voss}) conf:0.5585227272727272 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'country': France', 'taster_name': Roger Voss', 'price': (0.0, 25.0]}) conf:0.7346786248131539 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) --> frozensest({'country': France', 'taster_name': Roger Voss', 'province': Bordeaux}) conf:0.8525585429314831 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'province': Bordeaux}) --> frozensest({'country': France', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) conf:0.569195136074117 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend}) --> frozensest({'country': France', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) conf:0.569195136074117 support: 0.011136917237863253
frozensest({'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) --> frozensest({'country': France', 'points': (85.0, 89.0]', 'province': Bordeaux}) conf:0.5404068169323805 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend}) --> frozensest({'country': France', 'price': (0.0, 25.0]', 'province': Bordeaux}) conf:0.7169948942377826 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) conf:0.5675519630484989 support: 0.011136917237863253
frozensest({'country': France', 'price': (0.0, 25.0]', 'variety': Bordeaux-style Red Blend}) --> frozensest({'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) conf:0.537746170678337 support: 0.011136917237863253
frozensest({'country': France', 'points': (85.0, 89.0]', 'variety': Bordeaux-style Red Blend}) --> frozensest({'taster_name': Roger Voss', 'price': (0.0, 25.0]}) conf:0.7143895348837209 support: 0.011136917237863253
frozensest({'points': (85.0, 89.0]', 'variety': Bordeaux-style Red Blend', 'province': Bordeaux}) --> frozensest({'country': France', 'taster_name': Roger Voss', 'variety': Bordeaux-style Red Blend', 'price': (0.0, 25.0]}) conf:0.5675519630484989 support: 0.011136917237863253

```

```
frozenset({'points: (85.0, 89.0)', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'province: Bordeaux', 'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'}), conf:0.5203811540497618 support: 0.011136917237863253
```

```
print(rules[0])
```

```
(frozenset({'taster_name: Anne Krebiehl\xa0MW'}), frozenset({'points: (89.0, 93.0]'}), 0.5449141347424042, 0.018693706452161105)
```

## 对规则进行评价

### 使用Lift进行评价

```
def getLifts(rules, suppData):
    lift = []
    for rule in rules:
        freqSet_conseq = rule[0]
        conseq = rule[1]
        lift_val = float(rule[3]) / (float(suppData[conseq]) * float(suppData[freqSet_conseq]))
        lift.append([freqSet_conseq, conseq, lift_val])
    return lift

def showLifts(lifts):
    for lift in lifts:
        print(f'{lift[0]} --> {lift[1]} lift value:{lift[2]}')
```

```
lifts = getLifts(rules, suppData)
showLifts(lifts)
```

```
frozenset({'taster_name: Anne Krebiehl\xa0MW'}) --> frozenset({'points: (89.0, 93.0]'}), lift value:1.5798464755957928
frozenset({'province: Veneto'}) --> frozenset({'taster_name: Kerin O'Keefe'}), lift value:9.5372101871856
frozenset({'province: Loire Valley'}) --> frozenset({'price: (0.0, 25.0]'}), lift value:1.2347033685736195
frozenset({'province: Loire Valley'}) --> frozenset({'taster_name: Roger Voss'}), lift value:4.760017257186
frozenset({'province: Loire Valley'}) --> frozenset({'country: France'}), lift value:5.502462439997506
frozenset({'variety: Tempranillo'}) --> frozenset({'price: (0.0, 25.0]'}), lift value:1.1211265306600326
frozenset({'variety: Tempranillo'}) --> frozenset({'country: Spain'}), lift value:11.884967584898376
frozenset({'variety: Tempranillo'}) --> frozenset({'province: Northern Spain'}), lift value:17.224921728240453
frozenset({'variety: Tempranillo'}) --> frozenset({'taster_name: Michael Schachner'}), lift value:5.218368046911387
frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss'}), lift value:3.1348800522073454
frozenset({'province: Veneto'}) --> frozenset({'country: Italy'}), lift value:9.667579408543263
frozenset({'province: Piedmont'}) --> frozenset({'country: Italy'}), lift value:9.667579408543263
frozenset({'province: Piedmont'}) --> frozenset({'taster_name: Kerin O'Keefe'}), lift value:9.923734603458792
frozenset({'variety: Nebbiolo'}) --> frozenset({'country: Italy'}), lift value:9.395508693481073
frozenset({'variety: Nebbiolo'}) --> frozenset({'taster_name: Kerin O'Keefe'}), lift value:9.65458574805652
frozenset({'province: Piedmont'}) --> frozenset({'variety: Nebbiolo'}), lift value:43.441861289223915
frozenset({'variety: Nebbiolo'}) --> frozenset({'province: Piedmont'}), lift value:43.441861289223915
frozenset({'points: (93.0, 100.0]'}), --> frozenset({'price: (60.0, 3500.0]'}), lift value:5.350602183386529
frozenset({'province: Alsace'}) --> frozenset({'taster_name: Anne Krebiehl\xa0MW'}), lift value:19.203339137422034
frozenset({'variety: Rosé'}) --> frozenset({'taster_name: Roger Voss'}), lift value:2.4444744552825615
frozenset({'province: Provence'}) --> frozenset({'taster_name: Roger Voss'}), lift value:4.493189462989387
frozenset({'province: Provence'}) --> frozenset({'country: France'}), lift value:5.502462439997507
frozenset({'variety: Rosé'}) --> frozenset({'country: France'}), lift value:3.09244444347085
frozenset({'province: Catalonia'}) --> frozenset({'country: Spain'}), lift value:14.747702589807854
frozenset({'province: Catalonia'}) --> frozenset({'taster_name: Michael Schachner'}), lift value:6.335311036044565
frozenset({'country: Austria'}) --> frozenset({'points: (89.0, 93.0]'}), lift value:1.5253214711302263
frozenset({'province: Rhône Valley'}) --> frozenset({'country: France'}), lift value:5.502462439997506
frozenset({'province: Rhône Valley'}) --> frozenset({'taster_name: Joe Czerwinski'}), lift value:18.461963004688613
frozenset({'province: Northeastern Italy'}) --> frozenset({'country: Italy'}), lift value:9.667579408543265
frozenset({'province: Northeastern Italy'}) --> frozenset({'taster_name: Kerin O'Keefe'}), lift value:8.873408230306888
frozenset({'taster_name: Lauren Buzzeo'}) --> frozenset({'price: (0.0, 25.0]'}), lift value:1.3970802590469402
frozenset({'variety: Sauvignon Blanc'}) --> frozenset({'price: (0.0, 25.0]'}), lift value:1.5365236169996905
frozenset({'country: New Zealand'}) --> frozenset({'taster_name: Joe Czerwinski'}), lift value:19.01033814344174
frozenset({'province: Southwest France'}) --> frozenset({'price: (0.0, 25.0]'}), lift value:1.4412178786070358
frozenset({'province: Southwest France'}) --> frozenset({'taster_name: Roger Voss'}), lift value:4.736702886946722
frozenset({'province: Southwest France'}) --> frozenset({'country: France'}), lift value:5.502462439997506
frozenset({'variety: Portuguese White'}) --> frozenset({'country: Portugal'}), lift value:19.627529464087168
frozenset({'variety: Portuguese White'}) --> frozenset({'taster_name: Roger Voss'}), lift value:4.760017257186
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]'}), lift value:1.5058876806488926
frozenset({'price: (60.0, 3500.0]'}), --> frozenset({'points: (89.0, 93.0]'}), lift value:1.6574495896661452
```

```

frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France'}) lift
value:3.6312546742071086
frozensest({'province: Bordeaux'}) --> frozensest({'variety: Bordeaux-style Red Blend'}) lift
value:15.349358012492072
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'province: Bordeaux'}) lift
value:15.349358012492072
frozensest({'points: (89.0, 93.0]'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.5042169882330254
frozensest({'price: (25.0, 60.0]'}) --> frozensest({'points: (89.0, 93.0]'}) lift value:1.5042169882330254
frozensest({'variety: Syrah'}) --> frozensest({'country: US'}) lift value:1.9457151467835068
frozensest({'variety: Syrah'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.641679446376456
frozensest({'variety: Sangiovese'}) --> frozensest({'province: Tuscany'}) lift value:23.79552325033766
frozensest({'taster_name: Anna Lee C. Iijima'}) --> frozensest({'country: US'}) lift value:1.4227604259884425
frozensest({'province: New York'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.3656325279481827
frozensest({'province: New York'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.4337640138431607
frozensest({'province: New York'}) --> frozensest({'country: US'}) lift value:2.575876962586821
frozensest({'taster_name: Anna Lee C. Iijima'}) --> frozensest({'province: New York'}) lift
value:19.977306885933793
frozensest({'province: New York'}) --> frozensest({'taster_name: Anna Lee C. Iijima'}) lift
value:19.977306885933793
frozensest({'country: Austria'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.0316212738451207
frozensest({'taster_name: Anne Krebiehl\xA0MW'}) --> frozensest({'price: (0.0, 25.0]'}) lift
value:0.9747166102570164
frozensest({'taster_name: Anne Krebiehl\xA0MW'}) --> frozensest({'country: Austria'}) lift
value:20.098006031260972
frozensest({'country: Austria'}) --> frozensest({'taster_name: Anne Krebiehl\xA0MW'}) lift
value:20.098006031260972
frozensest({'variety: Grüner Veltliner'}) --> frozensest({'country: Austria'}) lift value:31.878869702806817
frozensest({'province: Tuscany'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.3111808976282644
frozensest({'province: Tuscany'}) --> frozensest({'country: Italy'}) lift value:9.667579408543263
frozensest({'province: Tuscany'}) --> frozensest({'taster_name: Kerin O'Keefe'}) lift value:9.631390566254549
frozensest({'variety: Zinfandel'}) --> frozensest({'country: US'}) lift value:2.5705254176506984
frozensest({'variety: Zinfandel'}) --> frozensest({'province: California'}) lift value:4.6113339791233106
frozensest({'variety: Rosé'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.1145415056696215
frozensest({'variety: Rosé'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.7181206595598828
frozensest({'country: Australia'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.104423979173792
frozensest({'country: Australia'}) --> frozensest({'province: South Australia'}) lift value:46.77530471648118
frozensest({'province: South Australia'}) --> frozensest({'country: Australia'}) lift value:46.77530471648118
frozensest({'taster_name: Joe Czerwinski'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.1242117567161982
frozensest({'country: Australia'}) --> frozensest({'taster_name: Joe Czerwinski'}) lift value:19.00026377240653
frozensest({'province: South Australia'}) --> frozensest({'taster_name: Joe Czerwinski'}) lift
value:18.993008755890745
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.145488976799699
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'country: US'}) lift value:2.5758769625868205
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'province: California'}) lift value:4.841109428996381
frozensest({'province: Burgundy'}) --> frozensest({'taster_name: Roger Voss'}) lift value:4.738350511967716
frozensest({'province: Burgundy'}) --> frozensest({'country: France'}) lift value:5.502462439997507
frozensest({'province: Burgundy'}) --> frozensest({'variety: Chardonnay'}) lift value:6.635617176882615
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.7123843893187052
frozensest({'variety: Sauvignon Blanc'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.1237578454655779
frozensest({'province: Champagne'}) --> frozensest({'taster_name: Roger Voss'}) lift value:4.659806367561031
frozensest({'province: Champagne'}) --> frozensest({'country: France'}) lift value:5.502462439997507
frozensest({'variety: Champagne Blend'}) --> frozensest({'taster_name: Roger Voss'}) lift
value:4.279302643093948
frozensest({'variety: Champagne Blend'}) --> frozensest({'country: France'}) lift value:5.08296777873037
frozensest({'province: Champagne'}) --> frozensest({'variety: Champagne Blend'}) lift value:64.95953020403255
frozensest({'variety: Champagne Blend'}) --> frozensest({'province: Champagne'}) lift value:64.95953020403255
frozensest({'variety: Sangiovese'}) --> frozensest({'country: Italy'}) lift value:7.914117044729574
frozensest({'variety: Sangiovese'}) --> frozensest({'taster_name: Kerin O'Keefe'}) lift value:7.703054276751252
frozensest({'province: Washington'}) --> frozensest({'country: US'}) lift value:2.5758769625868205
frozensest({'province: Washington'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.3886585457105964
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'points: (85.0, 89.0]'}) lift
value:1.1425121380750765
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'country: US'}) lift value:2.558987875561042
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'price: (25.0, 60.0]'}) lift
value:1.40878211494923
frozensest({'province: Washington'}) --> frozensest({'taster_name: Sean P. Sullivan'}) lift
value:10.20894487629568
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'province: Washington'}) lift
value:10.20894487629568
frozensest({'variety: Bordeaux'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.2530945884949687
frozensest({'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss'}) lift value:4.7406150129311655
frozensest({'province: Bordeaux'}) --> frozensest({'country: France'}) lift value:5.502462439997506
frozensest({'points: (0.0, 85.0]'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.6397206218067182
frozensest({'country: Chile'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.6091250547290306
frozensest({'country: Chile'}) --> frozensest({'taster_name: Michael Schachner'}) lift value:6.3284704024895015
frozensest({'province: Oregon'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.4095698226297697
frozensest({'taster_name: Paul Gregutt'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.3627812015754386
frozensest({'variety: Pinot Noir'}) --> frozensest({'price: (25.0, 60.0]'}) lift value:1.541669145657443
frozensest({'variety: Merlot'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.1524510806923975
frozensest({'variety: Merlot'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.1347381569300101
frozensest({'variety: Merlot'}) --> frozensest({'country: US'}) lift value:1.7711681469592266
frozensest({'variety: White Blend'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.4168058592823747
frozensest({'variety: Red Blend'}) --> frozensest({'points: (85.0, 89.0]'}) lift value:1.1435855129316757
frozensest({'country: Argentina'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.4665448960756293
frozensest({'variety: Malbec'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.1660869324326792
frozensest({'province: Mendoza Province'}) --> frozensest({'price: (0.0, 25.0]'}) lift value:1.44293903671409

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frozenset({'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner'}) lift
value:6.366488747836123
frozenset({'province: Mendoza Province'}) --> frozenset({'country: Argentina'}) lift value:25.225778793941128
frozenset({'country: Argentina'}) --> frozenset({'province: Mendoza Province'}) lift value:25.225778793941128
frozenset({'variety: Malbec'}) --> frozenset({'province: Mendoza Province'}) lift value:15.847718470259318
frozenset({'country: Argentina'}) --> frozenset({'taster_name: Michael Schachner'}) lift
value:6.366488747836122
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner'}) lift value:4.164072141902269
frozenset({'variety: Malbec'}) --> frozenset({'country: Argentina'}) lift value:15.068256348765864
frozenset({'country: Germany'}) --> frozenset({'variety: Riesling'}) lift value:16.90550549128245
frozenset({'province: Mosel'}) --> frozenset({'variety: Riesling'}) lift value:19.86809953428063
frozenset({'province: Mosel'}) --> frozenset({'country: Germany'}) lift value:45.87577962577963
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'country: US'}) lift value:2.5754204896180832
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'province: California'}) lift value:4.84454603824227
frozenset({'variety: Chardonnay'}) --> frozenset({'country: US'}) lift value:1.3220594295918124
frozenset({'price: (25.0, 60.0]') --> frozenset({'country: US'}) lift value:1.3509601363053778
frozenset({'province: California'}) --> frozenset({'price: (25.0, 60.0]'}) lift value:1.4247602352191808
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'price: (25.0, 60.0]'}) lift
value:1.4394430298556755
frozenset({'province: California'}) --> frozenset({'country: US'}) lift value:2.575876962586821
frozenset({'country: US'}) --> frozenset({'province: California'}) lift value:2.575876962586821
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'country: US'}) lift value:2.5758769625868205
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'province: California'}) lift
value:4.843472674379563
frozenset({'variety: Cabernet Sauvignon'}) --> frozenset({'country: US'}) lift value:1.752245147367526
frozenset({'taster_name: Anna Lee C. Iijima'}) --> frozenset({'points: (85.0, 89.0]'}) lift
value:1.1975571789655972
frozenset({'taster_name: Anna Lee C. Iijima'}) --> frozenset({'price: (0.0, 25.0]'}) lift
value:1.2284773300614227
frozenset({'country: Germany'}) --> frozenset({'taster_name: Anna Lee C. Iijima'}) lift
value:18.23948963480921
frozenset({'country: France'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.0413944024389237
frozenset({'taster_name: Roger Voss'}) --> frozenset({'country: France'}) lift value:3.912822614129705
frozenset({'country: France'}) --> frozenset({'taster_name: Roger Voss'}) lift value:3.912822614129705
frozenset({'province: Alsace'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.0002378012375361
frozenset({'province: Alsace'}) --> frozenset({'country: France'}) lift value:5.502462439997506
frozenset({'country: Italy'}) --> frozenset({'points: (85.0, 89.0]'}) lift value:1.2737268422953814
frozenset({'taster_name: Kerin O'Keefe'}) --> frozenset({'points: (85.0, 89.0]'}) lift
value:1.2802488021231464
frozenset({'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy'}) lift value:9.667579408543265
frozenset({'country: Italy'}) --> frozenset({'taster_name: Kerin O'Keefe'}) lift value:9.667579408543265
frozenset({'country: Spain'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.3402630030524367
frozenset({'province: Northern Spain'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.2723469942385042
frozenset({'country: Spain'}) --> frozenset({'province: Northern Spain'}) lift value:14.747702589807854
frozenset({'province: Northern Spain'}) --> frozenset({'country: Spain'}) lift value:14.747702589807854
frozenset({'taster_name: Michael Schachner'}) --> frozenset({'price: (0.0, 25.0]'}) lift
value:1.4446579641518777
frozenset({'country: Spain'}) --> frozenset({'taster_name: Michael Schachner'}) lift value:6.360106302976137
frozenset({'province: Northern Spain'}) --> frozenset({'taster_name: Michael Schachner'}) lift
value:6.36465666474322
frozenset({'variety: Pinot Noir'}) --> frozenset({'country: US'}) lift value:1.8218293414812612
frozenset({'province: Oregon'}) --> frozenset({'variety: Pinot Noir'}) lift value:5.080999786033499
frozenset({'variety: Riesling'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.12499973331405
frozenset({'province: Oregon'}) --> frozenset({'country: US'}) lift value:2.5758769625868205
frozenset({'taster_name: Paul Gregutt'}) --> frozenset({'country: US'}) lift value:2.5175794190180345
frozenset({'province: Oregon'}) --> frozenset({'taster_name: Paul Gregutt'}) lift value:9.454027003715938
frozenset({'taster_name: Paul Gregutt'}) --> frozenset({'province: Oregon'}) lift value:9.454027003715938
frozenset({'variety: Pinot Gris'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.5209462942826733
frozenset({'country: Portugal'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.397119936197878
frozenset({'price: (0.0, 25.0]'}) --> frozenset({'points: (85.0, 89.0]'}) lift value:1.2611681096658576
frozenset({'points: (85.0, 89.0]'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.2611681096658576
frozenset({'province: Douro'}) --> frozenset({'country: Portugal'}) lift value:19.627529464087168
frozenset({'country: Portugal'}) --> frozenset({'taster_name: Roger Voss'}) lift value:4.730379613601119
frozenset({'taster_name: Roger Voss'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.1171733077796036
frozenset({'province: Douro'}) --> frozenset({'taster_name: Roger Voss'}) lift value:4.7144232221554825
frozenset({'variety: Portuguese Red'}) --> frozenset({'country: Portugal'}) lift value:19.627529464087168
frozenset({'variety: Portuguese Red'}) --> frozenset({'price: (0.0, 25.0]'}) lift value:1.3815379126407916
frozenset({'variety: Portuguese Red'}) --> frozenset({'taster_name: Roger Voss'}) lift
value:4.7506286629903665
frozenset({'province: Veneto'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift
value:9.5372101871856
frozenset({'province: Loire Valley'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift
value:6.693841953587137
frozenset({'province: Loire Valley'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}) lift
value:6.523857718270376
frozenset({'province: Loire Valley'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift
value:5.2607856820327585
frozenset({'variety: Tempranillo'}) --> frozenset({'province: Northern Spain', 'taster_name: Michael
Schachner'}) lift value:17.213970567294968
frozenset({'variety: Tempranillo'}) --> frozenset({'taster_name: Michael Schachner', 'country: Spain'}) lift
value:11.887650399860167
frozenset({'variety: Tempranillo'}) --> frozenset({'province: Northern Spain', 'country: Spain'}) lift
value:17.224921728240453
frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift
value:4.3979518289897985
frozenset({'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red
Blend'}) lift value:23.21661702379894

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frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:15.352714656034347
frozenset({'province: Piedmont'}) --> frozenset({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) lift value:44.69983024547556
frozenset({'variety: Nebbiolo'}) --> frozenset({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) lift value:43.487493496460495
frozenset({'province: Piedmont'}) --> frozenset({'variety: Nebbiolo', 'country: Italy'}) lift value:44.69983024547556
frozenset({'variety: Nebbiolo'}) --> frozenset({'country: Italy', 'province: Piedmont'}) lift value:43.441861289223915
frozenset({'variety: Nebbiolo'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.65458574805652
frozenset({'province: Piedmont'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.923734603458792
frozenset({'province: Alsace'}) --> frozenset({'country: France', 'taster_name: Anne Krebiehl\xA0MW'}) lift value:47.42880171950564
frozenset({'province: Provence'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.318611573806478
frozenset({'province: Catalonia'}) --> frozenset({'taster_name: Michael Schachner', 'country: Spain'}) lift value:14.690207761117552
frozenset({'province: Rhône Valley'}) --> frozenset({'country: France', 'taster_name: Joe Czerwinski'}) lift value:83.30310420871646
frozenset({'province: Northeastern Italy'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:8.873408230306888
frozenset({'province: Southwest France'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}) lift value:7.6150277227490655
frozenset({'province: Southwest France'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:6.107322929171668
frozenset({'province: Southwest France'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.6610557889165065
frozenset({'variety: Portuguese White'}) --> frozenset({'taster_name: Roger Voss', 'country: Portugal'}) lift value:19.750503468337435
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) lift value:5.4825693076741056
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]', 'country: us'}) lift value:3.3127570309105328
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'variety: Bordeaux-style Red Blend'}) lift value:23.258976171990536
frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France', 'province: Bordeaux'}) lift value:15.349358012492072
frozenset({'variety: Syrah'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift value:2.6897536473108214
frozenset({'variety: Sangiovese'}) --> frozenset({'country: Italy', 'province: Tuscany'}) lift value:23.79552325033766
frozenset({'variety: Sangiovese'}) --> frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) lift value:23.211291927628707
frozenset({'taster_name: Anna Lee C. Iijima'}) --> frozenset({'province: New York', 'country: us'}) lift value:19.977306885933793
frozenset({'province: New York'}) --> frozenset({'taster_name: Anna Lee C. Iijima', 'country: us'}) lift value:36.168481806241864
frozenset({'province: New York'}) --> frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'}) lift value:22.816211512342466
frozenset({'province: New York'}) --> frozenset({'price: (0.0, 25.0]', 'country: us'}) lift value:4.842915166095041
frozenset({'province: New York'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) lift value:23.97726141375682
frozenset({'province: New York'}) --> frozenset({'points: (85.0, 89.0]', 'country: us'}) lift value:3.701228693303504
frozenset({'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.631390566254549
frozenset({'province: Tuscany'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'}) lift value:9.951855473142874
frozenset({'province: Tuscany'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift value:9.986743453964486
frozenset({'variety: Zinfandel'}) --> frozenset({'country: US', 'province: California'}) lift value:4.6113339791233106
frozenset({'country: Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'province: South Australia'}) lift value:46.77530471648119
frozenset({'province: South Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'country: Australia'}) lift value:46.75744414294842
frozenset({'country: Australia'}) --> frozenset({'taster_name: Joe Czerwinski', 'price: (0.0, 25.0]'}) lift value:18.6757282801833
frozenset({'taster_name: Jim Gordon'}) --> frozenset({'country: US', 'province: California'}) lift value:4.841109428996381
frozenset({'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'province: California'}) lift value:8.586873796751984
frozenset({'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:3.869190386127793
frozenset({'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.6633727850308935
frozenset({'province: Burgundy'}) --> frozenset({'country: France', 'variety: Chardonnay'}) lift value:24.812433475115032
frozenset({'province: Burgundy'}) --> frozenset({'taster_name: Roger Voss', 'variety: Chardonnay'}) lift value:24.785136770757685
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) lift value:5.821345107733303

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frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:3.2640911264501846  
frozenset({'variety: Champagne Blend'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift  
value:6.011202625647063  
frozenset({'province: Champagne'}) --> frozenset({'variety: Champagne Blend', 'taster_name: Roger Voss'}) lift  
value:70.28896984073195  
frozenset({'variety: Champagne Blend'}) --> frozenset({'province: Champagne', 'taster_name: Roger Voss'}) lift  
value:64.54941486704502  
frozenset({'province: Champagne'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift  
value:6.552918965090566  
frozenset({'variety: Champagne Blend'}) --> frozenset({'country: France', 'province: Champagne'}) lift  
value:64.95953020403255  
frozenset({'province: Champagne'}) --> frozenset({'country: France', 'variety: Champagne Blend'}) lift  
value:70.32060611583374  
frozenset({'variety: Sangiovese'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift  
value:7.703054276751252  
frozenset({'province: Washington'}) --> frozenset({'taster_name: Sean P. Sullivan', 'country: us'}) lift  
value:10.276322983126034  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'province: Washington', 'country: us'}) lift  
value:10.20894487629568  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:2.670970089735377  
frozenset({'taster_name: Sean P. Sullivan'}) --> frozenset({'points: (85.0, 89.0]', 'country: us'}) lift  
value:3.0828537993560206  
frozenset({'province: Washington'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:2.647756555258324  
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift  
value:6.666557271711035  
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'})) lift  
value:6.621032234098345  
frozenset({'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) lift  
value:5.312484015345268  
frozenset({'country: Chile'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift  
value:7.049196922074397  
frozenset({'province: Oregon'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:2.6876281066289534  
frozenset({'variety: Malbec'}) --> frozenset({'country: Argentina', 'province: Mendoza Province'}) lift  
value:15.847718470259318  
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'})  
lift value:15.847718470259318  
frozenset({'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner', 'country:  
Argentina'}) lift value:25.225778793941128  
frozenset({'country: Argentina'}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza  
Province'}) lift value:25.225778793941128  
frozenset({'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael  
Schachner'}) lift value:6.358913576091268  
frozenset({'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift  
value:6.462942655546413  
frozenset({'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'country: Argentina'}) lift  
value:24.81973859149759  
frozenset({'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]', 'province: Mendoza Province'}) lift  
value:25.225778793941124  
frozenset({'variety: Malbec'}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) lift  
value:15.068256348765864  
frozenset({'province: Mosel'}) --> frozenset({'variety: Riesling', 'country: Germany'}) lift  
value:53.91525005198586  
frozenset({'country: Germany'}) --> frozenset({'variety: Riesling', 'taster_name: Anna Lee C. Iijima'}) lift  
value:30.781935033878042  
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'country: us', 'province: California'}) lift  
value:4.84454603824227  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) lift  
value:4.8940874718905345  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:2.74458737894489  
frozenset({'province: California'}) --> frozenset({'price: (25.0, 60.0]', 'country: us'}) lift  
value:2.716591680601063  
frozenset({'taster_name: Virginie Boone'}) --> frozenset({'country: us', 'province: California'}) lift  
value:4.843472674379563  
frozenset({'province: Alsace'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'})) lift  
value:5.285001455246465  
frozenset({'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'})) lift  
value:9.71708104613192  
frozenset({'country: Italy'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift  
value:9.667579408543265  
frozenset({'country: Spain'}) --> frozenset({'province: Northern Spain', 'taster_name: Michael Schachner'})  
lift value:14.747702589807853  
frozenset({'province: Northern Spain'}) --> frozenset({'taster_name: Michael Schachner', 'country: Spain'})  
lift value:14.758253888610136  
frozenset({'province: Northern Spain'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael  
Schachner'}) lift value:5.6046948356807516  
frozenset({'province: Northern Spain'}) --> frozenset({'price: (0.0, 25.0]', 'country: Spain'}) lift  
value:14.000382775119618  
frozenset({'country: Spain'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift  
value:5.897950618938198  
frozenset({'province: Oregon'}) --> frozenset({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) lift  
value:17.807080325168855
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frozenset({'province: Oregon'}) --> frozenset({'variety: Pinot Noir', 'country: US'}) lift
value:7.184004559456084
frozenset({'province: Oregon'}) --> frozenset({'taster_name: Paul Gregutt', 'country: US'}) lift
value:9.672946235016525
frozenset({'taster_name: Paul Gregutt'}) --> frozenset({'province: Oregon', 'country: US'}) lift
value:9.454027003715938
frozenset({'variety: Portuguese Red'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift
value:5.8783501566307
frozenset({'variety: Portuguese Red'}) --> frozenset({'taster_name: Roger Voss', 'country: Portugal'}) lift
value:19.711547840194758
frozenset({'variety: Portuguese Red'}) --> frozenset({'price: (0.0, 25.0]', 'country: Portugal'}) lift
value:19.408624401928286
frozenset({'province: Douro'}) --> frozenset({'taster_name: Roger Voss', 'country: Portugal'}) lift
value:19.561322400633053
frozenset({'country: Portugal'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift
value:5.918259231644626
frozenset({'country: Portugal', 'points: (0.0, 85.0]'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:7.889118586731818
frozenset({'price: (25.0, 60.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.672155640562559
frozenset({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.5601867993642253
frozenset({'province: Washington', 'price: (25.0, 60.0]'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) lift value:3.260489950411857
frozenset({'province: Washington', 'points: (89.0, 93.0]'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.4627448856177914
frozenset({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'}) --> frozenset({'province: Washington', 'country: US'}) lift value:10.6924701363551
frozenset({'province: Washington', 'points: (89.0, 93.0]'}) --> frozenset({'taster_name: Sean P. Sullivan', 'country: US'}) lift value:10.13482160875451
frozenset({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'}) --> frozenset({'province: Washington', 'price: (25.0, 60.0]'}) lift value:14.626122040201862
frozenset({'points: (89.0, 93.0]', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.658611206462995
frozenset({'province: Loire Valley', 'price: (0.0, 25.0]'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.693841953587137
frozenset({'taster_name: Roger Voss', 'province: Loire Valley'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}) lift value:6.523857718270376
frozenset({'country: France', 'province: Loire Valley'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:5.2607856820327585
frozenset({'province: Loire Valley'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:8.040518396933827
frozenset({'variety: Tempranillo', 'taster_name: Michael Schachner'}) --> frozenset({'province: Northern Spain', 'country: Spain'}) lift value:20.995263559969445
frozenset({'variety: Tempranillo', 'province: Northern Spain'}) --> frozenset({'taster_name: Michael Schachner', 'country: Spain'}) lift value:14.748870971453336
frozenset({'variety: Tempranillo', 'country: Spain'}) --> frozenset({'province: Northern Spain', 'taster_name: Michael Schachner'}) lift value:21.360303804172542
frozenset({'variety: Tempranillo'}) --> frozenset({'province: Northern Spain', 'taster_name: Michael Schachner', 'country: Spain'}) lift value:17.213970567294968
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) lift value:24.333103132042346
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'price: (0.0, 25.0]', 'province: Bordeaux'}) lift value:19.172542615360584
frozenset({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) lift value:6.0443118998255
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:6.255094416519494
frozenset({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:20.43283332617622
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'price: (0.0, 25.0]', 'province: Bordeaux'}) lift value:21.9335408108644
frozenset({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:21.9335408108644
frozenset({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:5.024614686281387
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}) lift value:5.469680720541459
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) lift value:4.858262211947044
frozensest({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}) lift value:6.259435960779202
frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) lift value:21.988727242873846
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frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) lift value:21.988727242873846
frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) lift value:5.896415745072641
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}) lift value:6.286260002263075
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:5.058843537414965
frozensest({'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) lift value:6.668015134404585

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frozenset({'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozenset({'country: France', 'variety: Bordeaux-style Red Blend'}) lift value:23.264062514501024
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France', 'province: Bordeaux'}) lift value:23.21661702379894
frozenset({'country: France', 'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:23.21661702379894
frozenset({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:23.264062514501024
frozenset({'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:23.27214019399593
frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:15.352714656034347
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:4.3977205493102485
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:23.15318158060865
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frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}) lift value:7.774454701380774
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.674517929471701
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'variety: Bordeaux-style Red Blend'}) lift value:23.192599095065276
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France', 'province: Bordeaux'}) lift value:16.988884445416254
frozenset({'province: Piedmont', 'price: (25.0, 60.0]'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.923511150276154
frozenset({'province: Burgundy', 'price: (60.0, 3500.0]'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.674096107116379
frozenset({'variety: Nebbiolo', 'country: Italy'}) --> frozenset({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) lift value:44.746783848674596
frozenset({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'province: Piedmont'}) lift value:44.69983024547556
frozenset({'country: Italy', 'province: Piedmont'}) --> frozenset({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) lift value:44.69983024547556
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frozensest({'country: France', 'variety: Rosé'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) lift value:5.564768253225744
frozensest({'taster_name: Roger Voss', 'variety: Pinot Noir'}) --> frozensest({'country: France', 'province: Burgundy'}) lift value:25.21028804821273
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frozensest({'province: Washington', 'price: (0.0, 25.0]'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) lift value:5.497124658057403
frozensest({'country: Spain', 'points: (0.0, 85.0]'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:7.73606085680477
frozensest({'province: Northern Spain', 'points: (0.0, 85.0]'}) --> frozensest({'price: (0.0, 25.0]', 'country: Spain'}) lift value:19.354591137505714
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frozensest({'province: Northern Spain', 'points: (0.0, 85.0]'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:7.7429800145693495
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frozensest({'country: Argentina', 'points: (0.0, 85.0]'}) --> frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'}) lift value:31.222032363759457
frozensest({'province: Mendoza Province', 'points: (0.0, 85.0]'}) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) lift value:25.225778793941124
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frozensest({'variety: Chardonnay', 'province: California'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) lift value:2.9754237675429254
frozensest({'taster_name: Jim Gordon', 'price: (25.0, 60.0]'}) --> frozensest({'country: US', 'province: California'}) lift value:4.835666871403007

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frozenset({'taster_name: Jim Gordon', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) lift value:4.839365061872625
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frozenset({'taster_name: Paul Gregutt', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.089626574476474
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frozenset({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) lift value:3.5347451783831745
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frozenset({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) lift value:6.058436457377299
frozenset({'province: Southwest France', 'price: (0.0, 25.0]'})) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.6574623777524256
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frozenset({'country: Italy', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'taster_name: Kerin O'Keefe'}) lift value:12.427667178004786
frozenset({'points: (89.0, 93.0]', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'price: (25.0, 60.0]'})) lift value:12.505250077663868
frozenset({'points: (89.0, 93.0]', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:2.9228022930405957
frozenset({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.6121604605517748
frozenset({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) lift value:6.443913559485641
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frozenset({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]'})) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) lift value:6.417224471726702
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frozenset({'taster_name: Virginie Boone', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) lift value:4.845049359741678
frozenset({'variety: Cabernet Sauvignon', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) lift value:2.6280849802231514
frozenset({'variety: Red Blend', 'country: Italy'}) --> frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) lift value:19.104825774451225
frozenset({'variety: Red Blend', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'province: Tuscany'}) lift value:18.565876309136243
frozenset({'variety: Red Blend', 'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.904326386037134
frozenset({'country: Italy', 'variety: Sangiovese'}) --> frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) lift value:28.35401683055313
frozenset({'variety: Sangiovese', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'province: Tuscany'}) lift value:29.021867180277518
frozenset({'variety: Sangiovese', 'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.39491919343153
frozenset({'variety: Sangiovese'}) --> frozenset({'country: Italy', 'province: Tuscany', 'taster_name: Kerin O'Keefe'}) lift value:23.211291927628707
frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) lift value:3.8046131075578127
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frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) lift value:24.556302505362744
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frozenset({'province: New York', 'country: US'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) lift value:23.97726141375682
frozenset({'province: New York', 'points: (85.0, 89.0]'})) --> frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) lift value:38.06758466421419
frozenset({'province: New York'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima', 'country: US'}) lift value:36.82838353839627
frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'})) --> frozenset({'province: New York', 'country: US'}) lift value:22.816211512342466
frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) --> frozenset({'province: New York', 'price: (0.0, 25.0]'})) lift value:35.39373078301182
frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) lift value:35.39373078301182
frozenset({'province: New York', 'taster_name: Anna Lee C. Iijima'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:4.739176958324846
frozenset({'province: New York', 'country: US'}) --> frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'})) lift value:22.816211512342466
frozenset({'province: New York'}) --> frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]', 'country: US'}) lift value:36.164761425170866
frozenset({'province: Tuscany', 'price: (0.0, 25.0]'})) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.651886540874923
frozenset({'country: Italy', 'province: Tuscany'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift value:9.986743453964486
frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'})) lift value:10.075595508410366
frozenset({'points: (85.0, 89.0]', 'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.751145983880901
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frozenset({'province: Tuscany', 'price: (25.0, 60.0]'})) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) lift value:9.594326694539838
frozenset({'points: (85.0, 89.0]', 'taster_name: Jim Gordon'}) --> frozenset({'country: US', 'province: California'}) lift value:4.840734549261137
frozenset({'taster_name: Jim Gordon', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'province: California'}) lift value:7.385721640127528
frozenset({'points: (85.0, 89.0]', 'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'province: California'}) lift value:10.615297490528686
frozenset({'taster_name: Jim Gordon', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) lift value:3.482220281132763
frozenset({'points: (85.0, 89.0]', 'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:4.784752172766827
frozenset({'taster_name: Jim Gordon', 'province: California'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:3.871584527857612
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frozenset({'points: (85.0, 89.0]', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.6495118744243085
frozenset({'taster_name: Roger Voss', 'variety: Chardonnay'}) --> frozenset({'country: France', 'province: Burgundy'}) lift value:24.785136770757685
frozenset({'country: France', 'variety: Chardonnay'}) --> frozenset({'taster_name: Roger Voss', 'province: Burgundy'}) lift value:24.849384938441833
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frozenset({'taster_name: Roger Voss', 'province: Burgundy'}) --> frozenset({'country: France', 'variety: Chardonnay'}) lift value:24.849384938441833
frozenset({'country: France', 'province: Burgundy'}) --> frozenset({'taster_name: Roger Voss', 'variety: Chardonnay'}) lift value:24.785136770757685
frozenset({'variety: Chardonnay', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:6.673296091237269
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frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'price: (25.0, 60.0]', 'country: US', 'province: California'}) lift value:5.821345107733303
frozenset({'variety: Champagne Blend', 'taster_name: Roger Voss'}) --> frozenset({'country: France', 'province: Champagne'}) lift value:70.28896984073195
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frozenset({'province: Champagne'}) --> frozenset({'country: France', 'variety: Champagne Blend', 'taster_name: Roger Voss'}) lift value:70.36646594860485
frozenset({'province: Washington', 'price: (0.0, 25.0]'}) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) lift value:3.650093679446709
frozenset({'province: washington', 'points: (85.0, 89.0]'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:3.5660531222434066
frozenset({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'}) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) lift value:4.040214423424907
frozenset({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) lift value:3.3596453471796437
frozenset({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'}) --> frozenset({'province: Washington', 'points: (85.0, 89.0]'}) lift value:14.18739053803038
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frozenset({'variety: Cabernet Sauvignon', 'price: (60.0, 3500.0]'}) --> frozenset({'country: US', 'province: California'}) lift value:3.786630446469193
frozenset({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]'}) --> frozenset({'province: Washington', 'country: US'}) lift value:10.09692178876474
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frozenset({'taster_name: Sean P. Sullivan', 'province: Washington'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:2.7695521605622604
frozenset({'variety: Chardonnay', 'province: California'}) --> frozenset({'taster_name: Virginie Boone', 'country: US'}) lift value:5.23079545370102
frozenset({'taster_name: Virginie Boone', 'variety: Chardonnay'}) --> frozenset({'country: US', 'province: California'}) lift value:4.846263657826827
frozenset({'province: California', 'points: (0.0, 85.0]'}) --> frozenset({'taster_name: Virginie Boone', 'country: US'}) lift value:5.740847152795018
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frozenset({'taster_name: Roger Voss', 'points: (0.0, 85.0]'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'}) lift value:6.172052314368585
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frozenset({'country: Chile', 'points: (0.0, 85.0]'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:8.102655184647137
frozenset({'country: Chile', 'price: (0.0, 25.0]'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Michael Schachner'}) lift value:7.158258992004275
frozenset({'country: Chile', 'points: (85.0, 89.0]'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:7.496908820360366
frozenset({'province: Oregon', 'price: (25.0, 60.0]'}) --> frozenset({'variety: Pinot Noir', 'country: US'}) lift value:9.141814232617598

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frozenset({'province: Oregon', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.420069777708378
frozenset({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.41283208056081
frozenset({'province: Oregon', 'price: (25.0, 60.0]'})) --> frozenset({'taster_name: Paul Gregutt', 'country: US'}) lift value:9.7855622570293
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frozenset({'variety: Red Blend', 'country: Italy'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift value:10.339270934749754
frozenset({'variety: Red Blend', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'})) lift value:10.136992325406633
frozenset({'price: (60.0, 3500.0]', 'province: California'}) --> frozenset({'taster_name: Virginie Boone', 'country: US'}) lift value:7.409020582838195
frozenset({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]'})) --> frozenset({'country: US', 'province: California'}) lift value:4.846263657826826
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frozenset({'country: Italy', 'price: (25.0, 60.0]'})) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift value:8.866724779879313
frozenset({'price: (25.0, 60.0]'}), 'taster_name: Kerin O'Keefe') --> frozenset({'country: Italy', 'points: (85.0, 89.0]'})) lift value:8.845903357826147
frozenset({'variety: Malbec', 'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:5.919852448021462
frozenset({'variety: Malbec', 'taster_name: Michael Schachner'}) --> frozenset({'price: (0.0, 25.0]', 'country: Argentina'}) lift value:21.10208220101685
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frozenset({'points: (85.0, 89.0]', 'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) lift value:25.225778793941128
frozenset({'points: (85.0, 89.0]', 'country: Argentina'}) --> frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'}) lift value:24.701787145422742
frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) --> frozenset({'taster_name: Michael Schachner', 'taster_name: Michael Schachner'}) lift value:6.950806206886165
frozenset({'country: Argentina', 'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:6.358913576091268
frozenset({'taster_name: Michael Schachner', 'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'country: Argentina'}) lift value:24.81973859149759
frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) --> frozenset({'price: (0.0, 25.0]', 'province: Mendoza Province'}) lift value:25.225778793941124
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frozenset({'variety: Malbec', 'province: Mendoza Province'}) --> frozenset({'taster_name: Michael Schachner', 'country: Argentina'}) lift value:25.225778793941124
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frozenset({'points: (85.0, 89.0]', 'taster_name: Matt Kettmann'}) --> frozenset({'country: US', 'province: California'}) lift value:4.841503084489079
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frozenset({'taster_name: Virginie Boone', 'price: (25.0, 60.0]'})) --> frozenset({'country: US', 'province: California'}) lift value:4.844166162194788
frozenset({'taster_name: Virginie Boone', 'country: US'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) lift value:4.8940874718905345
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frozenset({'variety: Cabernet Sauvignon', 'province: California'}) --> frozenset({'taster_name: Virginie Boone', 'country: US'}) lift value:6.948945160383511
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frozenset({'country: Italy', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) lift value:12.502277887355413
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frozenset({'province: Oregon', 'country: US'}) --> frozenset({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) lift value:17.807080325168855
frozenset({'province: Oregon', 'variety: Pinot Noir'}) --> frozenset({'taster_name: Paul Gregutt', 'country: US'}) lift value:9.880506342560475
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frozenset({'price: (0.0, 25.0]', 'country: Portugal'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) lift value:5.567988549383193
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(0.0, 25.0]'})) lift value:5.8783501566307
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(0.0, 25.0]'})) lift value:19.495173560930382
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frozenset({'taster_name: Sean P. Sullivan', 'province: Washington', 'price: (25.0, 60.0]'})) -->
frozenset({'points: (89.0, 93.0]', 'country: us'}) lift value:3.215423003849718
frozenset({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'})) --> frozenset({'province: Washington',
'price: (25.0, 60.0]'})) lift value:14.626122040201862
frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozenset({'country:
France', 'taster_name: Roger Voss'}) lift value:6.678720322667889
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France', 'points: (85.0, 89.0]'})) lift value:7.038863057904278
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozenset({'country:
France', 'price: (0.0, 25.0]'})) lift value:7.779349634001584
frozenset({'country: France', 'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozenset({'points: (85.0,
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Roger Voss', 'price: (0.0, 25.0]'})) lift value:6.255094416519494
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France', 'variety: Bordeaux-style Red Blend'}) lift value:21.998634334536824
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
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Voss', 'variety: Bordeaux-style Red Blend'}) lift value:21.9335408108644
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frozenset({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
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frozenset({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
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frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'taster_name: Roger Voss'}) lift value:5.898476517644868
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) -->
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frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
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France', 'variety: Bordeaux-style Red Blend'}) lift value:22.290511535939675
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frozensest({'points: (89.0, 93.0]', 'variety: Chardonnay', 'province: California'}) --> frozensest({'price:
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frozensest({'province: Oregon', 'points: (89.0, 93.0]', 'country: US'}) --> frozensest({'taster_name: Paul
Gregutt', 'price: (25.0, 60.0]'} lift value:11.676903897370272
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frozenset({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) lift value:3.1236392160269313
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frozenset({'points: (85.0, 89.0]', 'province: Mendoza Province'}) --> frozenset({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'country: Argentina'}) lift value:27.129979200176102
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frozensest({'province: Northern Spain', 'points: (85.0, 89.0]', 'country: Spain'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) lift value:6.547650211277382
frozensest({'province: Northern Spain', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Michael Schachner', 'country: Spain'}) lift value:16.73540360991164
frozensest({'province: Northern Spain', 'points: (85.0, 89.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'country: Spain'}) lift value:16.372262878558224
frozensest({'province: Oregon', 'points: (85.0, 89.0]', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) lift value:9.736902294550871
frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]', 'variety: Pinot Noir'}) -->
frozensest({'province: Oregon', 'country: US'}) lift value:17.749158573265507
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (85.0, 89.0]'})) --> frozensest({'variety: Pinot Noir', 'country: US'}) lift value:7.033186587795876
frozensest({'province: Oregon', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]'})) lift value:11.947385523513203
frozensest({'province: Oregon', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) lift value:9.457520823881534
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US'}) lift value:3.322402265963686
frozensest({'province: Oregon', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]', 'country: US'}) lift value:12.19615477319155
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) lift value:6.673475294499144
frozensest({'province: Bordeaux', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) -->
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) lift value:22.27300603260172
frozensest({'province: Bordeaux', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) --> frozensest({'country: France', 'points: (85.0, 89.0]', 'lift value:7.126653271618202
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) lift value:7.477270954728918
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) --> frozensest({'country: France', 'province: Bordeaux'}) lift value:23.206012228260867
frozensest({'country: France', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) -->
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:22.268135681786454
frozensest({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) lift value:6.122455107144471
frozensest({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) lift value:6.007078167589906
frozensest({'country: France', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:23.23238951062152
frozensest({'country: France', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) lift value:24.329302026916196
frozensest({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) lift value:27.539842780910256
frozensest({'country: France', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) lift value:26.336060898833907
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) lift value:22.321390533092398

```

```

frozenset({'price: (0.0, 25.0)', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozenset({'country: France', 'points: (85.0, 89.0)', 'taster_name: Roger Voss'}) lift value:8.594492420280208
frozenset({'points: (85.0, 89.0)', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozenset({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]')}) lift value:9.181142406786497
frozenset({'points: (85.0, 89.0)', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'taster_name: Roger Voss', 'province: Bordeaux'}) lift value:20.532354649890138
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozenset({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) lift value:27.48359337285664
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) -->
frozenset({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) lift value:27.539842780910256
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'price: (0.0, 25.0]', 'province: Bordeaux'}) lift value:26.336060898833907
frozenset({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) lift value:27.539842780910256
frozenset({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) lift
value:27.48359337285664
frozenset({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'province: Bordeaux', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) lift
value:26.372058676918286
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) lift value:27.539842780910256
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'province: Bordeaux', 'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) lift value:19.210139089168642

```

## 使用Kulczynski + Imbalance Ratio进行评价

```

def getKulcAndIR(rules, suppData):
    kulcwithIRs = []
    for rule in rules:
        freqSet_conseq = rule[0]
        conseq = rule[1]
        SA = float(suppData[freqSet_conseq])
        SB = float(suppData[conseq])
        SAB = float(rule[3])
        kulc_val = (SAB / SA + SAB / SB) / 2.
        ir_val = (abs(SA - SB) / (SA + SB - SAB))
        kulcwithIRs.append([freqSet_conseq, conseq, kulc_val, ir_val])

    return kulcwithIRs

def showKulcAndIR(kwis):
    for kwi in kwis:
        print(f'{kwi[0]} --> {kwi[1]} Kulczynski:{kwi[2]} Imbalance Ratio:{kwi[3]}')

```

```

kulcwithIRs = getKulcAndIR(rules, suppData)
showKulcAndIR(kulcwithIRs)

```

```

frozenset({'taster_name: Anne Krebiehl\xa0MW'}) --> frozenset({'points: (89.0, 93.0]'})
kulczynski:0.299556003122089 Imbalance Ratio:0.8615423292062095
frozenset({'province: Veneto'}) --> frozenset({'taster_name: Kerin O'Keefe'}) Kulczynski:0.5313997586878013
Imbalance Ratio:0.889162837610669
frozenset({'province: Loire Valley'}) --> frozenset({'price: (0.0, 25.0]'}) Kulczynski:0.3317255501314769
Imbalance Ratio:0.9581989420719906
frozenset({'province: Loire Valley'}) --> frozenset({'taster_name: Roger Voss'}) Kulczynski:0.5386399180283665
Imbalance Ratio:0.922720163943267
frozenset({'province: Loire Valley'}) --> frozenset({'country: France'}) Kulczynski:0.5446667913471729
Imbalance Ratio:0.9106664173056542
frozenset({'variety: Tempranillo'}) --> frozenset({'price: (0.0, 25.0]'}) Kulczynski:0.3022526134207912
Imbalance Ratio:0.9515420390492725
frozenset({'variety: Tempranillo'}) --> frozenset({'country: Spain'}) Kulczynski:0.5104618151515294 Imbalance
Ratio:0.6970611596505162
frozenset({'variety: Tempranillo'}) --> frozenset({'province: Northern Spain'}) Kulczynski:0.4949006004964344
Imbalance Ratio:0.4707946853848082
frozenset({'variety: Tempranillo'}) --> frozenset({'taster_name: Michael Schachner'})
Kulczynski:0.4570395308066444 Imbalance Ratio:0.8668032786885247
frozenset({'variety: Bordeaux-style Red Blend'}) --> frozenset({'taster_name: Roger Voss'}) Kulczynski:0.40840634136217374 Imbalance Ratio:0.702153110047847
frozenset({'province: Veneto'}) --> frozenset({'country: Italy'}) Kulczynski:0.5520810514786418 Imbalance
Ratio:0.8958378970427163
frozenset({'province: Piedmont'}) --> frozenset({'country: Italy'}) Kulczynski:0.604381161007667 Imbalance
Ratio:0.7912376779846659
frozenset({'province: Piedmont'}) --> frozenset({'taster_name: Kerin O'Keefe'}) Kulczynski:0.6066222177869135
Imbalance Ratio:0.7853043771801508
frozenset({'variety: Nebbiolo'}) --> frozenset({'country: Italy'}) Kulczynski:0.5710327580148327 Imbalance
Ratio:0.8208174386920981
frozenset({'variety: Nebbiolo'}) --> frozenset({'taster_name: Kerin O'Keefe'}) Kulczynski:0.5733794651482725
Imbalance Ratio:0.8159014557670772
frozenset({'province: Piedmont'}) --> frozenset({'variety: Nebbiolo'}) Kulczynski:0.8625373807212928 Imbalance
Ratio:0.1531172069825437
frozenset({'variety: Nebbiolo'}) --> frozenset({'province: Piedmont'}) Kulczynski:0.8625373807212928 Imbalance
Ratio:0.1531172069825437
frozenset({'points: (93.0, 100.0]'}) --> frozenset({'price: (60.0, 3500.0]'}) Kulczynski:0.4230349213931105
Imbalance Ratio:0.4643981805458363

```

```

frozensest({'province: Alsace'}) --> frozensest({'taster_name: Anne Krebiehl\xa0MW'})
Kulczynski:0.5318366569016957 Imbalance Ratio:0.31859131859131856
frozensest({'variety: Rosé'}) --> frozensest({'taster_name: Roger Voss'}) Kulczynski:0.2946025833350507
Imbalance Ratio:0.7956421095008052
frozensest({'province: Provence'}) --> frozensest({'taster_name: Roger Voss'}) Kulczynski:0.4973993569690059
Imbalance Ratio:0.9432765202430238
frozensest({'province: Provence'}) --> frozensest({'country: France'}) Kulczynski:0.5311389564241631 Imbalance
Ratio:0.9377220871516738
frozensest({'variety: Rosé'}) --> frozensest({'country: France'}) Kulczynski:0.32320702403969764 Imbalance
Ratio:0.7709105653382763
frozensest({'province: Catalonia'}) --> frozensest({'country: Spain'}) Kulczynski:0.585296574770259 Imbalance
Ratio:0.829406850459482
frozensest({'province: Catalonia'}) --> frozensest({'taster_name: Michael Schachner'})
Kulczynski:0.5341930820343473 Imbalance Ratio:0.9260220635950682
frozensest({'country: Austria'}) --> frozensest({'points: (89.0, 93.0)'}) Kulczynski:0.28489718204331177
Imbalance Ratio:0.8822451172492256
frozensest({'province: Rhône Valley'}) --> frozensest({'country: France'}) Kulczynski:0.5291752384514681
Imbalance Ratio:0.9416495230970638
frozensest({'province: Rhône Valley'}) --> frozensest({'taster_name: Joe Czerwinski'})
Kulczynski:0.5834662187909011 Imbalance Ratio:0.7937901498929335
frozensest({'province: Northeastern Italy'}) --> frozensest({'country: Italy'}) Kulczynski:0.5589813800657174
Imbalance Ratio:0.8820372398685651
frozensest({'province: Northeastern Italy'}) --> frozensest({'taster_name: Kerin O'Keefe'})
Kulczynski:0.500747140941014 Imbalance Ratio:0.8675555555555555
frozensest({'taster_name: Lauren Buzzeo'}) --> frozensest({'price: (0.0, 25.0)'}) Kulczynski:0.37652234976727594
Imbalance Ratio:0.9566828217555197
frozensest({'variety: Sauvignon Blanc'}) --> frozensest({'price: (0.0, 25.0)'}) Kulczynski:0.4308672298686834
Imbalance Ratio:0.9099241872617466
frozensest({'country: New Zealand'}) --> frozensest({'taster_name: Joe Czerwinski'})
Kulczynski:0.6230885203532199 Imbalance Ratio:0.7538229592935602
frozensest({'province: Southwest France'}) --> frozensest({'price: (0.0, 25.0)'}) Kulczynski:0.3855112911563147
Imbalance Ratio:0.9669546436285097
frozensest({'province: Southwest France'}) --> frozensest({'taster_name: Roger Voss'})
Kulczynski:0.5304205668677436 Imbalance Ratio:0.9336352364008842
frozensest({'province: Southwest France'}) --> frozensest({'country: France'}) Kulczynski:0.5381834050246244
Imbalance Ratio:0.9236331899507512
frozensest({'variety: Portuguese white'}) --> frozensest({'country: Portugal'}) Kulczynski:0.6006226373137648
Imbalance Ratio:0.7987547253724704
frozensest({'variety: Portuguese white'}) --> frozensest({'taster_name: Roger Voss'})
Kulczynski:0.5244027395782775 Imbalance Ratio:0.9511945208434449
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'points: (89.0, 93.0)'})
Kulczynski:0.30783985007010545 Imbalance Ratio:0.7480094100615279
frozensest({'price: (60.0, 3500.0)'}) --> frozensest({'points: (89.0, 93.0)'}) Kulczynski:0.376285091514474
Imbalance Ratio:0.6019959502458779
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France'})
Kulczynski:0.42160650202542854 Imbalance Ratio:0.6599453178400546
frozensest({'province: Bordeaux'}) --> frozensest({'variety: Bordeaux-style Red Blend'})
Kulczynski:0.7073416837456693 Imbalance Ratio:0.14666919000756998
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'province: Bordeaux'})
Kulczynski:0.7073416837456693 Imbalance Ratio:0.14666919000756998
frozensest({'points: (89.0, 93.0)'}) --> frozensest({'price: (25.0, 60.0)'}) Kulczynski:0.5375149370346539
Imbalance Ratio:0.04752101932911501
frozensest({'price: (25.0, 60.0)'}) --> frozensest({'points: (89.0, 93.0)'}) Kulczynski:0.5375149370346539
Imbalance Ratio:0.04752101932911501
frozensest({'variety: Syrah'}) --> frozensest({'country: US'}) Kulczynski:0.4090377545589006 Imbalance
Ratio:0.8987186087752418
frozensest({'variety: Syrah'}) --> frozensest({'price: (25.0, 60.0)'}) Kulczynski:0.3299726398704436 Imbalance
Ratio:0.882595171085765
frozensest({'variety: Sangiovese'}) --> frozensest({'province: Tuscany'}) Kulczynski:0.6195220351133058
Imbalance Ratio:0.398418491484185
frozensest({'taster_name: Anna Lee C. Iijima'}) --> frozensest({'country: US'}) Kulczynski:0.30819893893274825
Imbalance Ratio:0.8403939520044389
frozensest({'province: New York'}) --> frozensest({'points: (85.0, 89.0)'}) Kulczynski:0.32455529982177567
Imbalance Ratio:0.919279190323377
frozensest({'province: New York'}) --> frozensest({'price: (0.0, 25.0)'}) Kulczynski:0.39271148018662266
Imbalance Ratio:0.9366186602562727
frozensest({'province: New York'}) --> frozensest({'country: US'}) Kulczynski:0.5343926924648339 Imbalance
Ratio:0.9312146150703319
frozensest({'taster_name: Anna Lee C. Iijima'}) --> frozensest({'province: New York'})
Kulczynski:0.7164579952124106 Imbalance Ratio:0.38399430064117795
frozensest({'province: New York'}) --> frozensest({'taster_name: Anna Lee C. Iijima'})
Kulczynski:0.7164579952124106 Imbalance Ratio:0.38399430064117795
frozensest({'country: Austria'}) --> frozensest({'price: (0.0, 25.0)'}) Kulczynski:0.28356290189082195 Imbalance
Ratio:0.9216139428377575
frozensest({'taster_name: Anne Krebiehl\xa0MW'}) --> frozensest({'price: (0.0, 25.0)'})
Kulczynski:0.270682204986672 Imbalance Ratio:0.9048541644729914
frozensest({'taster_name: Anne Krebiehl\xa0MW'}) --> frozensest({'country: Austria'})
Kulczynski:0.6325526624918483 Imbalance Ratio:0.13113034356150005
frozensest({'country: Austria'}) --> frozensest({'taster_name: Anne Krebiehl\xa0MW'})
Kulczynski:0.6325526624918483 Imbalance Ratio:0.13113034356150005
frozensest({'variety: Grüner Veltliner'}) --> frozensest({'country: Austria'}) Kulczynski:0.6392749036873968
Imbalance Ratio:0.5795107033639142
frozensest({'province: Tuscany'}) --> frozensest({'points: (85.0, 89.0)'}) Kulczynski:0.316041166906943
Imbalance Ratio:0.8978511748707522
frozensest({'province: Tuscany'}) --> frozensest({'country: Italy'}) Kulczynski:0.6617196056955094 Imbalance
Ratio:0.6765607886089814

```

```
frozense({{'province': Tuscany'}}) --> frozense({{'taster_name': Kerin O'Keefe'}}) Kulczynski:0.6458754972147588  
Imbalance Ratio:0.6609470752089137  
frozense({{'variety': zinfandel'}}) --> frozense({{'country': us'}}) Kulczynski:0.5199878925072591 Imbalance  
Ratio:0.9577752487671074  
frozense({{'variety': Zinfandel'}}) --> frozense({{'province': California'}}) Kulczynski:0.5134820825221035  
Imbalance Ratio:0.9171908330142756  
frozense({{'variety': Rosé'}}) --> frozense({{'points': (85.0, 89.0]'}}) Kulczynski:0.26724878147334397 Imbalance  
Ratio:0.8999584991333643  
frozense({{'variety': Rosé'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.47424724057312867 Imbalance  
Ratio:0.9347896545018474  
frozense({{'country': Australia'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.2995639776287289  
Imbalance Ratio:0.9425591930934267  
frozense({{'country': Australia'}}) --> frozense({{'province': South Australia'}}) Kulczynski:0.7906730259671436  
Imbalance Ratio:0.41865394806571266  
frozense({{'province': South Australia'}}) --> frozense({{'country': Australia'}}) Kulczynski:0.7906730259671436  
Imbalance Ratio:0.41865394806571266  
frozense({{'taster_name': Joe Czerwinski'}}) --> frozense({{'price': (0.0, 25.0]'}})  
Kulczynski:0.32248249553387437 Imbalance Ratio:0.8629742476731083  
frozense({{'country': Australia'}}) --> frozense({{'taster_name': Joe Czerwinski'}}) Kulczynski:0.7028364721793159  
Imbalance Ratio:0.5934539190353143  
frozense({{'province': South Australia'}}) --> frozense({{'taster_name': Joe Czerwinski'}})  
Kulczynski:0.6175713491124052 Imbalance Ratio:0.7635658914728681  
frozense({{'taster_name': Jim Gordon'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.3228626835645263  
Imbalance Ratio:0.8889309844036117  
frozense({{'taster_name': Jim Gordon'}}) --> frozense({{'country': US'}}) Kulczynski:0.5548794723632755 Imbalance  
Ratio:0.8902410552734489  
frozense({{'taster_name': Jim Gordon'}}) --> frozense({{'province': California'}}) Kulczynski:0.6026088403827479  
Imbalance Ratio:0.793329162869848  
frozense({{'province': Burgundy'}}) --> frozense({{'taster_name': Roger Voss'}}) Kulczynski:0.5743837455707085  
Imbalance Ratio:0.8453869368398362  
frozense({{'province': Burgundy'}}) --> frozense({{'country': France'}}) Kulczynski:0.5890218814288386 Imbalance  
Ratio:0.8219562371423228  
frozense({{'province': Burgundy'}}) --> frozense({{'variety': Chardonnay'}}) Kulczynski:0.3925437612767527  
Imbalance Ratio:0.5367597004765146  
frozense({{'taster_name': Matt Kettmann'}}) --> frozense({{'price': (25.0, 60.0]'}})  
Kulczynski:0.37132540884336956 Imbalance Ratio:0.7777681735672919  
frozense({{'variety': Sauvignon Blanc'}}) --> frozense({{'points': (85.0, 89.0]'}}) Kulczynski:0.2743922175887853  
Imbalance Ratio:0.8730888329785175  
frozense({{'province': Champagne'}}) --> frozense({{'taster_name': Roger Voss'}}) Kulczynski:0.522073587138855  
Imbalance Ratio:0.9320911196079487  
frozense({{'province': Champagne'}}) --> frozense({{'country': France'}}) Kulczynski:0.5384951062901315 Imbalance  
Ratio:0.9230097874197368  
frozense({{'variety': Champagne Blend'}}) --> frozense({{'taster_name': Roger Voss'}})  
Kulczynski:0.47398858313270253 Imbalance Ratio:0.9403593456690801  
frozense({{'variety': Champagne Blend'}}) --> frozense({{'country': France'}}) Kulczynski:0.4909629161906278  
Imbalance Ratio:0.932559870951731  
frozense({{'province': Champagne'}}) --> frozense({{'variety': Champagne Blend'}}) Kulczynski:0.8261153645728945  
Imbalance Ratio:0.16955538809344392  
frozense({{'variety': Champagne Blend'}}) --> frozense({{'province': Champagne'}}) Kulczynski:0.8261153645728945  
Imbalance Ratio:0.16955538809344392  
frozense({{'variety': Sangiovese'}}) --> frozense({{'country': Italy'}}) Kulczynski:0.48297050316020906 Imbalance  
Ratio:0.7941238862961391  
frozense({{'variety': Sangiovese'}}) --> frozense({{'taster_name': Kerin O'Keefe'}}) Kulczynski:0.4593992829866719  
Imbalance Ratio:0.7825805057272532  
frozense({{'province': Washington'}}) --> frozense({{'country': US'}}) Kulczynski:0.6153475748555419 Imbalance  
Ratio:0.7693048502889162  
frozense({{'province': Washington'}}) --> frozense({{'price': (25.0, 60.0]'}}) Kulczynski:0.3189202671511868  
Imbalance Ratio:0.6779047775676342  
frozense({{'taster_name': Sean P. Sullivan'}}) --> frozense({{'points': (85.0, 89.0]'}})  
Kulczynski:0.28489992815988713 Imbalance Ratio:0.8424304840370751  
frozense({{'taster_name': Sean P. Sullivan'}}) --> frozense({{'country': US'}}) Kulczynski:0.5608377155020743  
Imbalance Ratio:0.8701851581863245  
frozense({{'taster_name': Sean P. Sullivan'}}) --> frozense({{'price': (25.0, 60.0]'}})  
Kulczynski:0.2957540654847247 Imbalance Ratio:0.8117735067326505  
frozense({{'province': Washington'}}) --> frozense({{'taster_name': Sean P. Sullivan'}})  
Kulczynski:0.7129432529030371 Imbalance Ratio:0.420328343795268  
frozense({{'taster_name': Sean P. Sullivan'}}) --> frozense({{'province': Washington'}})  
Kulczynski:0.7129432529030371 Imbalance Ratio:0.420328343795268  
frozense({{'province': Bordeaux'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.35261696982658797  
Imbalance Ratio:0.8951387713657133  
frozense({{'province': Bordeaux'}}) --> frozense({{'taster_name': Roger Voss'}}) Kulczynski:0.5967863107254818  
Imbalance Ratio:0.8008944929410499  
frozense({{'province': Bordeaux'}}) --> frozense({{'country': France'}}) Kulczynski:0.6147060657066268 Imbalance  
Ratio:0.7705878685867467  
frozense({{'points': (0.0, 85.0]'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.5563420758121191  
Imbalance Ratio:0.6683951851389062  
frozense({{'country': Chile'}}) --> frozense({{'price': (0.0, 25.0]'}}) Kulczynski:0.45589293880483617 Imbalance  
Ratio:0.8999228196552611  
frozense({{'country': Chile'}}) --> frozense({{'taster_name': Michael Schachner'}}) Kulczynski:0.6410923707455943  
Imbalance Ratio:0.7088853686635946  
frozense({{'province': Oregon'}}) --> frozense({{'price': (25.0, 60.0]'}}) Kulczynski:0.2995765060070453 Imbalance  
Ratio:0.7936181163149768  
frozense({{'taster_name': Paul Gregutt'}}) --> frozense({{'price': (25.0, 60.0]'}}) Kulczynski:0.3201721381869356  
Imbalance Ratio:0.642878366332622  
frozense({{'variety': Pinot Noir'}}) --> frozense({{'price': (25.0, 60.0]'}}) Kulczynski:0.3637546210554796  
Imbalance Ratio:0.6469476624763782
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frozense({{'variety': Merlot'}}) --> frozense({{'points': (85.0, 89.0)'}}) Kulczynski:0.2709790939635192 Imbalance Ratio:0.9300592300098718
frozense({{'variety': Merlot'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.30794066813509924 Imbalance Ratio:0.9424491192064306
frozense({{'variety': Merlot'}}) --> frozense({{'country': US'}}) Kulczynski:0.36297258286151896 Imbalance Ratio:0.9280612683934257
frozense({{'variety': White Blend'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.38132487388106373 Imbalance Ratio:0.9587428867046044
frozense({{'variety': Red Blend'}}) --> frozense({{'points': (85.0, 89.0)'}}) Kulczynski:0.2970355346906655 Imbalance Ratio:0.781886827849823
frozense({{'country': Argentina'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.4111775510472282 Imbalance Ratio:0.9076463049978643
frozense({{'variety': Malbec'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.31919590295707206 Imbalance Ratio:0.9309286262471221
frozense({{'province': Mendoza Province'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.4004721869640861 Imbalance Ratio:0.9199169858148442
frozense({{'province': Mendoza Province'}}) --> frozense({{'taster_name': Michael Schachner'}}) Kulczynski:0.6081578188113098 Imbalance Ratio:0.7836843623773804
frozense({{'province': Mendoza Province'}}) --> frozense({{'country': Argentina'}}) Kulczynski:0.928551014575593 Imbalance Ratio:0.14289797084881403
frozense({{'country': Argentina'}}) --> frozense({{'province': Mendoza Province'}}) Kulczynski:0.928551014575593 Imbalance Ratio:0.14289797084881403
frozense({{'variety': Malbec'}}) --> frozense({{'province': Mendoza Province'}}) Kulczynski:0.4781337368866545 Imbalance Ratio:0.16498895163270305
frozense({{'country': Argentina'}}) --> frozense({{'taster_name': Michael Schachner'}}) Kulczynski:0.6261901327178303 Imbalance Ratio:0.7476197345643392
frozense({{'variety': Malbec'}}) --> frozense({{'taster_name': Michael Schachner'}}) Kulczynski:0.38192087491950166 Imbalance Ratio:0.7864885131910831
frozense({{'variety': Malbec'}}) --> frozense({{'country': Argentina'}}) Kulczynski:0.49729599211414444 Imbalance Ratio:0.2642019837691614
frozense({{'country': Germany'}}) --> frozense({{'variety': Riesling'}}) Kulczynski:0.5990139741005591 Imbalance Ratio:0.5166344709165057
frozense({{'province': Mosel'}}) --> frozense({{'variety': Riesling'}}) Kulczynski:0.5905393885252959 Imbalance Ratio:0.7843362425355992
frozense({{'province': Mosel'}}) --> frozense({{'country': Germany'}}) Kulczynski:0.738045738045738 Imbalance Ratio:0.5239085239085238
frozense({{'taster_name': Matt Kettmann'}}) --> frozense({{'country': US'}}) Kulczynski:0.5822378990549373 Imbalance Ratio:0.835293430997753
frozense({{'taster_name': Matt Kettmann'}}) --> frozense({{'province': California'}}) Kulczynski:0.6546847011177 Imbalance Ratio:0.6900905846829535
frozense({{'variety': Chardonnay'}}) --> frozense({{'country': US'}}) Kulczynski:0.3134433428125878 Imbalance Ratio:0.7028372717932507
frozense({{'price': (25.0, 60.0)'}}) --> frozense({{'country': US'}}) Kulczynski:0.5119995808034821 Imbalance Ratio:0.03272004177881341
frozense({{'province': California'}}) --> frozense({{'price': (25.0, 60.0)'}}) Kulczynski:0.410406491592904 Imbalance Ratio:0.34963034783662583
frozense({{'taster_name': Virginie Boone'}}) --> frozense({{'price': (25.0, 60.0)'}}) Kulczynski:0.33691920098910466 Imbalance Ratio:0.6527603684124474
frozense({{'province': California'}}) --> frozense({{'country': US'}}) Kulczynski:0.7657590614603397 Imbalance Ratio:0.46848187707932054
frozense({{'country': US'}}) --> frozense({{'province': California'}}) Kulczynski:0.7657590614603397 Imbalance Ratio:0.46848187707932054
frozense({{'taster_name': Virginie Boone'}}) --> frozense({{'country': US'}}) Kulczynski:0.6266853440728419 Imbalance Ratio:0.7466293118543165
frozense({{'taster_name': Virginie Boone'}}) --> frozense({{'province': California'}}) Kulczynski:0.7379210195289094 Imbalance Ratio:0.5231639038313756
frozense({{'variety': Cabernet Sauvignon'}}) --> frozense({{'country': US'}}) Kulczynski:0.3968731531592125 Imbalance Ratio:0.7909624868399182
frozense({{'taster_name': Anna Lee C. Iijima'}}) --> frozense({{'points': (85.0, 89.0)'}}) Kulczynski:0.2955801498029232 Imbalance Ratio:0.8597113621005888
frozense({{'taster_name': Anna Lee C. Iijima'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.3477357033129736 Imbalance Ratio:0.8860516605166051
frozense({{'country': Germany'}}) --> frozense({{'taster_name': Anna Lee C. Iijima'}}) Kulczynski:0.6093950595712045 Imbalance Ratio:0.47475683186660494
frozense({{'country': France'}}) --> frozense({{'price': (0.0, 25.0)'}}) Kulczynski:0.36596580269473217 Imbalance Ratio:0.5616620727156814
frozense({{'taster_name': Roger Voss'}}) --> frozense({{'country': France'}}) Kulczynski:0.7665612490061844 Imbalance Ratio:0.11692681559024219
frozense({{'country': France'}}) --> frozense({{'taster_name': Roger Voss'}}) Kulczynski:0.7665612490061844 Imbalance Ratio:0.11692681559024219
frozense({{'province': Alsace'}}) --> frozene({{'price': (0.0, 25.0)'}}) Kulczynski:0.27115719830070545 Imbalance Ratio:0.9413044405579493
frozense({{'province': Alsace'}}) --> frozene({{'country': France'}}) Kulczynski:0.5580076055108784 Imbalance Ratio:0.8839847889782432
frozene({{'country': Italy'}}) --> frozene({{'points': (85.0, 89.0)'}}) Kulczynski:0.35158266495511836 Imbalance Ratio:0.7002298322224777
frozene({{'taster_name': Kerin O'Keefe'}}) --> frozene({{'points': (85.0, 89.0)'}}) Kulczynski:0.35160608635662144 Imbalance Ratio:0.7079923465271214
frozene({{'taster_name': Kerin O'Keefe'}}) --> frozene({{'country': Italy'}}) Kulczynski:0.9865826944140197 Imbalance Ratio:0.026834611171960482
frozene({{'country': Italy'}}) --> frozene({{'taster_name': Kerin O'Keefe'}}) Kulczynski:0.9865826944140197 Imbalance Ratio:0.026834611171960482
frozene({{'country': Spain'}}) --> frozene({{'price': (0.0, 25.0)'}}) Kulczynski:0.3946460709152306 Imbalance Ratio:0.8370292887029288
frozene({{'province': Northern Spain'}}) --> frozene({{'price': (0.0, 25.0)'}}) Kulczynski:0.35655699204089275 Imbalance Ratio:0.9014968409447482
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frozensest({'country: Spain'}) --> frozensest({'province: Northern Spain'}) Kulczynski:0.7903091060985798
Imbalance Ratio:0.4193817878028404
frozensest({'province: Northern Spain'}) --> frozensest({'country: Spain'}) Kulczynski:0.7903091060985798
Imbalance Ratio:0.4193817878028404
frozensest({'taster_name: Michael Schachner'}) --> frozensest({'price: (0.0, 25.0]'})
Kulczynski:0.48986450504824813 Imbalance Ratio:0.6501355671563273
frozensest({'country: Spain'}) --> frozensest({'taster_name: Michael Schachner'}) Kulczynski:0.7151291565613399
Imbalance Ratio:0.5680605623648162
frozensest({'province: Northern Spain'}) --> frozensest({'taster_name: Michael Schachner'})
Kulczynski:0.6251446321304179 Imbalance Ratio:0.7492967904796248
frozensest({'variety: Pinot Noir'}) --> frozensest({'country: US'}) Kulczynski:0.4466696636755818 Imbalance
Ratio:0.6842162308630266
frozensest({'province: Oregon'}) --> frozensest({'variety: Pinot Noir'}) Kulczynski:0.3999635927418654 Imbalance
Ratio:0.3638123734929156
frozensest({'variety: Riesling'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.3207201981462804 Imbalance
Ratio:0.8718689183250675
frozensest({'province: Oregon'}) --> frozensest({'country: US'}) Kulczynski:0.5712222027665907 Imbalance
Ratio:0.8575555944668184
frozensest({'taster_name: Paul Gregutt'}) --> frozensest({'country: US'}) Kulczynski:0.6147126590264224
Imbalance Ratio:0.7377995705913073
frozensest({'province: Oregon'}) --> frozensest({'taster_name: Paul Gregutt'}) Kulczynski:0.7346646033930506
Imbalance Ratio:0.43482083974499897
frozensest({'taster_name: Paul Gregutt'}) --> frozensest({'province: Oregon'}) Kulczynski:0.7346646033930506
Imbalance Ratio:0.43482083974499897
frozensest({'variety: Pinot Gris'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.40625196662333085
Imbalance Ratio:0.9697847950686709
frozensest({'country: Portugal'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.3996112831728502 Imbalance
Ratio:0.8788597568723792
frozensest({'price: (0.0, 25.0]'}) --> frozensest({'points: (85.0, 89.0]'}) Kulczynski:0.6114875706255032
Imbalance Ratio:0.10740485823163055
frozensest({'points: (85.0, 89.0]'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.6114875706255032
Imbalance Ratio:0.10740485823163055
frozensest({'province: Douro'}) --> frozensest({'country: Portugal'}) Kulczynski:0.6160773849232821 Imbalance
Ratio:0.7678452301534354
frozensest({'country: Portugal'}) --> frozensest({'taster_name: Roger Voss'}) Kulczynski:0.6173905075475544
Imbalance Ratio:0.7563405309353292
frozensest({'taster_name: Roger Voss'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.4084299039114035
Imbalance Ratio:0.5108014066948253
frozensest({'province: Douro'}) --> frozensest({'taster_name: Roger Voss'}) Kulczynski:0.5230918691007729
Imbalance Ratio:0.9431897806284699
frozensest({'variety: Portuguese Red'}) --> frozensest({'country: Portugal'}) Kulczynski:0.7254836557705137
Imbalance Ratio:0.5490326884589727
frozensest({'variety: Portuguese Red'}) --> frozensest({'price: (0.0, 25.0]'}) Kulczynski:0.37583184262589214
Imbalance Ratio:0.9442475785494922
frozensest({'variety: Portuguese Red'}) --> frozensest({'taster_name: Roger Voss'})
Kulczynski:0.5535896574314555 Imbalance Ratio:0.890440502507144
frozensest({'province: Veneto'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5313997586878013 Imbalance Ratio:0.889162837610669
frozensest({'province: Loire Valley'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5543379341726073 Imbalance Ratio:0.8913241316547853
frozensest({'province: Loire Valley'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}) Kulczynski:0.374660791637824 Imbalance Ratio:0.7890625000000001
frozensest({'province: Loire Valley'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) Kulczynski:0.36440767756130155 Imbalance Ratio:0.8280558995223776
frozensest({'variety: Tempranillo'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael
Schachner'}) Kulczynski:0.4944884424559723 Imbalance Ratio:0.4705439959889697
frozensest({'variety: Tempranillo'}) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.510172998523473 Imbalance Ratio:0.6966613672496024
frozensest({'variety: Tempranillo'}) --> frozensest({'province: Northern Spain', 'country: Spain'}) Kulczynski:0.4949006004964344 Imbalance Ratio:0.4707946853848082
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.4394962228245003 Imbalance Ratio:0.5933804539893979
frozensest({'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red
Blend'}) Kulczynski:0.8698504786461575 Imbalance Ratio:0.19766825649178593
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province:
Bordeaux'}) Kulczynski:0.706191825791644 Imbalance Ratio:0.14962121212121207
frozensest({'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8761197113767941 Imbalance Ratio:0.17959183673469384
frozensest({'variety: Nebbiolo'}) --> frozensest({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8629507149951912 Imbalance Ratio:0.15227159261108342
frozensest({'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'country: Italy'}) Kulczynski:0.8761197113767941 Imbalance Ratio:0.17959183673469384
frozensest({'variety: Nebbiolo'}) --> frozensest({'country: Italy', 'province: Piedmont'}) Kulczynski:0.8625373807212928 Imbalance Ratio:0.1531172069825437
frozensest({'variety: Nebbiolo'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5733794651482725 Imbalance Ratio:0.8159014557670772
frozensest({'province: Piedmont'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.6066222177869135 Imbalance Ratio:0.7853043771801508
frozensest({'province: Alsace'}) --> frozensest({'country: France', 'taster_name: Anne Krebiehl\xAOMW'}) Kulczynski:0.8293927995701236 Imbalance Ratio:0.34121440085975274
frozensest({'province: Provence'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.507729593691978 Imbalance Ratio:0.9203292553994865
frozensest({'province: Catalonia'}) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.5825154609857977 Imbalance Ratio:0.8285427807486629
frozensest({'province: Rhône Valley'}) --> frozensest({'country: France', 'taster_name: Joe Czerwinski'}) Kulczynski:0.9272678851760485 Imbalance Ratio:0.08806818181818177

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frozensest({'province: Northeastern Italy'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'})  
Kulczynski:0.50074140941014 Imbalance Ratio:0.867555555555555  
frozensest({'province: Southwest France'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'}))  
Kulczynski:0.42835339764854824 Imbalance Ratio:0.8301886792452831  
frozensest({'province: Southwest France'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'}))  
Kulczynski:0.4158501195753892 Imbalance Ratio:0.8617739756866275  
frozensest({'province: Southwest France'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}))  
Kulczynski:0.5437742875096345 Imbalance Ratio:0.9066858702243785  
frozensest({'variety: Portuguese White'}) --> frozensest({'taster_name: Roger Voss', 'country: Portugal'}))  
Kulczynski:0.601253076750951 Imbalance Ratio:0.7974938464980978  
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'points: (89.0, 93.0]', 'province: California'}))  
Kulczynski:0.43495940154067775 Imbalance Ratio:0.24553007043525382  
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'points: (89.0, 93.0]', 'country: US'}))  
Kulczynski:0.36559866581430356 Imbalance Ratio:0.4951966648540874  
frozensest({'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}))  
Kulczynski:0.8722280760130139 Imbalance Ratio:0.19633855133987804  
frozensest({'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'province: Bordeaux'}))  
Kulczynski:0.7073416837456693 Imbalance Ratio:0.14666919000756998  
frozensest({'variety: Syrah'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}))  
Kulczynski:0.3041571535014933 Imbalance Ratio:0.7723779629830069  
frozensest({'variety: Sangiovese'}) --> frozensest({'country: Italy', 'province: Tuscany'}))  
Kulczynski:0.6195220351133058 Imbalance Ratio:0.398418491484185  
frozensest({'variety: Sangiovese'}) --> frozensest({'province: Tuscany', 'taster_name: Kerin O'Keefe'}))  
Kulczynski:0.5924776606010024 Imbalance Ratio:0.3732028143163047  
frozensest({'taster_name: Anna Lee C. Iijima'}) --> frozensest({'province: New York', 'country: US'}))  
Kulczynski:0.7164579952124106 Imbalance Ratio:0.38399430064117795  
frozensest({'province: New York'}) --> frozensest({'taster_name: Anna Lee C. Iijima', 'country: US'}))  
Kulczynski:0.9326399432505126 Imbalance Ratio:0.06661184210526307  
frozensest({'province: New York'}) --> frozensest({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'}))  
Kulczynski:0.6334461713136035 Imbalance Ratio:0.055804237541032586  
frozensest({'province: New York'}) --> frozensest({'price: (0.0, 25.0]', 'country: US'}))  
Kulczynski:0.4382299148201562 Imbalance Ratio:0.7922324632378808  
frozensest({'province: New York'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}))  
Kulczynski:0.6101277871783586 Imbalance Ratio:0.07104  
frozensest({'province: New York'}) --> frozensest({'points: (85.0, 89.0]', 'country: US'}))  
Kulczynski:0.3557398019559313 Imbalance Ratio:0.7893448431359917  
frozensest({'province: Tuscany'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}))  
Kulczynski:0.6458754972147588 Imbalance Ratio:0.6609470752089137  
frozensest({'province: Tuscany'}) --> frozensest({'country: Italy', 'points: (85.0, 89.0]'}))  
Kulczynski:0.4605826727217883 Imbalance Ratio:0.35193533343696565  
frozensest({'province: Tuscany'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}))  
Kulczynski:0.4557480613218031 Imbalance Ratio:0.33852936545425916  
frozensest({'variety: Zinfandel'}) --> frozensest({'country: US', 'province: California'}))  
Kulczynski:0.5134820825221035 Imbalance Ratio:0.9171908330142756  
frozensest({'country: Australia'}) --> frozensest({'taster_name: Joe Czerwinski', 'province: South Australia'}))  
Kulczynski:0.7904080551139374 Imbalance Ratio:0.41918388977212495  
frozensest({'province: South Australia'}) --> frozensest({'taster_name: Joe Czerwinski', 'country: Australia'}))  
Kulczynski:0.7901062475410138 Imbalance Ratio:0.41812400635930036  
frozensest({'country: Australia'}) --> frozensest({'taster_name: Joe Czerwinski', 'price: (0.0, 25.0]'}))  
Kulczynski:0.4873906995230525 Imbalance Ratio:0.23658051689860835  
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'country: US', 'province: California'}))  
Kulczynski:0.6026088403827479 Imbalance Ratio:0.7933249162869848  
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'price: (0.0, 25.0]', 'province: California'}))  
Kulczynski:0.4812696388436194 Imbalance Ratio:0.31006535947712427  
frozensest({'taster_name: Jim Gordon'}) --> frozensest({'price: (0.0, 25.0]', 'country: US'}))  
Kulczynski:0.3808915795056296 Imbalance Ratio:0.6512918786757417  
frozensest({'province: Burgundy'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}))  
Kulczynski:0.6055278208659469 Imbalance Ratio:0.7826350481097053  
frozensest({'province: Burgundy'}) --> frozensest({'country: France', 'variety: Chardonnay'}))  
Kulczynski:0.6866183511354271 Imbalance Ratio:0.2539926289926291  
frozensest({'province: Burgundy'}) --> frozensest({'taster_name: Roger Voss', 'variety: Chardonnay'}))  
Kulczynski:0.6853013798111838 Imbalance Ratio:0.2551427694197115  
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'}))  
Kulczynski:0.502496214533734 Imbalance Ratio:0.3387331790520271  
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}))  
Kulczynski:0.42083903040846427 Imbalance Ratio:0.5979779028559515  
frozensest({'variety: Champagne Blend'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}))  
Kulczynski:0.483402438529914 Imbalance Ratio:0.916246519677929  
frozensest({'province: Champagne'}) --> frozensest({'variety: Champagne Blend', 'taster_name: Roger Voss'}))  
Kulczynski:0.8532785496441884 Imbalance Ratio:0.2616  
frozensest({'variety: Champagne Blend'}) --> frozensest({'province: Champagne', 'taster_name: Roger Voss'}))  
Kulczynski:0.8113926901375 Imbalance Ratio:0.1500754147812971  
frozensest({'province: Champagne'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}))  
Kulczynski:0.5353177612619444 Imbalance Ratio:0.9045564638207688  
frozensest({'variety: Champagne Blend'}) --> frozensest({'country: France', 'province: Champagne'}))  
Kulczynski:0.8261153645728945 Imbalance Ratio:0.16955538809344392  
frozensest({'province: Champagne'}) --> frozensest({'country: France', 'variety: Champagne Blend'}))  
Kulczynski:0.8636213338193368 Imbalance Ratio:0.2416000000000001  
frozensest({'variety: Sangiovese'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}))  
Kulczynski:0.4593992829866719 Imbalance Ratio:0.7825805057272532  
frozensest({'province: Washington'}) --> frozensest({'taster_name: Sean P. Sullivan', 'country: US'}))  
Kulczynski:0.715960439412378 Imbalance Ratio:0.4253179890975168  
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'province: Washington', 'country: US'}))  
Kulczynski:0.7129432529030371 Imbalance Ratio:0.420328343795268  
frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}))  
Kulczynski:0.32590888649464694 Imbalance Ratio:0.6594628292378825
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frozensest({'taster_name: Sean P. Sullivan'}) --> frozensest({'points: (85.0, 89.0]', 'country: us'})
Kulczynski:0.3323851830461856 Imbalance Ratio:0.6072365283738673
frozensest({'province: Washington'}) --> frozensest({'price: (25.0, 60.0]', 'country: us'})
Kulczynski:0.37530258044340226 Imbalance Ratio:0.43944091971568955
frozensest({'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'})
Kulczynski:0.6369351098661954 Imbalance Ratio:0.7200969623513371
frozensest({'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})
Kulczynski:0.4645186892840197 Imbalance Ratio:0.5034061310358645
frozensest({'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})
Kulczynski:0.4356098460438609 Imbalance Ratio:0.5887951009599469
frozensest({'country: Chile'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'})
Kulczynski:0.5772570707840451 Imbalance Ratio:0.5778858274806412
frozensest({'province: Oregon'}) --> frozensest({'price: (25.0, 60.0]', 'country: us'})
Kulczynski:0.3349144229854626 Imbalance Ratio:0.628970905726329
frozensest({'variety: Malbec'}) --> frozensest({'country: Argentina', 'province: Mendoza Province'})
Kulczynski:0.4781337368866545 Imbalance Ratio:0.16498895163270305
frozensest({'variety: Malbec'}) --> frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'})
Kulczynski:0.4781337368866545 Imbalance Ratio:0.16498895163270305
frozensest({'province: Mendoza Province'}) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'})
Kulczynski:0.928551014575593 Imbalance Ratio:0.14289797084881403
frozensest({'country: Argentina'}) --> frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'})
Kulczynski:0.928551014575593 Imbalance Ratio:0.14289797084881403
frozensest({'variety: Malbec'}) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'})
Kulczynski:0.4839877800281101 Imbalance Ratio:0.6652356676504785
frozensest({'country: Argentina'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'})
Kulczynski:0.510211190530819 Imbalance Ratio:0.6160539868584621
frozensest({'province: Mendoza Province'}) --> frozensest({'price: (0.0, 25.0]', 'country: Argentina'})
Kulczynski:0.7976116072597623 Imbalance Ratio:0.09508484493856045
frozensest({'country: Argentina'}) --> frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'})
Kulczynski:0.8222349242640754 Imbalance Ratio:0.35553015147184913
frozensest({'variety: Malbec'}) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'})
Kulczynski:0.49729599211414444 Imbalance Ratio:0.2642019837691614
frozensest({'province: Mosel'}) --> frozensest({'variety: Riesling', 'country: Germany'})
Kulczynski:0.7672073196090663 Imbalance Ratio:0.42001235330450887
frozensest({'country: Germany'}) --> frozensest({'variety: Riesling', 'taster_name: Anna Lee C. Iijima'})
Kulczynski:0.6720306895177361 Imbalance Ratio:0.0023446658851113823
frozensest({'taster_name: Matt Kettmann'}) --> frozensest({'country: us', 'province: California'})
Kulczynski:0.6546847011177 Imbalance Ratio:0.6900905846829535
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'})
Kulczynski:0.5067084162677352 Imbalance Ratio:0.06684726899985355
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'price: (25.0, 60.0]', 'country: us'})
Kulczynski:0.4011080824188478 Imbalance Ratio:0.3982906790065162
frozensest({'province: California'}) --> frozensest({'price: (25.0, 60.0]', 'country: us'})
Kulczynski:0.5436876682469585 Imbalance Ratio:0.04258791529046046
frozensest({'taster_name: Virginie Boone'}) --> frozensest({'country: us', 'province: California'})
Kulczynski:0.7379210195289094 Imbalance Ratio:0.5231639038313756
frozensest({'province: Alsace'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})
Kulczynski:0.3163276801457777 Imbalance Ratio:0.7132138390996248
frozensest({'taster_name: Kerin O'Keefe'}) --> frozensest({'country: Italy', 'points: (85.0, 89.0]'})
Kulczynski:0.7762435671701826 Imbalance Ratio:0.40760084453828205
frozensest({'country: Italy'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'})
Kulczynski:0.779463307765608 Imbalance Ratio:0.4410733844468785
frozensest({'country: Spain'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'})
Kulczynski:0.7902255639097744 Imbalance Ratio:0.41954887218045106
frozensest({'province: Northern Spain'}) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'})
Kulczynski:0.7903729239388219 Imbalance Ratio:0.4187290969899666
frozensest({'province: Northern Spain'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'})
Kulczynski:0.4416955449724727 Imbalance Ratio:0.5997071237832716
frozensest({'province: Northern Spain'}) --> frozensest({'price: (0.0, 25.0]', 'country: Spain'})
Kulczynski:0.6071088774913084 Imbalance Ratio:0.13175107456550178
frozensest({'country: Spain'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'})
Kulczynski:0.5486667708842865 Imbalance Ratio:0.3634879163945134
frozensest({'province: Oregon'}) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'})
Kulczynski:0.7432309966342499 Imbalance Ratio:0.48668428542386666
frozensest({'province: Oregon'}) --> frozensest({'variety: Pinot Noir', 'country: us'})
Kulczynski:0.4581110254676097 Imbalance Ratio:0.1713663457129757
frozensest({'province: Oregon'}) --> frozensest({'taster_name: Paul Gregutt', 'country: us'})
Kulczynski:0.7407176525517102 Imbalance Ratio:0.42211732973701954
frozensest({'taster_name: Paul Gregutt'}) --> frozensest({'province: Oregon', 'country: us'})
Kulczynski:0.734664603390506 Imbalance Ratio:0.43482083974499897
frozensest({'variety: Portuguese Red'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})
Kulczynski:0.4269987200955954 Imbalance Ratio:0.7714034315882093
frozensest({'variety: Portuguese Red'}) --> frozensest({'taster_name: Roger Voss', 'country: Portugal'})
Kulczynski:0.7254626766994015 Imbalance Ratio:0.5457187569863627
frozensest({'variety: Portuguese Red'}) --> frozensest({'price: (0.0, 25.0]', 'country: Portugal'})
Kulczynski:0.5829293977172366 Imbalance Ratio:0.3243102550754816
frozensest({'province: Douro'}) --> frozensest({'taster_name: Roger Voss', 'country: Portugal'})
Kulczynski:0.6108965637267888 Imbalance Ratio:0.7646796159857109
frozensest({'country: Portugal'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})
Kulczynski:0.5126721813307065 Imbalance Ratio:0.523200714463736
frozensest({'country: Portugal', 'points: (0.0, 85.0]'} --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})
Kulczynski:0.5243919871790129 Imbalance Ratio:0.9102327299593646
frozensest({'price: (25.0, 60.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'})
Kulczynski:0.5333793712095328 Imbalance Ratio:0.9295625142163924
frozensest({'taster_name: Sean P. Sullivan', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]', 'country: us'})
Kulczynski:0.37804170143365096 Imbalance Ratio:0.879008001816015

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frozensest({'province': 'Washington', 'price': (25.0, 60.0]}) --> frozensest({'points': (89.0, 93.0]', 'country': 'US'}) Kulczynski:0.33057411846412177 Imbalance Ratio:0.6180875940087215
frozensest({'province': 'Washington', 'points': (89.0, 93.0]}) --> frozensest({'price': (25.0, 60.0]', 'country': 'US'}) Kulczynski:0.39637277462005727 Imbalance Ratio:0.7736046768144716
frozensest({'taster_name': 'Sean P. Sullivan', 'points': (89.0, 93.0]}) --> frozensest({'province': 'Washington', 'country': 'US'}) Kulczynski:0.5774168294566776 Imbalance Ratio:0.7871833458740909
frozensest({'province': 'Washington', 'points': (89.0, 93.0]}) --> frozensest({'taster_name': 'Sean P. Sullivan', 'country': 'US'}) Kulczynski:0.42966637353378323 Imbalance Ratio:0.22008438818565396
frozensest({'taster_name': 'Sean P. Sullivan', 'points': (89.0, 93.0]}) --> frozensest({'province': 'Washington', 'price': (25.0, 60.0]}) Kulczynski:0.4711876510656998 Imbalance Ratio:0.529398547038328
frozensest({'points': (89.0, 93.0]', 'province': 'Burgundy'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss'}) Kulczynski:0.5403685727286516 Imbalance Ratio:0.9131291691934504
frozensest({'province': 'Loire Valley', 'price': (0.0, 25.0]}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss'}) Kulczynski:0.5349613226148946 Imbalance Ratio:0.9300773547702108
frozensest({'taster_name': 'Roger Voss', 'province': 'Loire Valley'}) --> frozensest({'country': 'France', 'price': (0.0, 25.0]}) Kulczynski:0.374660791637824 Imbalance Ratio:0.7890625000000001
frozensest({'country': 'France', 'province': 'Loire Valley'}) --> frozensest({'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.36440767756130155 Imbalance Ratio:0.8280558995223776
frozensest({'province': 'Loire Valley'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.3869724369815317 Imbalance Ratio:0.7433324531291261
frozensest({'variety': 'Tempranillo', 'taster_name': 'Michael Schachner'}) --> frozensest({'province': 'Northern Spain', 'country': 'Spain'}) Kulczynski:0.5689760430005881 Imbalance Ratio:0.5850891410048622
frozensest({'variety': 'Tempranillo', 'province': 'Northern Spain'}) --> frozensest({'taster_name': 'Michael Schachner', 'country': 'Spain'}) Kulczynski:0.5900216779040585 Imbalance Ratio:0.8187290969899665
frozensest({'variety': 'Tempranillo', 'country': 'Spain'}) --> frozensest({'province': 'Northern Spain', 'taster_name': 'Michael Schachner'}) Kulczynski:0.5760856874846512 Imbalance Ratio:0.5944550149497145
frozensest({'variety': 'Tempranillo'}) --> frozensest({'province': 'Northern Spain', 'taster_name': 'Michael Schachner', 'country': 'Spain'}) Kulczynski:0.4944884424559723 Imbalance Ratio:0.4705439959889697
frozensest({'points': (85.0, 89.0]', 'province': 'Bordeaux'}) --> frozensest({'price': (0.0, 25.0]', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.5233829524294158 Imbalance Ratio:0.11846318036286016
frozensest({'points': (85.0, 89.0]', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) Kulczynski:0.466144864358056 Imbalance Ratio:0.15547489413188145
frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) --> frozensest({'points': (85.0, 89.0]', 'taster_name': 'Roger Voss'}) Kulczynski:0.3579747403425797 Imbalance Ratio:0.6187294633077766
frozensest({'points': (85.0, 89.0]', 'province': 'Bordeaux'}) --> frozensest({'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.4438767787670068 Imbalance Ratio:0.8090519550080344
frozensest({'price': (0.0, 25.0]', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'taster_name': 'Roger Voss', 'province': 'Bordeaux'}) Kulczynski:0.6632308103947756 Imbalance Ratio:0.40221216691804945
frozensest({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) Kulczynski:0.6631128267579636 Imbalance Ratio:0.14811715481171542
frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) --> frozensest({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.6631128267579636 Imbalance Ratio:0.14811715481171542
frozensest({'variety': 'Bordeaux-style Red Blend', 'province': 'Bordeaux'}) --> frozensest({'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.3884092902565899 Imbalance Ratio:0.6678997814023878
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frozensest({'points': (85.0, 89.0]', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss'}) Kulczynski:0.414877340729717 Imbalance Ratio:0.8243578517221248
frozensest({'variety': 'Bordeaux-style Red Blend', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'price': (0.0, 25.0]}) Kulczynski:0.4097549536212794 Imbalance Ratio:0.597590853409555
frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.6655286334259047 Imbalance Ratio:0.14987440692157405
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frozensest({'country': 'France', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.3936057100005356 Imbalance Ratio:0.65919717354817
frozensest({'variety': 'Bordeaux-style Red Blend', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss'}) Kulczynski:0.6057608265475916 Imbalance Ratio:0.7831325301204818
frozensest({'taster_name': 'Roger Voss', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.8704420376609034 Imbalance Ratio:0.19256308100929617
frozensest({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'country': 'France', 'province': 'Bordeaux'}) Kulczynski:0.8698504786461575 Imbalance Ratio:0.19766825649178593
frozensest({'country': 'France', 'province': 'Bordeaux'}) --> frozensest({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.8698504786461575 Imbalance Ratio:0.19766825649178593
frozensest({'country': 'France', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'taster_name': 'Roger Voss', 'province': 'Bordeaux'}) Kulczynski:0.8704420376609034 Imbalance Ratio:0.19256308100929617
frozensest({'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.8710079321459872 Imbalance Ratio:0.1998938147066632
frozensest({'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'country': 'France', 'taster_name': 'Roger Voss', 'province': 'Bordeaux'}) Kulczynski:0.706191825791644 Imbalance Ratio:0.149621212121207
frozensest({'points': (85.0, 89.0]', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'taster_name': 'Roger Voss', 'price': (0.0, 25.0]}) Kulczynski:0.3159841808613334 Imbalance Ratio:0.7632841960918753
frozensest({'points': (85.0, 89.0]', 'province': 'Bordeaux'}) --> frozensest({'taster_name': 'Roger Voss', 'variety': 'Bordeaux-style Red Blend'}) Kulczynski:0.6119795233394888 Imbalance Ratio:0.36063606360636075
frozensest({'points': (85.0, 89.0]', 'variety': 'Bordeaux-style Red Blend'}) --> frozensest({'taster_name': 'Roger Voss', 'province': 'Bordeaux'}) Kulczynski:0.5346875751550767 Imbalance Ratio:0.42075337597725665
frozensest({'price': (0.0, 25.0]', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'points': (85.0, 89.0]}) Kulczynski:0.37187458210934227 Imbalance Ratio:0.5665503489531406
frozensest({'points': (85.0, 89.0]', 'province': 'Bordeaux'}) --> frozensest({'country': 'France', 'price': (0.0, 25.0]}) Kulczynski:0.45964982562913465 Imbalance Ratio:0.765506641782852
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frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5640427036303112 Imbalance Ratio:0.8683193086195133
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.6138096809162464 Imbalance Ratio:0.3623275344931014
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France', 'province: Bordeaux'}) Kulczynski:0.5359491161645222 Imbalance Ratio:0.4233041834081777
frozensest({'province: Piedmont', 'price: (25.0, 60.0]'})) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5519120402957645 Imbalance Ratio:0.894890389522845
frozensest({'province: Burgundy', 'price: (60.0, 3500.0]'})) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5369749448216956 Imbalance Ratio:0.9226628250815075
frozensest({'variety: Nebbiolo', 'country: Italy'}) --> frozensest({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8765330456506926 Imbalance Ratio:0.17875383043922363
frozensest({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8761197113767941 Imbalance Ratio:0.17959183673469384
frozensest({'country: Italy', 'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8761197113767941 Imbalance Ratio:0.17959183673469384
frozensest({'variety: Nebbiolo', 'province: Piedmont'}) --> frozensest({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.584411930219471 Imbalance Ratio:0.8311761395610578
frozensest({'province: Piedmont', 'taster_name: Kerin O'Keefe'}) --> frozensest({'variety: Nebbiolo', 'country: Italy'}) Kulczynski:0.8765330456506926 Imbalance Ratio:0.17875383043922363
frozensest({'variety: Nebbiolo'}) --> frozensest({'country: Italy', 'province: Piedmont', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8629507149951912 Imbalance Ratio:0.15227159261108342
frozensest({'province: Piedmont'}) --> frozensest({'variety: Nebbiolo', 'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.8761197113767941 Imbalance Ratio:0.17959183673469384
frozensest({'taster_name: Roger Voss', 'variety: Rosé'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.4249905122485132 Imbalance Ratio:0.8040964651470102
frozensest({'country: France', 'variety: Rosé'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.3878599024964004 Imbalance Ratio:0.8234459519375721
frozensest({'taster_name: Roger Voss', 'variety: Pinot Noir'}) --> frozensest({'country: France', 'province: Burgundy'}) Kulczynski:0.6039444182625708 Imbalance Ratio:0.47700225152782255
frozensest({'country: France', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Roger Voss', 'province: Burgundy'}) Kulczynski:0.5826499575100604 Imbalance Ratio:0.43811023622047257
frozensest({'variety: Pinot Noir', 'province: Burgundy'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5389231863151656 Imbalance Ratio:0.9139002576928907
frozensest({'province: Washington', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.3732738530342383 Imbalance Ratio:0.5190967108492881
frozensest({'country: Spain', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5339823346749342 Imbalance Ratio:0.8208010580011337
frozensest({'province: Northern Spain', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'country: Spain'}) Kulczynski:0.5673823663773413 Imbalance Ratio:0.7471264367816092
frozensest({'country: Spain', 'points: (0.0, 85.0]'})) --> frozensest({'province: Northern Spain', 'price: (0.0, 25.0]'})) Kulczynski:0.458786231884058 Imbalance Ratio:0.1770700636942675
frozensest({'province: Northern Spain', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5014317539599887 Imbalance Ratio:0.8974432088204544
frozensest({'province: Northern Spain', 'points: (0.0, 85.0]'})) --> frozensest({'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.5826217557094723 Imbalance Ratio:0.8334448160535116
frozensest({'country: Spain', 'points: (0.0, 85.0]'})) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'}) Kulczynski:0.427387694662804 Imbalance Ratio:0.40823084200567644
frozensest({'country: Argentina', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.539143238855023 Imbalance Ratio:0.8635368060184745
frozensest({'province: Mendoza Province', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5304224647358758 Imbalance Ratio:0.8863354629541337
frozensest({'province: Mendoza Province', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'country: Argentina'}) Kulczynski:0.6822970631114698 Imbalance Ratio:0.5624082232011747
frozensest({'country: Argentina', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'}) Kulczynski:0.6409598668003414 Imbalance Ratio:0.3499210110584518
frozensest({'province: Mendoza Province', 'points: (0.0, 85.0]'})) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.6631894827093455 Imbalance Ratio:0.673621034581309
frozensest({'country: Argentina', 'points: (0.0, 85.0]'})) --> frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'}) Kulczynski:0.6074895673770975 Imbalance Ratio:0.5052696838189709
frozensest({'variety: Chardonnay', 'province: California'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3303086136777812 Imbalance Ratio:0.805735990315712
frozensest({'taster_name: Jim Gordon', 'price: (25.0, 60.0]'})) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.5364897506170504 Imbalance Ratio:0.9245169082125603
frozensest({'taster_name: Jim Gordon', 'points: (89.0, 93.0]'})) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.5378047005257869 Imbalance Ratio:0.9227559703541036
frozensest({'price: (25.0, 60.0]', 'province: Burgundy'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5393797677764426 Imbalance Ratio:0.9111852076386785
frozensest({'province: Oregon', 'points: (89.0, 93.0]'})) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3368625413426963 Imbalance Ratio:0.8468201631831901
frozensest({'province: Oregon', 'points: (89.0, 93.0]'})) --> frozensest({'variety: Pinot Noir', 'country: US'}) Kulczynski:0.38195278501100105 Imbalance Ratio:0.6133741137216738
frozensest({'taster_name: Paul Gregutt', 'points: (89.0, 93.0]'})) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3623262297899052 Imbalance Ratio:0.7293306025654845
frozensest({'province: Oregon', 'points: (89.0, 93.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5968233458711597 Imbalance Ratio:0.7678057760902083
frozensest({'taster_name: Paul Gregutt', 'points: (89.0, 93.0]'})) --> frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.4620443543789899 Imbalance Ratio:0.19768151311775478
frozensest({'province: Oregon', 'points: (89.0, 93.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) Kulczynski:0.5153151786438155 Imbalance Ratio:0.15753012048192766
frozensest({'province: Oregon', 'points: (89.0, 93.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]'})) Kulczynski:0.42446435342109007 Imbalance Ratio:0.4731939163498094
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozensest({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.31182567644570997 Imbalance Ratio:0.8284286887489737
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozensest({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.3345672892171346 Imbalance Ratio:0.7255610290093049

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frozenset({'taster_name: Virginie Boone', 'price: (25.0, 60.0]'})) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.3440862152050338 Imbalance Ratio:0.5734013436178154
frozenset({'taster_name: Virginie Boone', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3683103832369692 Imbalance Ratio:0.7010254219183935
frozenset({'taster_name: Virginie Boone', 'price: (25.0, 60.0]'})) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.4003344573438201 Imbalance Ratio:0.3529245283018868
frozenset({'taster_name: Virginie Boone', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.42272599017408763 Imbalance Ratio:0.5002231545121844
frozenset({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3626550737481553 Imbalance Ratio:0.8686543565418714
frozenset({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.3888065859946038 Imbalance Ratio:0.771669775203691
frozenset({'province: Southwest France', 'price: (0.0, 25.0]'})) --> frozenset({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5319784982755096 Imbalance Ratio:0.929876430899856
frozenset({'province: Southwest France', 'taster_name: Roger Voss'}) --> frozenset({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.42786363150179596 Imbalance Ratio:0.830946830946831
frozenset({'province: Southwest France', 'country: France'}) --> frozenset({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.4158501195753892 Imbalance Ratio:0.8617739756866275
frozenset({'province: Southwest France'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.4382435630347282 Imbalance Ratio:0.7918079479180795
frozenset({'country: Italy', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.454711960022279 Imbalance Ratio:0.15226501696268205
frozenset({'points: (89.0, 93.0]', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'price: (25.0, 60.0]'})) Kulczynski:0.4574977681727336 Imbalance Ratio:0.18123752495009987
frozenset({'points: (89.0, 93.0]', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.35205089875331214 Imbalance Ratio:0.6858245651139429
frozenset({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3790793898611124 Imbalance Ratio:0.8956040823308056
frozenset({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.4016814411634283 Imbalance Ratio:0.8172107417390437
frozenset({'variety: Pinot Noir', 'province: California'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.4008255220463395 Imbalance Ratio:0.7324511245439199
frozenset({'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.38506116489321335 Imbalance Ratio:0.6742857142857143
frozenset({'taster_name: Matt Kettmann', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.4369647179275346 Imbalance Ratio:0.7942444432002689
frozenset({'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.43681549073203296 Imbalance Ratio:0.49128026261797303
frozenset({'taster_name: Matt Kettmann', 'points: (89.0, 93.0]'})) --> frozenset({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.4870464668618454 Imbalance Ratio:0.6445497630331753
frozenset({'price: (25.0, 60.0]', 'province: California'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.4758796810231983 Imbalance Ratio:0.23524194889418548
frozenset({'points: (89.0, 93.0]', 'province: California'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.4800041470707594 Imbalance Ratio:0.43587573434238
frozenset({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.5386811618075001 Imbalance Ratio:0.9226376763849997
frozenset({'variety: Pinot Noir', 'province: California'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.3575531523029467 Imbalance Ratio:0.6591071081448845
frozenset({'points: (89.0, 93.0]', 'variety: Pinot Noir'}) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.30690989952231923 Imbalance Ratio:0.6934338952972493
frozenset({'taster_name: Matt Kettmann', 'province: California'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.36569074249787675 Imbalance Ratio:0.4953773641911898
frozenset({'taster_name: Matt Kettmann', 'country: US'}) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.43500543172253137 Imbalance Ratio:0.24564255396008308
frozenset({'taster_name: Matt Kettmann', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.580464503376709 Imbalance Ratio:0.8390709932465823
frozenset({'taster_name: Matt Kettmann'}) --> frozenset({'points: (89.0, 93.0]', 'country: US', 'province: California'}) Kulczynski:0.43495940154067775 Imbalance Ratio:0.24553007043525382
frozenset({'price: (60.0, 3500.0]', 'province: California'}) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.35932825073862495 Imbalance Ratio:0.7666441593517893
frozenset({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]'})) --> frozenset({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.34375458978856355 Imbalance Ratio:0.826723486150251
frozenset({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]'})) --> frozenset({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.36980923667861404 Imbalance Ratio:0.722111992453262
frozenset({'taster_name: Virginie Boone', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.6094118619141462 Imbalance Ratio:0.7808279345558361
frozenset({'variety: Cabernet Sauvignon', 'points: (89.0, 93.0]'})) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.30194765517977656 Imbalance Ratio:0.84258872651357
frozenset({'variety: Red Blend', 'country: Italy'}) --> frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5417705649289233 Imbalance Ratio:0.19575856443719405
frozenset({'variety: Red Blend', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'province: Tuscany'}) Kulczynski:0.5354267053181477 Imbalance Ratio:0.2165825139516344
frozenset({'variety: Red Blend', 'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5732311940528034 Imbalance Ratio:0.8497018787265159
frozenset({'country: Italy', 'variety: Sangiovese'}) --> frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.6758834352402854 Imbalance Ratio:0.5109390777515989
frozenset({'variety: Sangiovese', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'province: Tuscany'}) Kulczynski:0.6949268258711441 Imbalance Ratio:0.5615384615384615
frozenset({'variety: Sangiovese', 'province: Tuscany'}) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5424710323381159 Imbalance Ratio:0.84602501161656991
frozenset({'variety: Sangiovese'}) --> frozenset({'country: Italy', 'province: Tuscany', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5924776606010024 Imbalance Ratio:0.3732028143163047
frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3528313668148697 Imbalance Ratio:0.841894902371904
frozenset({'province: New York', 'points: (85.0, 89.0]'})) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.42472392745991094 Imbalance Ratio:0.8724913990825689

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frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) Kulczynski:0.5419552175884736 Imbalance Ratio:0.13122807017543853
frozenset({'province: New York', 'points: (85.0, 89.0]'})) --> frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'})) Kulczynski:0.5677701266572589 Imbalance Ratio:0.37389530931339227
frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) --> frozenset({'province: New York', 'points: (85.0, 89.0]'})) Kulczynski:0.7847274717785953 Imbalance Ratio:0.3305457746478874
frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) --> frozenset({'province: New York', 'country: US'}) Kulczynski:0.6101277871783586 Imbalance Ratio:0.07104
frozenset({'province: New York', 'taster_name: Anna Lee C. Iijima'}) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.36918868570247826 Imbalance Ratio:0.8129922541170345
frozenset({'province: New York', 'country: US'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) Kulczynski:0.6101277871783586 Imbalance Ratio:0.07104
frozenset({'province: New York', 'points: (85.0, 89.0]'})) --> frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) Kulczynski:0.7847274717785953 Imbalance Ratio:0.3305457746478874
frozenset({'province: New York'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima', 'country: US'}) Kulczynski:0.7817138906609121 Imbalance Ratio:0.40630252100840336
frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'})) --> frozenset({'province: New York', 'country: US'}) Kulczynski:0.6334461713136035 Imbalance Ratio:0.055804237541032586
frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) --> frozenset({'province: New York', 'price: (0.0, 25.0]'})) Kulczynski:0.7931660283101727 Imbalance Ratio:0.1803823773898587
frozenset({'province: New York', 'price: (0.0, 25.0]'})) --> frozenset({'taster_name: Anna Lee C. Iijima', 'country: US'}) Kulczynski:0.7931660283101727 Imbalance Ratio:0.1803823773898587
frozenset({'province: New York', 'taster_name: Anna Lee C. Iijima'}) --> frozenset({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.42248018916421065 Imbalance Ratio:0.8103897934727979
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frozenset({'province: New York'}) --> frozenset({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'})) Kulczynski:0.8116738501474365 Imbalance Ratio:0.31177446102819234
frozenset({'province: Tuscany', 'price: (0.0, 25.0]'})) --> frozenset({'country: Italy', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.5454439479508766 Imbalance Ratio:0.8741588156123821
frozenset({'country: Italy', 'province: Tuscany'}) --> frozenset({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.4557480613218031 Imbalance Ratio:0.33852936545425916
frozenset({'province: Tuscany', 'taster_name: Kerin O'Keefe'}) --> frozenset({'country: Italy', 'points: (85.0, 89.0]'})) Kulczynski:0.4611726715456623 Imbalance Ratio:0.3692549019607844
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frozenset({'points: (85.0, 89.0]', 'taster_name: Jim Gordon'}) --> frozenset({'price: (0.0, 25.0]', 'province: California'}) Kulczynski:0.4742096867971972 Imbalance Ratio:0.6643409676930079
frozenset({'taster_name: Jim Gordon', 'price: (0.0, 25.0]'})) --> frozenset({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3324807275731758 Imbalance Ratio:0.7946147419831631
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frozenset({'points: (85.0, 89.0]', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5365036969774284 Imbalance Ratio:0.9193511710755705
frozenset({'taster_name: Roger Voss', 'variety: Chardonnay'}) --> frozenset({'country: France', 'province: Burgundy'}) Kulczynski:0.6853013798111838 Imbalance Ratio:0.2551427694197115
frozenset({'country: France', 'variety: chardonnay'}) --> frozenset({'taster_name: Roger Voss', 'province: Burgundy'}) Kulczynski:0.6858109297008363 Imbalance Ratio:0.25061576354679804
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frozenset({'variety: Chardonnay', 'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5600457802734954 Imbalance Ratio:0.8761276628003943
frozenset({'province: Burgundy'}) --> frozenset({'country: France', 'taster_name: Roger Voss', 'variety: Chardonnay'}) Kulczynski:0.696078431372549 Imbalance Ratio:0.2759051186017478
frozenset({'taster_name: Matt Kettmann', 'province: California'}) --> frozenset({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.42083339646530227 Imbalance Ratio:0.5981133058841925
frozenset({'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) --> frozenset({'country: US', 'province: California'}) Kulczynski:0.5977544941994588 Imbalance Ratio:0.8037331869338457
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frozenset({'variety: Champagne Blend', 'taster_name: Roger Voss'}) --> frozenset({'country: France', 'province: Champagne'}) Kulczynski:0.8532785496441884 Imbalance Ratio:0.2616
frozenset({'country: France', 'variety: Champagne Blend'}) --> frozenset({'province: Champagne', 'taster_name: Roger Voss'}) Kulczynski:0.8478772549926994 Imbalance Ratio:0.2209767814251401
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frozensest({'country: France', 'province: Champagne'}) --> frozensest({'variety: Champagne Blend', 'taster_name: Roger Voss'}) Kulczynski:0.8532785496441884 Imbalance Ratio:0.2616
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frozensest({'province: Washington', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.37135717171532481 Imbalance Ratio:0.7065763052208833
frozensest({'province: Washington', 'points: (85.0, 89.0]'})) --> frozensest({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.34939361469621005 Imbalance Ratio:0.6507333682556312
frozensest({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3745889620358889 Imbalance Ratio:0.8460373880989995
frozensest({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]'})) --> frozensest({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.30229766438906397 Imbalance Ratio:0.771636413080427
frozensest({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'})) --> frozensest({'province: Washington', 'points: (85.0, 89.0]'})) Kulczynski:0.4368812947642505 Imbalance Ratio:0.4371162156015465
frozensest({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'})) --> frozensest({'province: Washington', 'country: US'}) Kulczynski:0.5373928520129296 Imbalance Ratio:0.7574226931132192
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frozensest({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]'})) --> frozensest({'province: Washington', 'country: US'}) Kulczynski:0.5818041603994502 Imbalance Ratio:0.694163999015021
frozensest({'taster_name: Sean P. Sullivan', 'province: Washington'}) --> frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.32361934531244607 Imbalance Ratio:0.6363526860997349
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frozensest({'variety: Chardonnay', 'province: California'}) --> frozensest({'taster_name: Virginie Boone', 'country: US'}) Kulczynski:0.33074343655022254 Imbalance Ratio:0.6273518106413111
frozensest({'taster_name: Virginie Boone', 'variety: Chardonnay'}) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.5350299236808873 Imbalance Ratio:0.9299401526382254
frozensest({'province: California', 'points: (0.0, 85.0]'})) --> frozensest({'taster_name: Virginie Boone', 'country: US'}) Kulczynski:0.3409125967413481 Imbalance Ratio:0.7269173885484893
frozensest({'taster_name: Virginie Boone', 'points: (0.0, 85.0]'})) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.5264490296200839 Imbalance Ratio:0.9438405797101449
frozensest({'province: California', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.3750104233704995 Imbalance Ratio:0.8306502636203866
frozensest({'taster_name: Roger Voss', 'points: (0.0, 85.0]'})) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.41676125070681214 Imbalance Ratio:0.5510388437217706
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frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5881674620663198 Imbalance Ratio:0.8170177299590847
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frozensest({'country: France', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.4356098460438609 Imbalance Ratio:0.5887951009599469
frozensest({'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.4941264835425272 Imbalance Ratio:0.4050526819923371
frozensest({'country: Chile', 'points: (0.0, 85.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5469854519653312 Imbalance Ratio:0.8531288694161349
frozensest({'country: Chile', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.3915490218478065 Imbalance Ratio:0.36734693877551017
frozensest({'country: Chile', 'points: (85.0, 89.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5255437979491278 Imbalance Ratio:0.797503987989115
frozensest({'province: Oregon', 'price: (25.0, 60.0]'})) --> frozensest({'variety: Pinot Noir', 'country: US'}) Kulczynski:0.4619327193958476 Imbalance Ratio:0.5292817679558011
frozensest({'province: Oregon', 'variety: Pinot Noir'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3806966018988102 Imbalance Ratio:0.8115748469671674
frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.37900164338817266 Imbalance Ratio:0.8146786947321528
frozensest({'province: Oregon', 'price: (25.0, 60.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.6197947728181299 Imbalance Ratio:0.6967409948542023
frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]'})) --> frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.5230624962129217 Imbalance Ratio:0.062046970136273128
frozensest({'taster_name: Paul Gregutt', 'province: Oregon'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.33479369260756187 Imbalance Ratio:0.6474794052121652
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frozensest({'province: Oregon', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]'})) Kulczynski:0.5081820042805282 Imbalance Ratio:0.3592142188961646
frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) --> frozensest({'province: Oregon', 'price: (25.0, 60.0]'})) Kulczynski:0.6524391458224275 Imbalance Ratio:0.01681415929203547
frozensest({'variety: Red Blend', 'country: Italy'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Kerin O'Keefe'}) Kulczynski:0.4243944779538703 Imbalance Ratio:0.49622799664710804
frozensest({'variety: Red Blend', 'taster_name: Kerin O'Keefe'}) --> frozensest({'country: Italy', 'points: (85.0, 89.0]'})) Kulczynski:0.4223507537153219 Imbalance Ratio:0.5069147184721766
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frozensest({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]}) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.5497172349420744 Imbalance Ratio:0.9005655301158515
frozensest({'price: (60.0, 3500.0]', 'country: US'}) --> frozensest({'taster_name: Virginie Boone', 'province: California'}) Kulczynski:0.36072667278447035 Imbalance Ratio:0.4948066935949221
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frozensest({'variety: Malbec', 'price: (0.0, 25.0]'}) --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.48309913157649 Imbalance Ratio:0.5291878172588832
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frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'}) --> frozensest({'price: (0.0, 25.0]', 'country: Argentina'}) Kulczynski:0.7976116072597623 Imbalance Ratio:0.09508484493856045
frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) --> frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'}) Kulczynski:0.8222349242640754 Imbalance Ratio:0.35553015147184913
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Ratio:0.40221216691804945
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'country: France',
'price: (0.0, 25.0]', 'province: Bordeaux'}) Kulczynski:0.6631128267579636 Imbalance Ratio:0.14811715481171542
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'province: Bordeaux',
'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.6643330858064682 Imbalance
Ratio:0.15339480301760267

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frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.4791154749136677 Imbalance
Ratio:0.9031749605944608
frozenset({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) -->
frozenset({'country: France', 'points: (85.0, 89.0]'})) Kulczynski:0.3523783703003529 Imbalance
Ratio:0.6617647058823529
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.4288897239989258 Imbalance
Ratio:0.8094922737306842
frozenset({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) Kulczynski:0.34098925909378974 Imbalance
Ratio:0.7021660649819496
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France',
'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.3408494688992443 Imbalance
Ratio:0.6519657258064515
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozenset({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5486775732834367 Imbalance
Ratio:0.8981881585929802
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozenset({'country:
France', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.6126300375390458 Imbalance
Ratio:0.3638272345530894
frozenset({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'province: Bordeaux'}) Kulczynski:0.6672556329876637 Imbalance
Ratio:0.6210328133405056
frozenset({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'taster_name:
Roger Voss', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.6119795233394888 Imbalance
Ratio:0.36063606360636075
frozenset({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'taster_name: Roger Voss', 'province: Bordeaux'}) Kulczynski:0.6662303888130968 Imbalance
Ratio:0.6173139158576052
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'taster_name:
Roger Voss', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.6125227928871201 Imbalance
Ratio:0.3592904389657246
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France',
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Ratio:0.42075337597725665
frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozenset({'country:
France', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5389220145889682 Imbalance
Ratio:0.4911639244363193
frozenset({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozenset({'country: France', 'points: (85.0, 89.0]'})) Kulczynski:0.3510590961420217 Imbalance
Ratio:0.6718891622426518
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozenset({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.4250945069625638 Imbalance
Ratio:0.8134039969084685
frozenset({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'country: France', 'province: Bordeaux'}) Kulczynski:0.5615476168030469 Imbalance
Ratio:0.6568754873927736
frozenset({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'price: (0.0,
25.0]', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5233829524294158 Imbalance
Ratio:0.11846318036286016
frozenset({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) Kulczynski:0.5543356865995219 Imbalance
Ratio:0.037296037296037345
frozenset({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozenset({'price: (0.0, 25.0]', 'province: Bordeaux'}) Kulczynski:0.5634451001171017 Imbalance
Ratio:0.36770497672753316
frozenset({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozenset({'country: France', 'price: (0.0,
25.0]', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5543356865995219 Imbalance
Ratio:0.037296037296037345
frozenset({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozenset({'country: France',
'price: (0.0, 25.0]', 'province: Bordeaux'}) Kulczynski:0.466144864358056 Imbalance Ratio:0.15547489413188145
frozenset({'taster_name: Paul Gregutt', 'province: Washington', 'price: (0.0, 25.0]'})) --> frozenset({'points:
(85.0, 89.0]', 'country: US'}) Kulczynski:0.307017223998584 Imbalance Ratio:0.8302327088870164
frozenset({'taster_name: Paul Gregutt', 'province: Washington', 'points: (85.0, 89.0]'})) -->
frozenset({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.33850074472233077 Imbalance
Ratio:0.8406142626744268
frozenset({'province: Northern Spain', 'price: (0.0, 25.0]', 'points: (0.0, 85.0]'})) -->
frozenset({'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.5756350626314909 Imbalance
Ratio:0.847324414715719
frozenset({'province: Northern Spain', 'taster_name: Michael Schachner', 'points: (0.0, 85.0]'})) -->
frozenset({'price: (0.0, 25.0]', 'country: Spain'}) Kulczynski:0.56722078884792 Imbalance
Ratio:0.74736101337088656
frozenset({'points: (0.0, 85.0]', 'price: (0.0, 25.0]', 'country: Spain'}) --> frozenset({'province: Northern
Spain', 'taster_name: Michael Schachner'}) Kulczynski:0.41527157808240234 Imbalance Ratio:0.4491185789726354
frozenset({'points: (0.0, 85.0]', 'taster_name: Michael Schachner', 'country: Spain'}) -->
frozenset({'province: Northern Spain', 'price: (0.0, 25.0]'})) Kulczynski:0.45888084543832824 Imbalance
Ratio:0.17851450430347468
frozenset({'province: Northern Spain', 'points: (0.0, 85.0]', 'country: Spain'}) --> frozenset({'price: (0.0,
25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5014317539599887 Imbalance Ratio:0.8974432088204544
frozenset({'province: Northern Spain', 'points: (0.0, 85.0]'})) --> frozenset({'price: (0.0, 25.0]',
'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.566916879558309 Imbalance
Ratio:0.7465946453734147

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frozensest({'points: (0.0, 85.0]', 'country: Spain'}) --> frozensest({'province: Northern Spain', 'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.4583690212050544 Imbalance Ratio:0.1767515923566879
frozensest({'province: Mendoza Province', 'country: Argentina', 'points: (0.0, 85.0]'} --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.5304224647358758 Imbalance Ratio:0.8863354629541337
frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province', 'points: (0.0, 85.0]'} --> frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.6560445841669048 Imbalance Ratio:0.6879108316661904
frozensest({'price: (0.0, 25.0]', 'country: Argentina', 'points: (0.0, 85.0]'} --> frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'}) Kulczynski:0.6004514914933331 Imbalance Ratio:0.5273972602739725
frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province', 'points: (0.0, 85.0]'} --> frozensest({'price: (0.0, 25.0]', 'country: Argentina'}) Kulczynski:0.6822970631114698 Imbalance Ratio:0.5624082232011747
frozensest({'taster_name: Michael Schachner', 'country: Argentina', 'points: (0.0, 85.0]'} --> frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'}) Kulczynski:0.6409598668003414 Imbalance Ratio:0.3499210110584518
frozensest({'province: Mendoza Province', 'points: (0.0, 85.0]'} --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.6822970631114698 Imbalance Ratio:0.5624082232011747
frozensest({'country: Argentina', 'points: (0.0, 85.0]'} --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'province: Mendoza Province'}) Kulczynski:0.6409598668003414 Imbalance Ratio:0.3499210110584518
frozensest({'country: US', 'points: (89.0, 93.0]', 'variety: Chardonnay'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.33611272500510786 Imbalance Ratio:0.7828588143525742
frozensest({'points: (89.0, 93.0]', 'variety: Chardonnay', 'province: California'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.4128575688483844 Imbalance Ratio:0.9173330265201634
frozensest({'price: (25.0, 60.0]', 'points: (89.0, 93.0]', 'variety: Chardonnay'}) --> frozensest({'country: US', 'province: California'}) Kulczynski:0.2861035515199977 Imbalance Ratio:0.8655987394957984
frozensest({'price: (25.0, 60.0]', 'variety: Chardonnay', 'province: California'}) --> frozensest({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.34890988809161 Imbalance Ratio:0.8637660981552385
frozensest({'province: Oregon', 'points: (89.0, 93.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]'} Kulczynski:0.42446435342109007 Imbalance Ratio:0.47319391634980984
frozensest({'province: Oregon', 'price: (25.0, 60.0]', 'points: (89.0, 93.0]'} --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5543423754640382 Imbalance Ratio:0.8595823237567786
frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]', 'points: (89.0, 93.0]'} -->
frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.3802855008014269 Imbalance Ratio:0.4501179642736771
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.33667639134053373 Imbalance Ratio:0.8509792949076664
frozensest({'province: Oregon', 'points: (89.0, 93.0]'} --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.4276016128397634 Imbalance Ratio:0.46246362754607173
frozensest({'province: Oregon', 'points: (89.0, 93.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) Kulczynski:0.5153151786438155 Imbalance Ratio:0.15753012048192766
frozensest({'points: (89.0, 93.0]', 'province: Oregon', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5584994063072249 Imbalance Ratio:0.8655957471397204
frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir', 'points: (89.0, 93.0]'} -->
frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.6106080624371861 Imbalance Ratio:0.7639484978540774
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (89.0, 93.0]'} --> frozensest({'variety: Pinot Noir', 'country: US'}) Kulczynski:0.38476526831639596 Imbalance Ratio:0.624178895877009
frozensest({'province: Oregon', 'points: (89.0, 93.0]'} --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir', 'country: US'}) Kulczynski:0.5176240981038052 Imbalance Ratio:0.15113808801213963
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir', 'country: US'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.3888065859946038 Imbalance Ratio:0.771669775203691
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir', 'province: California'}) -->
frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.42272599017408763 Imbalance Ratio:0.5002231545121844
frozensest({'taster_name: Virginie Boone', 'points: (89.0, 93.0]', 'province: California'}) -->
frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3682307143684414 Imbalance Ratio:0.7010788293099766
frozensest({'taster_name: Virginie Boone', 'price: (25.0, 60.0]', 'country: US'}) --> frozensest({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.4003344573438201 Imbalance Ratio:0.3529245283018868
frozensest({'taster_name: Virginie Boone', 'price: (25.0, 60.0]', 'points: (89.0, 93.0]'} -->
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frozensest({'taster_name: Virginie Boone', 'price: (25.0, 60.0]', 'province: California'}) -->
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frozensest({'taster_name: Virginie Boone', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]', 'country: US', 'province: California'}) Kulczynski:0.42272599017408763 Imbalance Ratio:0.5002231545121844
frozensest({'taster_name: Virginie Boone', 'price: (25.0, 60.0]'} --> frozensest({'points: (89.0, 93.0]', 'country: US', 'province: California'}) Kulczynski:0.4003344573438201 Imbalance Ratio:0.3529245283018868
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir', 'country: US'}) --> frozensest({'points: (89.0, 93.0]', 'province: California'}) Kulczynski:0.3345672892171346 Imbalance Ratio:0.7255610290093049
frozensest({'points: (89.0, 93.0]', 'taster_name: Virginie Boone', 'variety: Pinot Noir'}) -->
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frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir', 'province: California'}) -->
frozensest({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.31182567644570997 Imbalance
Ratio:0.8284286887489737
frozensest({'taster_name: Virginie Boone', 'variety: Pinot Noir'}) --> frozensest({'points: (89.0, 93.0]',
'country: US', 'province: California'}) Kulczynski:0.3345672892171346 Imbalance Ratio:0.7255610290093049
frozensest({'taster_name: Matt Kettmann', 'variety: Pinot Noir', 'country: US'}) --> frozensest({'price: (25.0,
60.0]', 'province: California'}) Kulczynski:0.4016814411634283 Imbalance Ratio:0.8172107417390437
frozensest({'taster_name: Matt Kettmann', 'variety: Pinot Noir', 'province: California'}) -->
frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3790793898611124 Imbalance
Ratio:0.8956040823308056
frozensest({'price: (25.0, 60.0]', 'variety: Pinot Noir', 'taster_name: Matt Kettmann'}) -->
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Ratio:0.9458079393839565
frozensest({'taster_name: Matt Kettmann', 'variety: Pinot Noir'}) --> frozensest({'price: (25.0, 60.0]',
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frozensest({'points: (89.0, 93.0]', 'variety: Pinot Noir', 'province: California'}) --> frozensest({'price:
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Ratio:0.7942444432002689
frozensest({'price: (25.0, 60.0]', 'country: US', 'taster_name: Matt Kettmann'}) --> frozensest({'points: (89.0,
93.0]', 'province: California'}) Kulczynski:0.43690116971860926 Imbalance Ratio:0.4914332615163641
frozensest({'price: (25.0, 60.0]', 'points: (89.0, 93.0]', 'taster_name: Matt Kettmann'}) -->
frozensest({'country: US', 'province: California'}) Kulczynski:0.5600395322022731 Imbalance
Ratio:0.8799209355954538
frozensest({'province: California', 'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) -->
frozensest({'points: (89.0, 93.0]', 'country: US'}) Kulczynski:0.3852325708523567 Imbalance
Ratio:0.674505682191421
frozensest({'taster_name: Matt Kettmann', 'points: (89.0, 93.0]'} --> frozensest({'price: (25.0, 60.0]',
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frozensest({'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) --> frozensest({'points: (89.0, 93.0]',
'country: US', 'province: California'}) Kulczynski:0.43681549073203296 Imbalance Ratio:0.49128026261797303
frozensest({'price: (60.0, 3500.0]', 'points: (89.0, 93.0]', 'country: US'}) --> frozensest({'taster_name:
Virginie Boone', 'province: California'}) Kulczynski:0.3197285026941449 Imbalance Ratio:0.6714315096668039
frozensest({'points: (89.0, 93.0]', 'price: (60.0, 3500.0]', 'province: California'}) -->
frozensest({'taster_name: Virginie Boone', 'country: US'}) Kulczynski:0.4270133898860577 Imbalance
Ratio:0.788125343953819
frozensest({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]', 'country: US'}) --> frozensest({'points:
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frozensest({'taster_name: Virginie Boone', 'points: (89.0, 93.0]', 'price: (60.0, 3500.0]'} -->
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Ratio:0.9395486740240488
frozensest({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]', 'province: California'}) -->
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Ratio:0.826723486150251
frozensest({'taster_name: Virginie Boone', 'price: (60.0, 3500.0]'} --> frozensest({'points: (89.0, 93.0]',
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frozensest({'province: New York', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'points: (85.0, 89.0]',
'taster_name: Anna Lee C. Iijima'}) Kulczynski:0.5419552175884736 Imbalance Ratio:0.13122807017543853
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Anna Lee C. Iijima', 'country: US'}) Kulczynski:0.7098648251723834 Imbalance Ratio:0.4809565987599647
frozensest({'province: New York', 'points: (85.0, 89.0]', 'country: US'}) --> frozensest({'taster_name: Anna Lee
C. Iijima', 'price: (0.0, 25.0]'} Kulczynski:0.5677701266572589 Imbalance Ratio:0.37389530931339227
frozensest({'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'province:
New York', 'points: (85.0, 89.0]'} Kulczynski:0.6880450634702842 Imbalance Ratio:0.08037943085371947
frozensest({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'} -->
frozensest({'province: New York', 'country: US'}) Kulczynski:0.5360063500071985 Imbalance
Ratio:0.23252688172043012
frozensest({'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima', 'country: US'}) -->
frozensest({'province: New York', 'price: (0.0, 25.0]'} Kulczynski:0.6732493391998498 Imbalance
Ratio:0.17624703087885993
frozensest({'province: New York', 'taster_name: Anna Lee C. Iijima', 'price: (0.0, 25.0]'} -->
frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3732167538804619 Imbalance
Ratio:0.8640995103877199
frozensest({'province: New York', 'points: (85.0, 89.0]', 'taster_name: Anna Lee C. Iijima'}) -->
frozensest({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.42099748480198623 Imbalance
Ratio:0.8788922370497921
frozensest({'province: New York', 'price: (0.0, 25.0]'} --> frozensest({'points: (85.0, 89.0]', 'taster_name:
Anna Lee C. Iijima', 'country: US'}) Kulczynski:0.6732493391998498 Imbalance Ratio:0.17624703087885993
frozensest({'province: New York', 'points: (85.0, 89.0]'} --> frozensest({'taster_name: Anna Lee C. Iijima',
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frozensest({'taster_name: Jim Gordon', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'points: (85.0,
89.0]', 'province: California'}) Kulczynski:0.3819003406281316 Imbalance Ratio:0.591959157626037
frozensest({'points: (85.0, 89.0]', 'taster_name: Jim Gordon', 'price: (0.0, 25.0]'} --> frozensest({'country:
US', 'province: California'}) Kulczynski:0.5351102245275319 Imbalance Ratio:0.928900845503459
frozensest({'points: (85.0, 89.0]', 'taster_name: Jim Gordon', 'country: US'}) --> frozensest({'price: (0.0,
25.0]', 'province: California'}) Kulczynski:0.4742096867971972 Imbalance Ratio:0.6643409676930079
frozensest({'taster_name: Jim Gordon', 'price: (0.0, 25.0]', 'province: California'}) --> frozensest({'points:
(85.0, 89.0]', 'country: US'}) Kulczynski:0.3323521176250974 Imbalance Ratio:0.794679005205321
frozensest({'points: (85.0, 89.0]', 'taster_name: Jim Gordon', 'province: California'}) --> frozensest({'price:
(0.0, 25.0]', 'country: US'}) Kulczynski:0.4166950078206637 Imbalance Ratio:0.8430550621669626

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frozensest({'taster_name: Jim Gordon', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US', 'province: California'}) Kulczynski:0.3819003406281316 Imbalance Ratio:0.591959157626037
frozensest({'points: (85.0, 89.0]', 'taster_name: Jim Gordon'}) --> frozensest({'price: (0.0, 25.0]', 'country: US', 'province: California'}) Kulczynski:0.4742096867971972 Imbalance Ratio:0.6643409676930079
frozensest({'points: (85.0, 89.0]', 'price: (25.0, 60.0]', 'taster_name: Matt Kettmann'}) -->
frozensest({'country: US', 'province: California'}) Kulczynski:0.5267393051351714 Imbalance
Ratio:0.9443315948394182
frozensest({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'province: Washington', 'points: (85.0, 89.0]'})) Kulczynski:0.4375559654888982 Imbalance Ratio:0.4384247666742545
frozensest({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) -->
frozensest({'province: Washington', 'country: US'}) Kulczynski:0.5067195978561204 Imbalance
Ratio:0.8362754848334162
frozensest({'province: washington', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Sean P. Sullivan', 'country: US'}) Kulczynski:0.3748993642066706 Imbalance Ratio:0.4406023424428332
frozensest({'taster_name: Sean P. Sullivan', 'province: Washington', 'price: (0.0, 25.0]'})) -->
frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3718037917904348 Imbalance
Ratio:0.8643159566022756
frozensest({'taster_name: Sean P. Sullivan', 'province: washington', 'points: (85.0, 89.0]'})) -->
frozensest({'price: (0.0, 25.0]', 'country: US'}) Kulczynski:0.29156547500703034 Imbalance
Ratio:0.7907437790538693
frozensest({'taster_name: Sean P. Sullivan', 'price: (0.0, 25.0]'})) --> frozensest({'province: washington', 'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.4368812947642505 Imbalance Ratio:0.4371162156015465
frozensest({'taster_name: Sean P. Sullivan', 'points: (85.0, 89.0]', 'price: (25.0, 60.0]'})) -->
frozensest({'province: washington', 'country: US'}) Kulczynski:0.5255137873571208 Imbalance
Ratio:0.8587896253602305
frozensest({'province: washington', 'points: (85.0, 89.0]', 'price: (25.0, 60.0]'})) -->
frozensest({'taster_name: Sean P. Sullivan', 'country: US'}) Kulczynski:0.4135538219122233 Imbalance
Ratio:0.5532803180914512
frozensest({'province: Oregon', 'price: (25.0, 60.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) Kulczynski:0.6524391458224275 Imbalance Ratio:0.01681415929203547
frozensest({'province: Oregon', 'variety: Pinot Noir', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]'})) Kulczynski:0.5081820042805282 Imbalance Ratio:0.3592142188961646
frozensest({'province: Oregon', 'price: (25.0, 60.0]', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5833911204287202 Imbalance Ratio:0.8018672199170124
frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir', 'country: US'}) --> frozensest({'province: Oregon', 'price: (25.0, 60.0]'})) Kulczynski:0.6557892225985928 Imbalance Ratio:0.024368499257057964
frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]', 'variety: Pinot Noir'}) -->
frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.661783109485909 Imbalance Ratio:0.6566707466340269
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'price: (25.0, 60.0]'})) --> frozensest({'variety: Pinot Noir', 'country: US'}) Kulczynski:0.4655083564598772 Imbalance Ratio:0.5494352252126621
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'variety: Pinot Noir'}) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3829695097032688 Imbalance Ratio:0.8182984658298466
frozensest({'province: Oregon', 'price: (25.0, 60.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir', 'country: US'}) Kulczynski:0.6557892225985928 Imbalance Ratio:0.024368499257057964
frozensest({'province: Oregon', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.5126316522546361 Imbalance Ratio:0.3463740458015267
frozensest({'taster_name: Paul Gregutt', 'variety: Pinot Noir'}) --> frozensest({'province: Oregon', 'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.6524391458224275 Imbalance Ratio:0.01681415929203547
frozensest({'province: Oregon', 'points: (85.0, 89.0]', 'price: (25.0, 60.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.53018173020419 Imbalance Ratio:0.8713201471941123
frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]', 'price: (25.0, 60.0]'})) -->
frozensest({'province: Oregon', 'country: US'}) Kulczynski:0.39992608393490564 Imbalance
Ratio:0.5748696746359878
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (85.0, 89.0]'})) --> frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.28125403559566725 Imbalance Ratio:0.8358744890067396
frozensest({'points: (85.0, 89.0]', 'country: Argentina', 'province: Mendoza Province'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) Kulczynski:0.45804525352465164 Imbalance
Ratio:0.867699530516432
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Mendoza Province'}) -->
frozensest({'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.640468705344384 Imbalance
Ratio:0.7190625893112318
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'country: Argentina'}) --> frozensest({'taster_name: Michael Schachner', 'province: Mendoza Province'}) Kulczynski:0.5818301395249664 Imbalance
Ratio:0.5711152882205515
frozensest({'points: (85.0, 89.0]', 'taster_name: Michael Schachner', 'province: Mendoza Province'}) -->
frozensest({'price: (0.0, 25.0]', 'country: Argentina'}) Kulczynski:0.5947602079231945 Imbalance
Ratio:0.51195012123314
frozensest({'points: (85.0, 89.0]', 'taster_name: Michael Schachner', 'country: Argentina'}) -->
frozensest({'price: (0.0, 25.0]', 'province: Mendoza Province'}) Kulczynski:0.5628723693935503 Imbalance
Ratio:0.30774935113088614
frozensest({'points: (85.0, 89.0]', 'province: Mendoza Province'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'country: Argentina'}) Kulczynski:0.5947602079231945 Imbalance
Ratio:0.51195012123314
frozensest({'points: (85.0, 89.0]', 'country: Argentina'}) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'province: Mendoza Province'}) Kulczynski:0.5628723693935503 Imbalance
Ratio:0.30774935113088614
frozensest({'taster_name: Matt Kettmann', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'points: (85.0, 89.0]', 'province: California'}) Kulczynski:0.38102802689102266 Imbalance Ratio:0.7158360128617363
frozensest({'points: (85.0, 89.0]', 'taster_name: Matt Kettmann', 'price: (0.0, 25.0]'})) -->
frozensest({'country: US', 'province: California'}) Kulczynski:0.5263273485971559 Imbalance
Ratio:0.9473453028056883
frozensest({'taster_name: Matt Kettmann', 'price: (0.0, 25.0]', 'province: California'}) -->
frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.3441836226743824 Imbalance
Ratio:0.8603778553090646
frozensest({'taster_name: Matt Kettmann', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US', 'province: California'}) Kulczynski:0.38102802689102266 Imbalance Ratio:0.7158360128617363

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frozensest({'points: (85.0, 89.0]', 'price: (25.0, 60.0]', 'province: California'}) -->
frozensest({'taster_name: Virginie Boone', 'country: US'}) Kulczynski:0.3503711875294343 Imbalance
Ratio:0.5530071857466285
frozensest({'taster_name: Virginie Boone', 'points: (85.0, 89.0]', 'country: US'}) --> frozensest({'price: (25.0, 60.0]', 'province: California'}) Kulczynski:0.34449410976277955 Imbalance Ratio:0.5946190778150194
frozensest({'taster_name: Virginie Boone', 'points: (85.0, 89.0]', 'province: California'}) -->
frozensest({'price: (25.0, 60.0]', 'country: US'}) Kulczynski:0.3082386105643339 Imbalance
Ratio:0.7589978448275863
frozensest({'taster_name: Virginie Boone', 'points: (85.0, 89.0]', 'price: (25.0, 60.0]'})) -->
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Ratio:0.9127594158339739
frozensest({'taster_name: Virginie Boone', 'points: (85.0, 89.0]'})) --> frozensest({'price: (25.0, 60.0]', 'country: US', 'province: California'}) Kulczynski:0.34449410976277955 Imbalance Ratio:0.5946190778150194
frozensest({'taster_name: Virginie Boone', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'points: (85.0, 89.0]', 'province: California'}) Kulczynski:0.3467611990895443 Imbalance Ratio:0.5822546185748397
frozensest({'taster_name: Virginie Boone', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) -->
frozensest({'country: US', 'province: California'}) Kulczynski:0.5322846318563663 Imbalance
Ratio:0.9354307362872674
frozensest({'taster_name: Virginie Boone', 'price: (0.0, 25.0]', 'province: California'}) -->
frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.30192864956149607 Imbalance
Ratio:0.7884063516357375
frozensest({'taster_name: Virginie Boone', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US', 'province: California'}) Kulczynski:0.3467611990895443 Imbalance Ratio:0.5822546185748397
frozensest({'province: Northern Spain', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) -->
frozensest({'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.6015219936444222 Imbalance
Ratio:0.7969560127111558
frozensest({'province: Northern Spain', 'price: (0.0, 25.0]', 'taster_name: Michael Schachner'}) -->
frozensest({'points: (85.0, 89.0]', 'country: Spain'}) Kulczynski:0.48183606799005035 Imbalance
Ratio:0.12351421188630489
frozensest({'province: Northern Spain', 'points: (85.0, 89.0]', 'taster_name: Michael Schachner'}) -->
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Ratio:0.5760917512130568
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'country: Spain'}) --> frozensest({'province: Northern Spain', 'taster_name: Michael Schachner'}) Kulczynski:0.4479038577432873 Imbalance Ratio:0.2793395805443998
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frozensest({'province: Northern Spain', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.4818787545979769 Imbalance
Ratio:0.12277074179374514
frozensest({'province: Northern Spain', 'points: (85.0, 89.0]'})) --> frozensest({'price: (0.0, 25.0]', 'taster_name: Michael Schachner', 'country: Spain'}) Kulczynski:0.5325414006043241 Imbalance
Ratio:0.575530035335689
frozensest({'province: Oregon', 'points: (85.0, 89.0]', 'variety: Pinot Noir'}) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5348043088878108 Imbalance Ratio:0.872337976286405
frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]', 'variety: Pinot Noir'}) -->
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Ratio:0.7863265306122449
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'points: (85.0, 89.0]'})) --> frozensest({'variety: Pinot Noir', 'country: US'}) Kulczynski:0.331530405435287 Imbalance Ratio:0.5970352237182103
frozensest({'province: Oregon', 'price: (0.0, 25.0]', 'country: US'}) --> frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]'})) Kulczynski:0.3787997324823169 Imbalance Ratio:0.41855979425632234
frozensest({'province: Oregon', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'country: US'}) Kulczynski:0.5166196867653636 Imbalance Ratio:0.8759182736455464
frozensest({'taster_name: Paul Gregutt', 'province: Oregon', 'price: (0.0, 25.0]'})) --> frozensest({'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.30681743847618304 Imbalance Ratio:0.8402940411137133
frozensest({'province: Oregon', 'price: (0.0, 25.0]'})) --> frozensest({'taster_name: Paul Gregutt', 'points: (85.0, 89.0]', 'country: US'}) Kulczynski:0.38136732763846004 Imbalance Ratio:0.4088036609283068
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name: Roger Voss'}) Kulczynski:0.5357530837457762
Imbalance Ratio:0.9250132686329516
frozensest({'province: Bordeaux', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) -->
frozensest({'country: France', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5381202669747144 Imbalance
Ratio:0.4920780012187691
frozensest({'province: Bordeaux', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) --> frozensest({'country: France', 'points: (85.0, 89.0]'})) Kulczynski:0.35126613106185905 Imbalance
Ratio:0.6733609743456853
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'country: France', 'price: (0.0, 25.0]'})) Kulczynski:0.4251789828559955 Imbalance
Ratio:0.8141358365543898
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'})) --> frozensest({'country: France', 'province: Bordeaux'}) Kulczynski:0.6173196251283807
Imbalance Ratio:0.7174791273902504
frozensest({'country: France', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) -->
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5376241674263517
Imbalance Ratio:0.48978347057029575
frozensest({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss'}) Kulczynski:0.3403020988574267
Imbalance Ratio:0.7126514894098991
frozensest({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) --> frozensest({'taster_name: Roger Voss', 'price: (0.0, 25.0]'})) Kulczynski:0.4128696505260767
Imbalance Ratio:0.8481614349775785
frozensest({'country: France', 'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'taster_name: Roger Voss', 'province: Bordeaux'}) Kulczynski:0.6164420351654178
Imbalance Ratio:0.7149419075925425

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frozensest({'country: France', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) -->
frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5226120958820948 Imbalance
Ratio:0.12032751868992525
frozensest({'country: France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0,
25.0]'}) --> frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) Kulczynski:0.5539793899904397 Imbalance
Ratio:0.03387850467289722
frozensest({'country: France', 'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red
Blend'}) --> frozensest({'price: (0.0, 25.0]', 'province: Bordeaux'}) Kulczynski:0.5630334437897194 Imbalance
Ratio:0.36975994267287715
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'province: Bordeaux'}) --> frozensest({'country:
France', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.5380247930567504
Imbalance Ratio:0.48869193154034235
frozensest({'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozensest({'country: France', 'points: (85.0, 89.0]', 'taster_name: Roger Voss'})
Kulczynski:0.364948253455026 Imbalance Ratio:0.6104713649623829
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend', 'province: Bordeaux'}) -->
frozensest({'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) Kulczynski:0.43692730617692954
Imbalance Ratio:0.7717713669452683
frozensest({'points: (85.0, 89.0]', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozensest({'country: France', 'taster_name: Roger Voss', 'province: Bordeaux'}) Kulczynski:0.5603856834711987
Imbalance Ratio:0.6550195567144719
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'}) --> frozensest({'country:
France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) Kulczynski:0.553470653376227 Imbalance
Ratio:0.03926905132192851
frozensest({'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'}) -->
frozensest({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) Kulczynski:0.5539793899904397
Imbalance Ratio:0.03387850467289722
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'variety: Bordeaux-style Red Blend'}) -->
frozensest({'country: France', 'price: (0.0, 25.0]', 'province: Bordeaux'}) Kulczynski:0.5630334437897194
Imbalance Ratio:0.36975994267287715
frozensest({'country: France', 'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'taster_name:
Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'}) Kulczynski:0.5539793899904397
Imbalance Ratio:0.03387850467289722
frozensest({'country: France', 'price: (0.0, 25.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozensest({'points: (85.0, 89.0]', 'taster_name: Roger Voss', 'province: Bordeaux'})
Kulczynski:0.553470653376227 Imbalance Ratio:0.03926905132192851
frozensest({'country: France', 'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) -->
frozensest({'province: Bordeaux', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'})
Kulczynski:0.562757293581551 Imbalance Ratio:0.3645833333333333
frozensest({'points: (85.0, 89.0]', 'province: Bordeaux'}) --> frozensest({'country: France', 'taster_name:
Roger Voss', 'variety: Bordeaux-style Red Blend', 'price: (0.0, 25.0]'}) Kulczynski:0.5539793899904397
Imbalance Ratio:0.03387850467289722
frozensest({'points: (85.0, 89.0]', 'variety: Bordeaux-style Red Blend'}) --> frozensest({'province: Bordeaux',
'country: France', 'taster_name: Roger Voss', 'price: (0.0, 25.0]'}) Kulczynski:0.4657531031645714 Imbalance
Ratio:0.15225962996663633

```

## 可视化展示并分析

```

# 将满足条件的关联规则对应的支撑度、信任度、Lift值、kulczynski及Imbalance Ratio合并在一起并转成Dataframe对象
itemSet_list = []
for i in range(len(rules)):
    tA = str(list(map(lambda x: x, rules[i][0])))
    tB = str(list(map(lambda x: x, rules[i][1])))
    tAB = tA + '-->' + tB
    SA, SB, SAB = float(suppData[rules[i][0]]), float(suppData[rules[i][1]]), float(rules[i][3])
    CAB = SAB / SA
    lift = lifts[i][-1]
    kulc, ir = kulcwithIrs[i][-2], kulcwithIrs[i][-1]

    itemSet_list.append([tA, tB, tAB, SA, SB, SAB, CAB, lift, kulc, ir])

itemSet = pd.DataFrame(data=itemSet_list, columns=['rule_A', 'rule_B', 'rule','Support_A', 'Support_B',
'Support_AB', 'Confidence', 'Lift', 'Kulczynski', 'Imbalance_Ratio'])
display(itemSet)

```

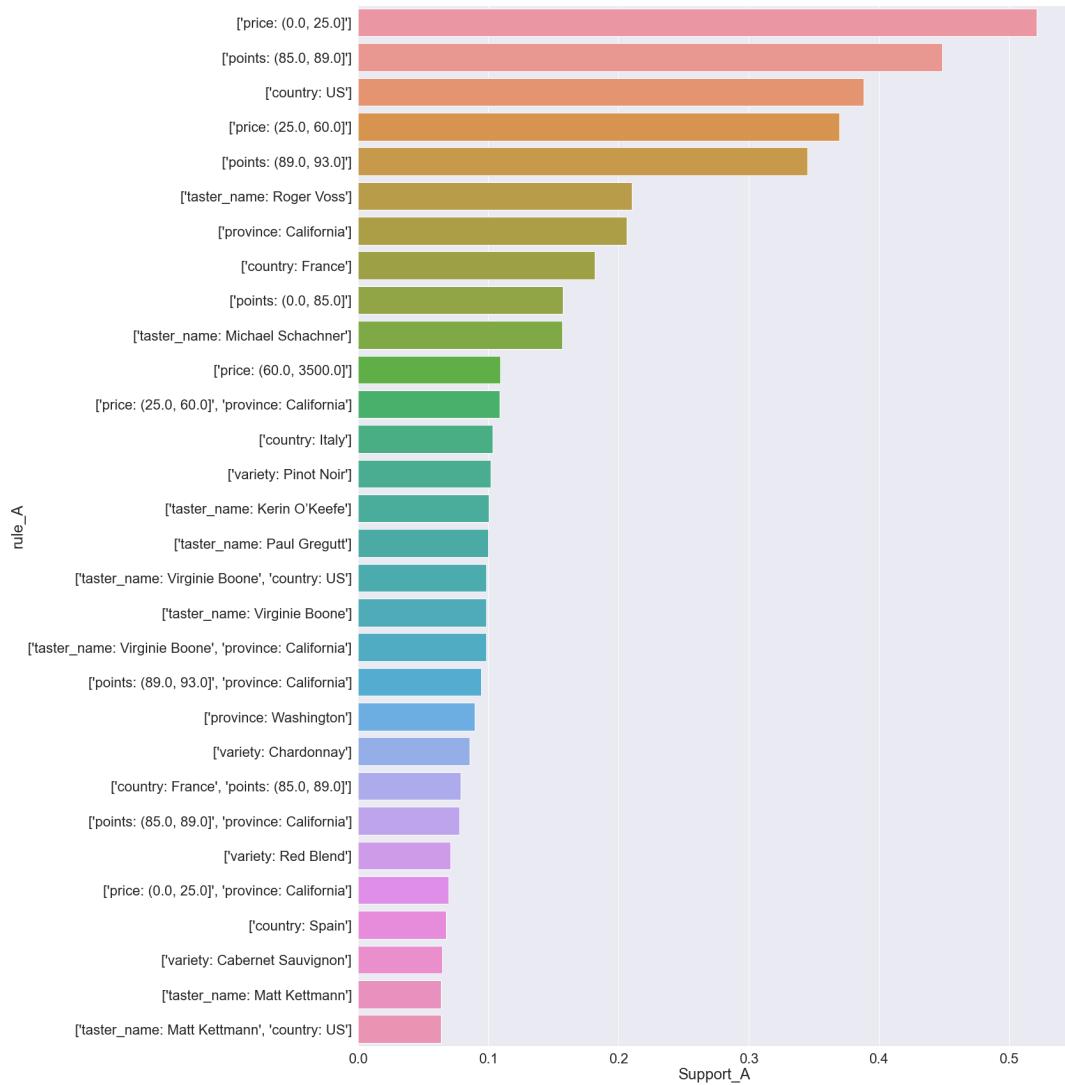
	rule_A	rule_B	rule	Support_A	Support_B	Support_AB	Confidence	Lift	K
0	['taster_name: Anne Krebiehl\xa0MW']	['points: (89.0, 93.0)']	['taster_name: Anne Krebiehl\xxa0MW']->['point...']	0.034306	0.344916	0.018694	0.544914	1.579846	0
1	['province: Veneto']	['taster_name: Kerin O'Keefe']	['province: Veneto']->['taster_name: Kerin O'...']	0.010774	0.100663	0.010344	0.960042	9.537210	0
2	['province: Loire Valley']	['price: (0.0, 25.0)']	['province: Loire Valley']->['price: (0.0, 25...']	0.016235	0.521101	0.010446	0.643405	1.234703	0
3	['province: Loire Valley']	['taster_name: Roger Voss']	['province: Loire Valley']->['taster_name: Ro...']	0.016235	0.210083	0.016235	1.000000	4.760017	0
4	['province: Loire Valley']	['country: France']	['province: Loire Valley']->['country: France']	0.016235	0.181737	0.016235	1.000000	5.502462	0
...	...	...	...	...	...	...	...	...	..
787	['country: France', 'points: (85.0, 89.0)', 'p...']	['taster_name: Roger Voss', 'variety: Bordeaux...']	['country: France', 'points: (85.0, 89.0)', 'p...']	0.019623	0.020608	0.011137	0.567552	27.539843	0
788	['country: France', 'price: (0.0, 25.0)', 'var...']	['points: (85.0, 89.0)', 'taster_name: Roger V...']	['country: France', 'price: (0.0, 25.0)', 'var...']	0.020710	0.019566	0.011137	0.537746	27.483593	0
789	['country: France', 'points: (85.0, 89.0)', 'v...']	['province: Bordeaux', 'taster_name: Roger Vos...']	['country: France', 'points: (85.0, 89.0)', 'v...']	0.015589	0.027089	0.011137	0.714390	26.372059	0
790	['points: (85.0, 89.0)', 'province: Bordeaux']	['country: France', 'taster_name: Roger Voss', ...]	['points: (85.0, 89.0)', 'province: Bordeaux']...	0.019623	0.020608	0.011137	0.567552	27.539843	0
791	['points: (85.0, 89.0)', 'variety: Bordeaux-st...']	['province: Bordeaux', 'country: France', 'tas...']	['points: (85.0, 89.0)', 'variety: Bordeaux-st...']	0.021401	0.027089	0.011137	0.520381	19.210139	0

792 rows × 10 columns

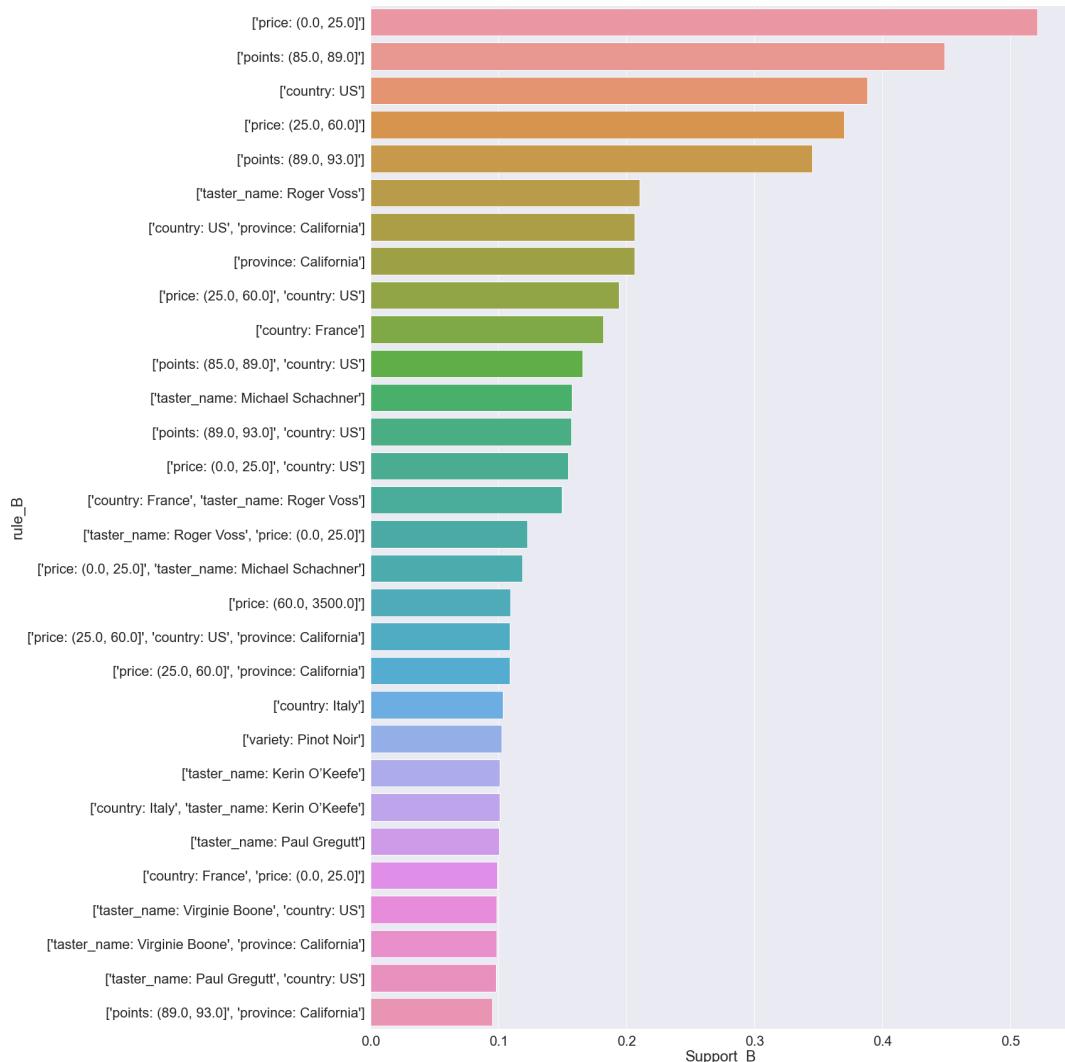
```
def drawBarPlot(df, columns, column_x, column_y, sortedby, nums=30, fig_size=(20, 30), ascending=False):
    plt.figure(figsize=fig_size)
    sns.set_theme(font_scale=2, palette=sns.color_palette('Oranges_r'))
    filt_df = df[columns].drop_duplicates()
    sorted_df = filt_df.sort_values(sortedby, inplace=False, ascending=ascending)[: nums]
    sns.barplot(x=column_x, y=column_y, data=sorted_df)
    plt.show()

def drawBarPlotMulti(df, columns, columns_x, column_y, sortedby, nums=30, fig_size=(20, 30), ascending=False):
    plt.figure(figsize=fig_size)
    sns.set_theme(font_scale=2, palette=sns.color_palette('Oranges_r'))
    filt_df = df[columns].drop_duplicates()
    sorted_df = filt_df.sort_values(sortedby, inplace=False, ascending=ascending)[: nums]
    trans_df = pd.melt(sorted_df, id_vars=column_y, var_name='metrics', value_name='values')
    sns.barplot(x='values', y=column_y, hue='metrics', data=trans_df)
    plt.show()
```

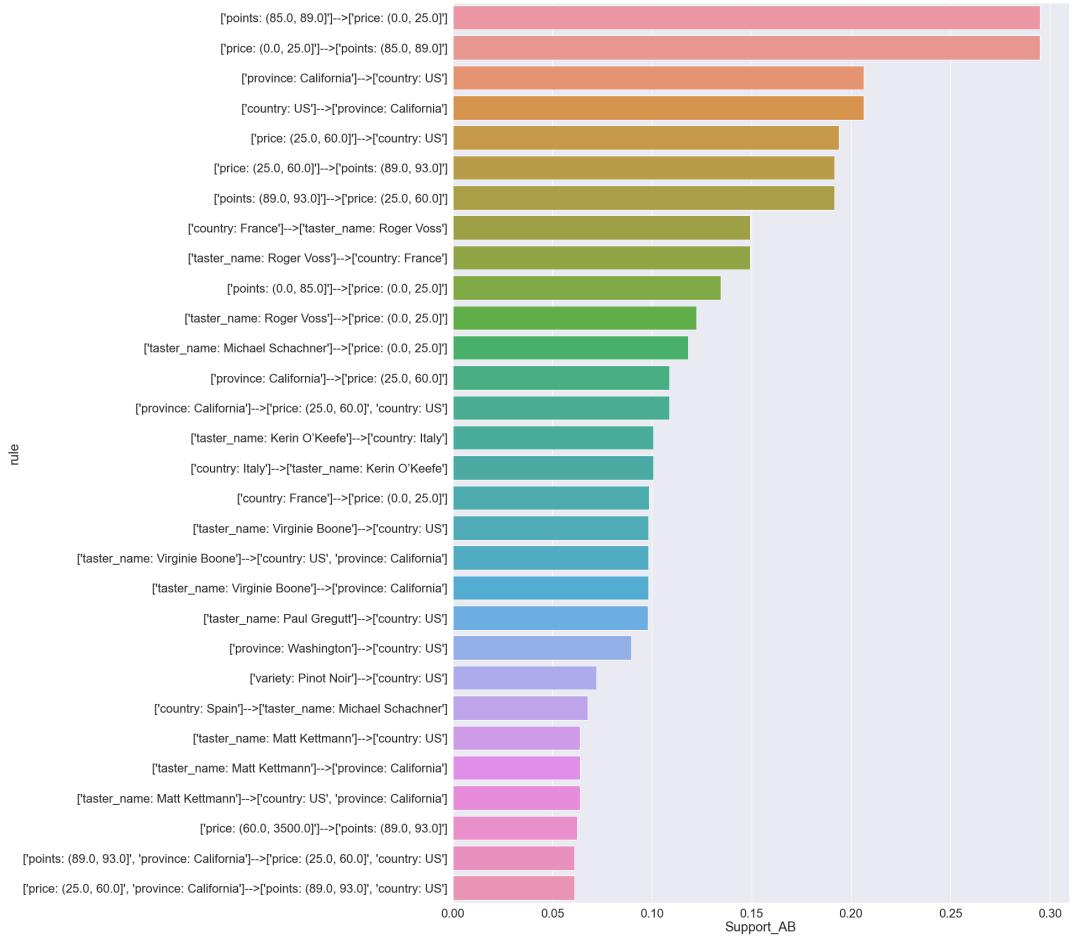
```
drawBarPlot(itemSet, ['rule_A', 'Support_A'], 'Support_A', 'rule_A', 'Support_A')
```



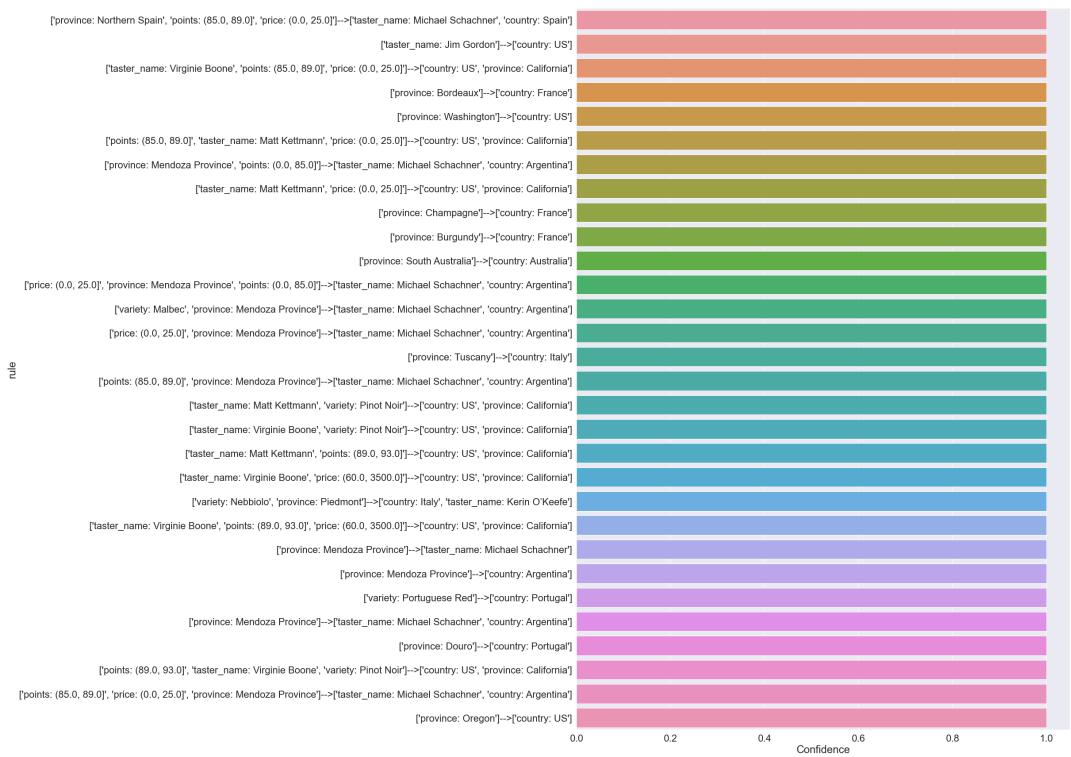
```
drawBarPlot(itemSet, ['rule_B', 'support_B'], 'Support_B', 'rule_B', 'support_B')
```



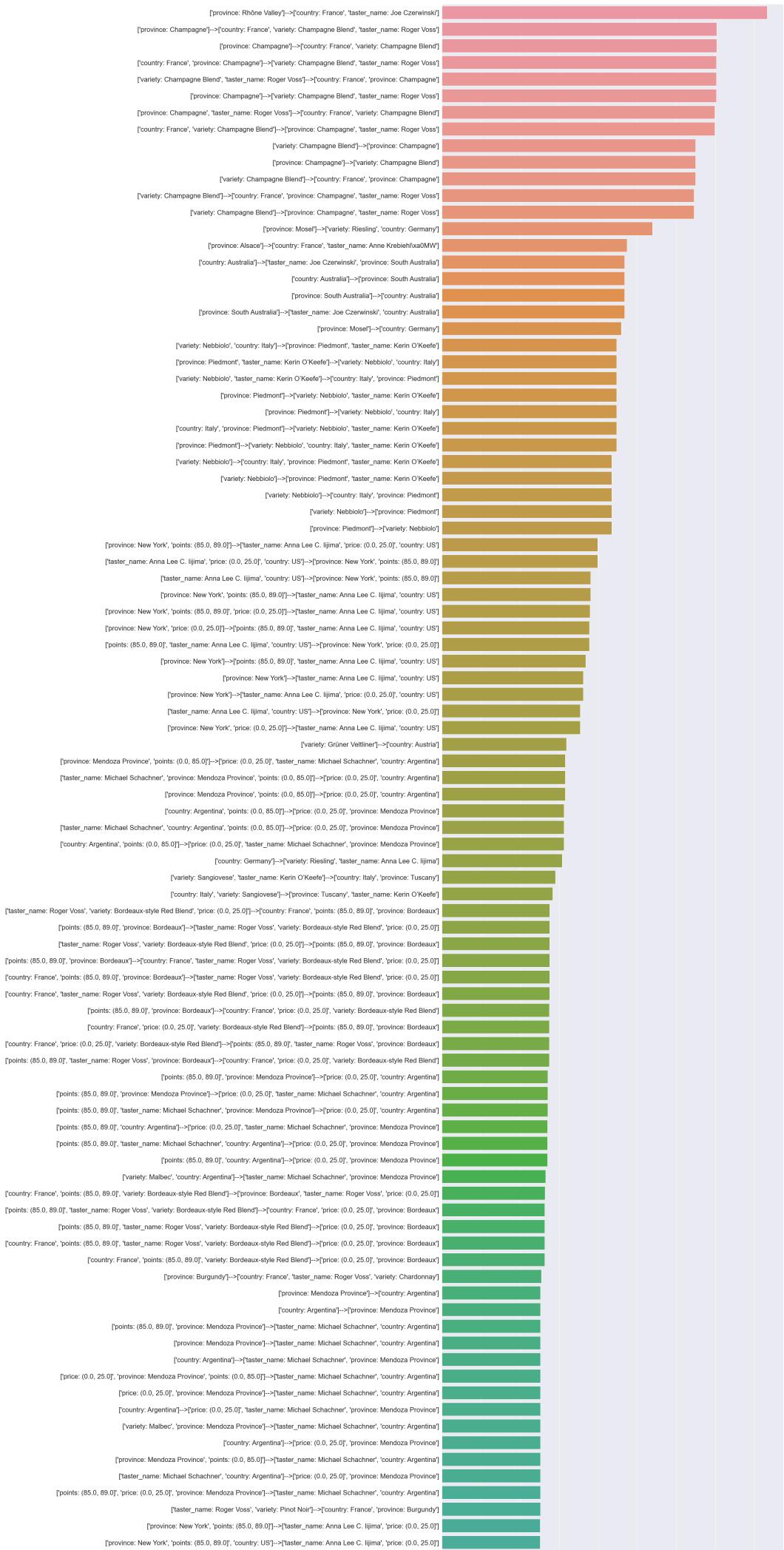
```
drawBarPlot(itemSet, ['rule', 'Support_AB'], 'Support_AB', 'rule', 'Support_AB')
```

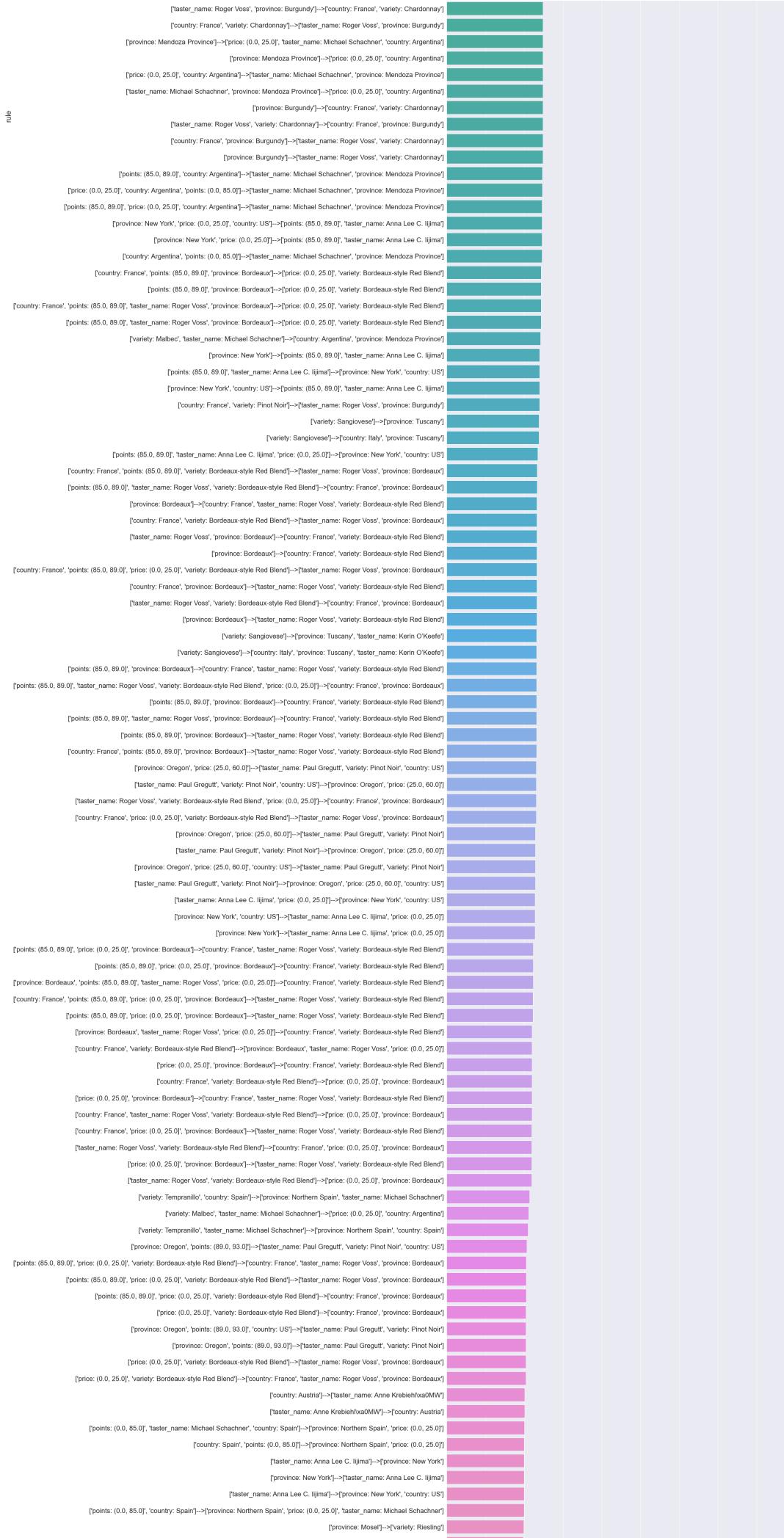


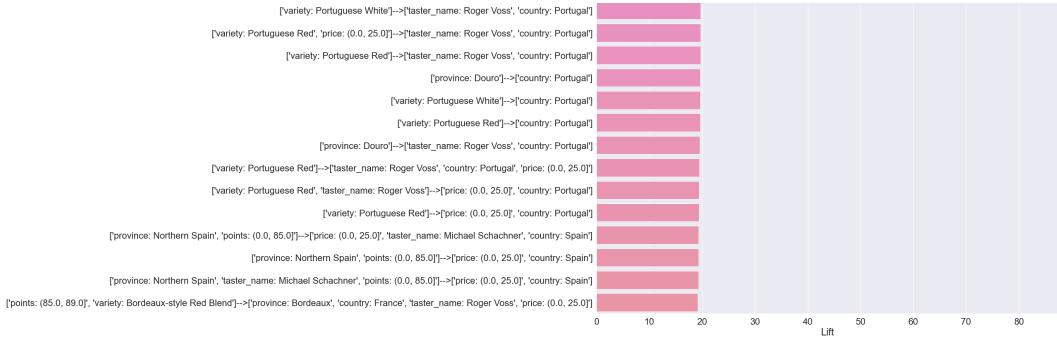
```
drawBarPlot(itemSet, ['rule', 'Confidence'], 'Confidence', 'rule', 'Confidence')
```



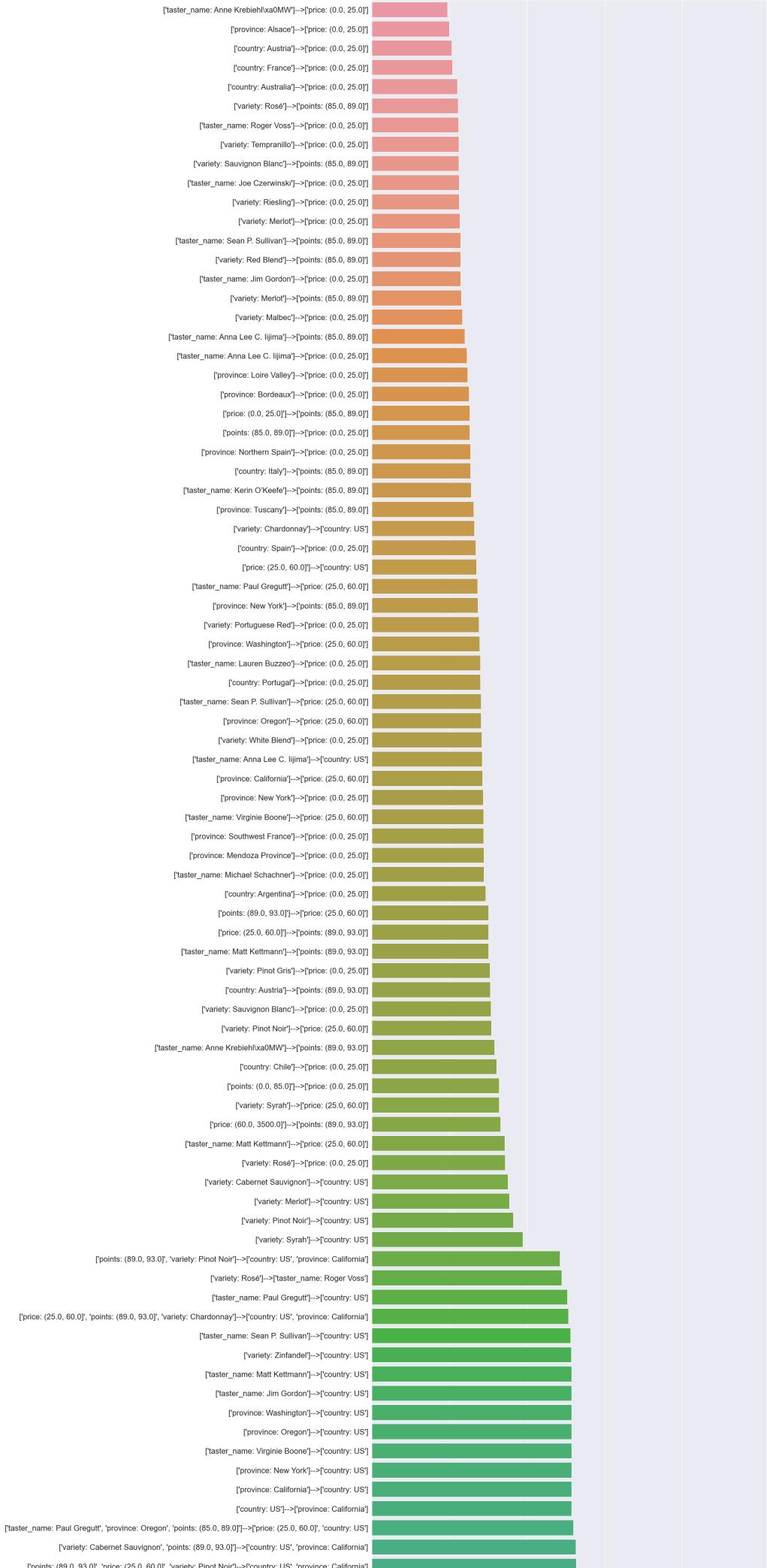
```
drawBarPlot(itemSet, ['rule', 'Lift'], 'Lift', 'rule', 'Lift', nums=200, fig_size=(20, 200))
```

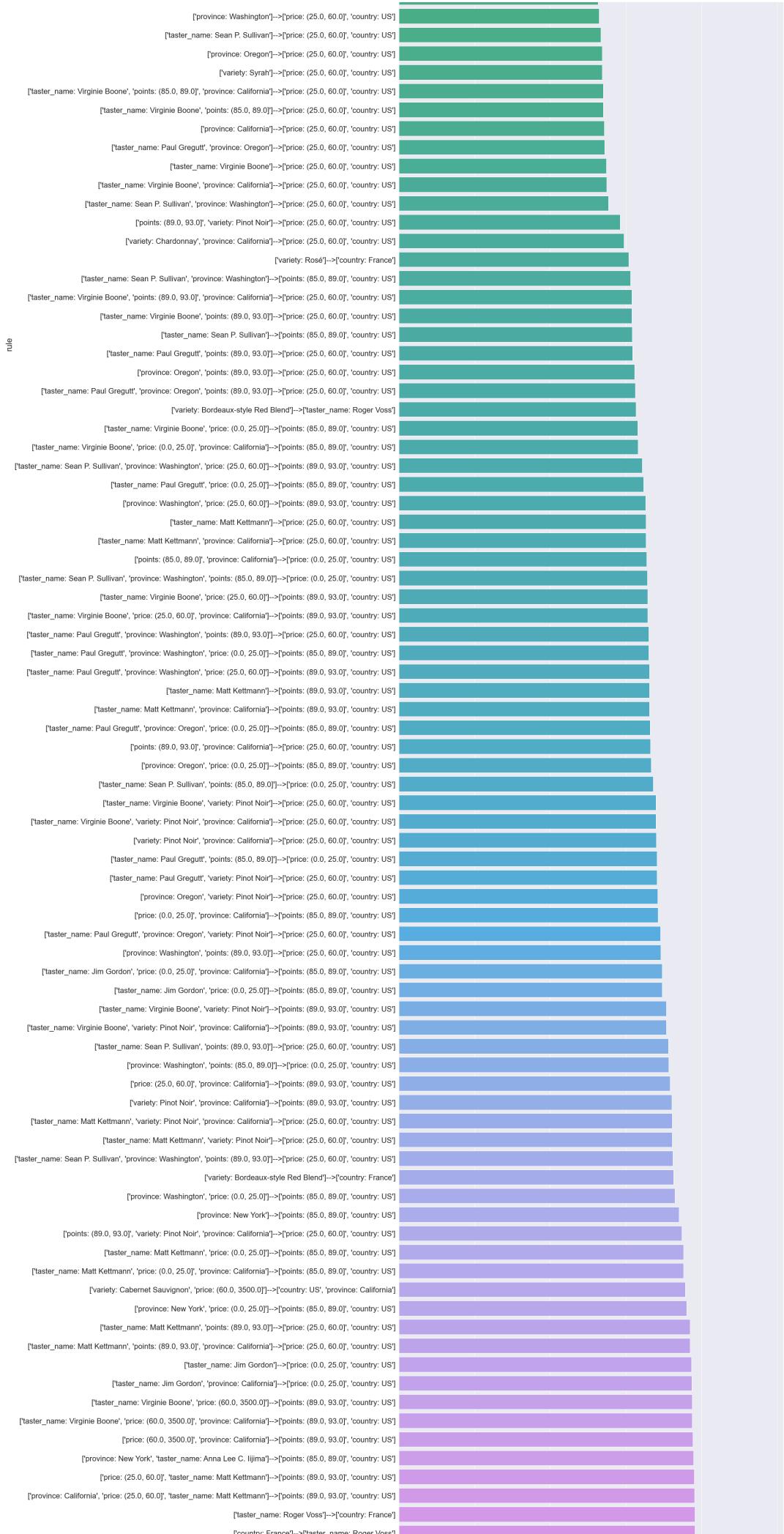


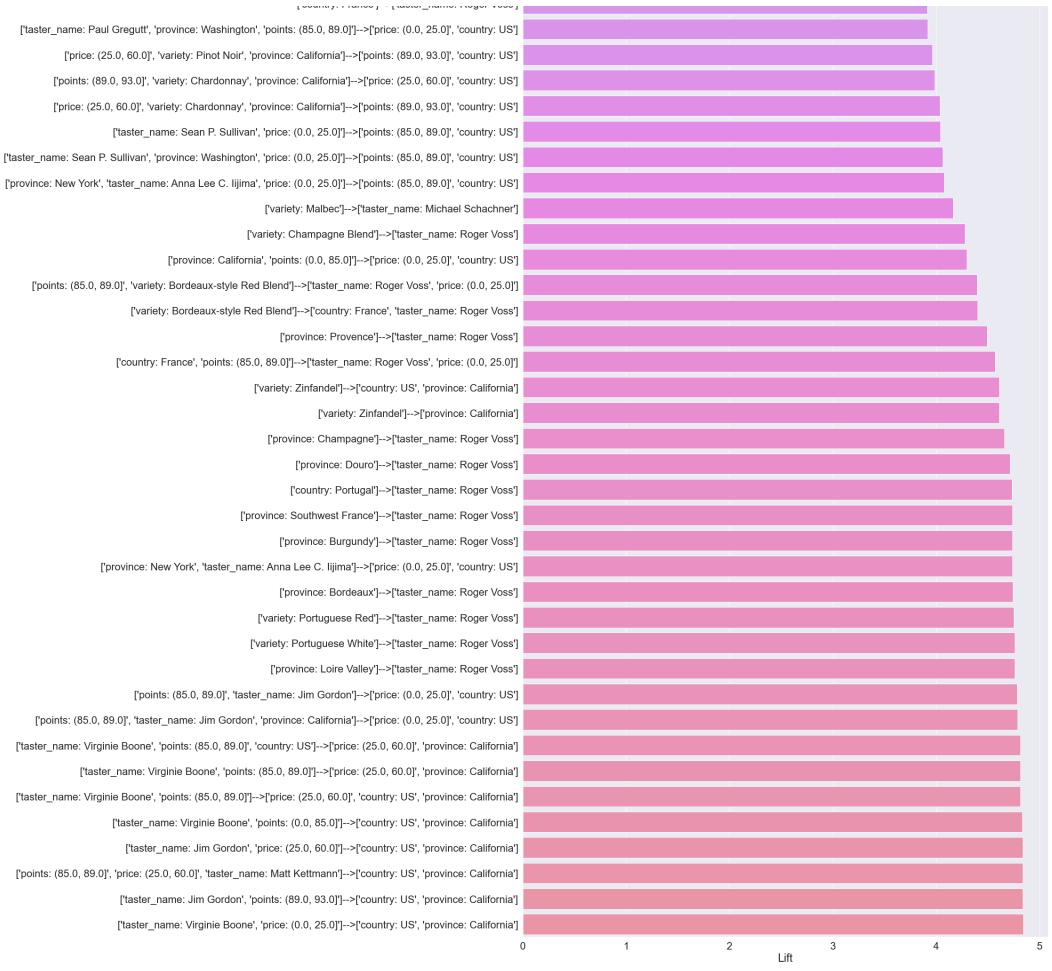




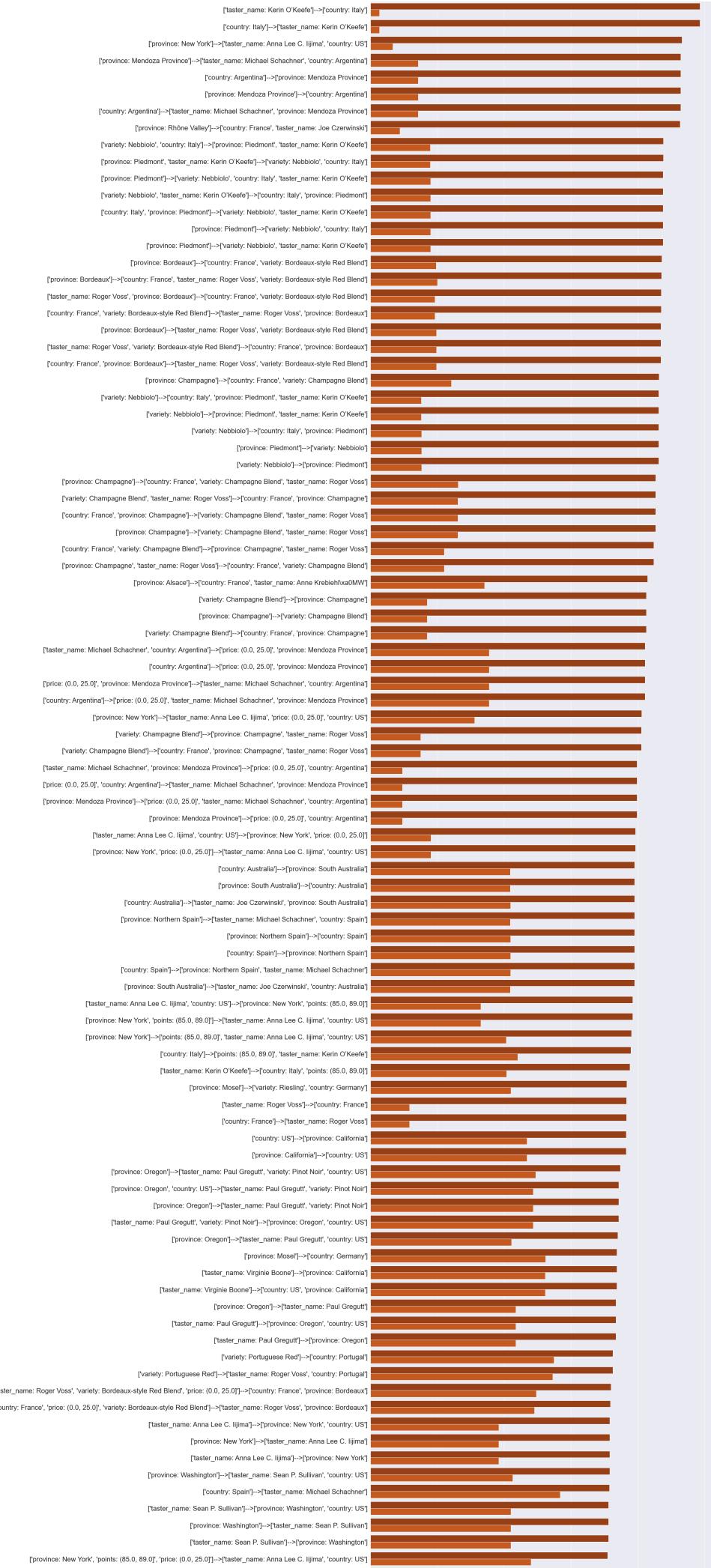
```
drawBarPlot(itemSet, ['rule', 'Lift'], 'Lift', 'rule', 'Lift', nums=200, fig_size=(20, 200), ascending=True)
```

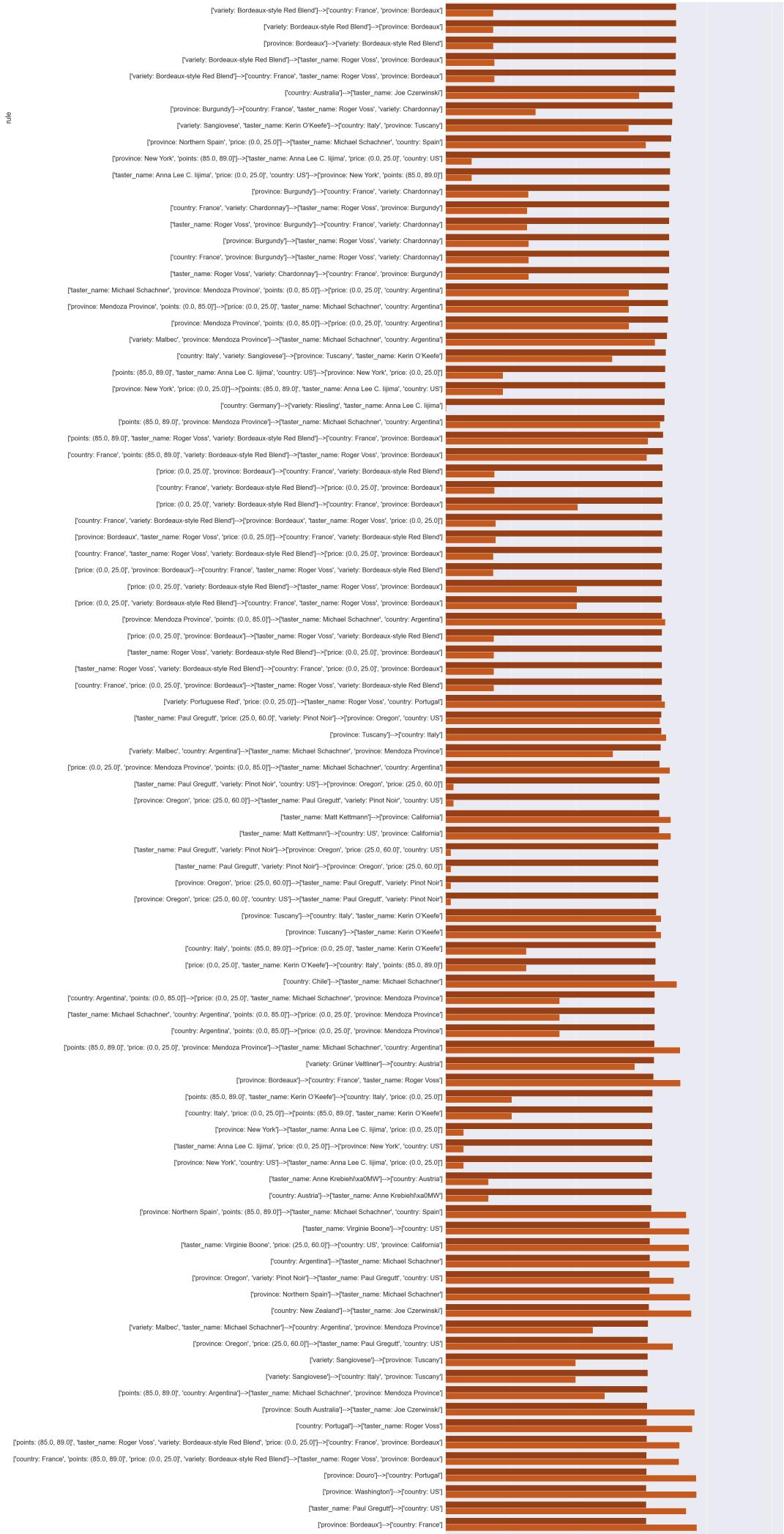


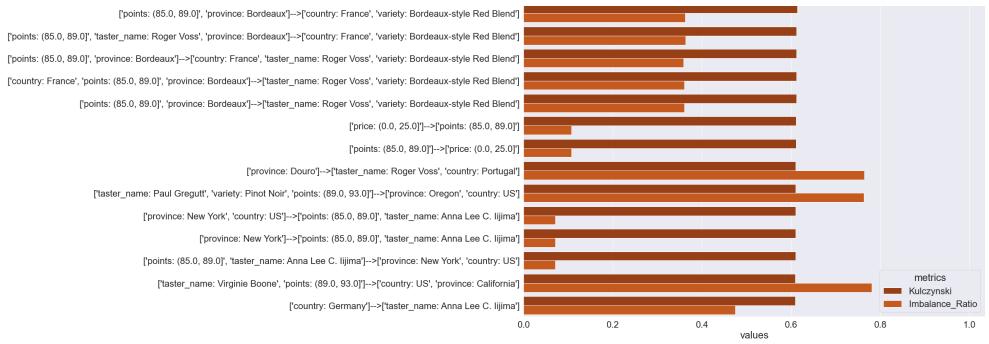




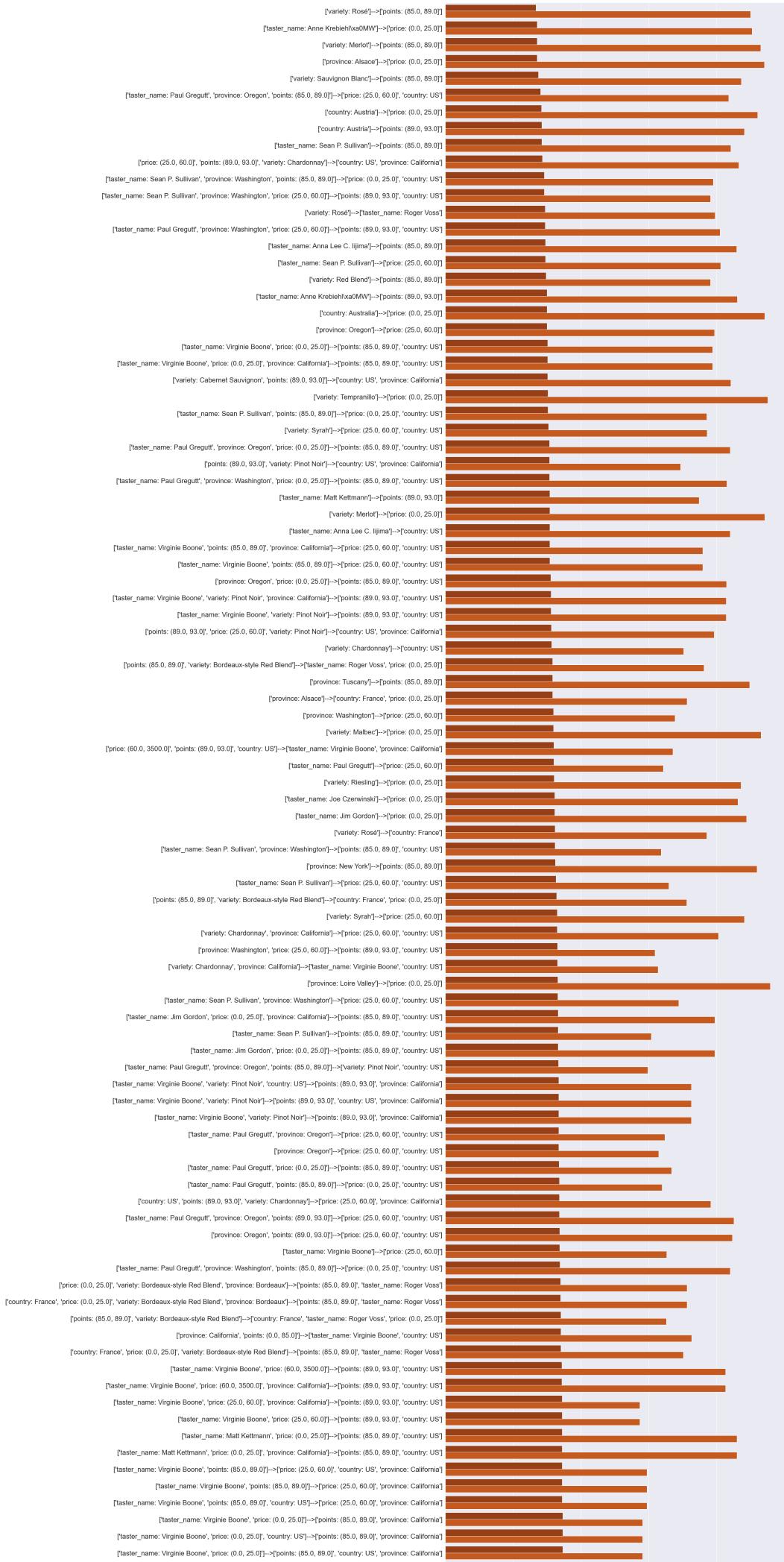
```
drawBarPlotMulti(itemSet, ['rule', 'kulczynski', 'Imbalance_Ratio'], ['kulczynski', 'Imbalance_Ratio'],
    'rule', 'kulczynski', nums=200, fig_size=(20, 200))
```

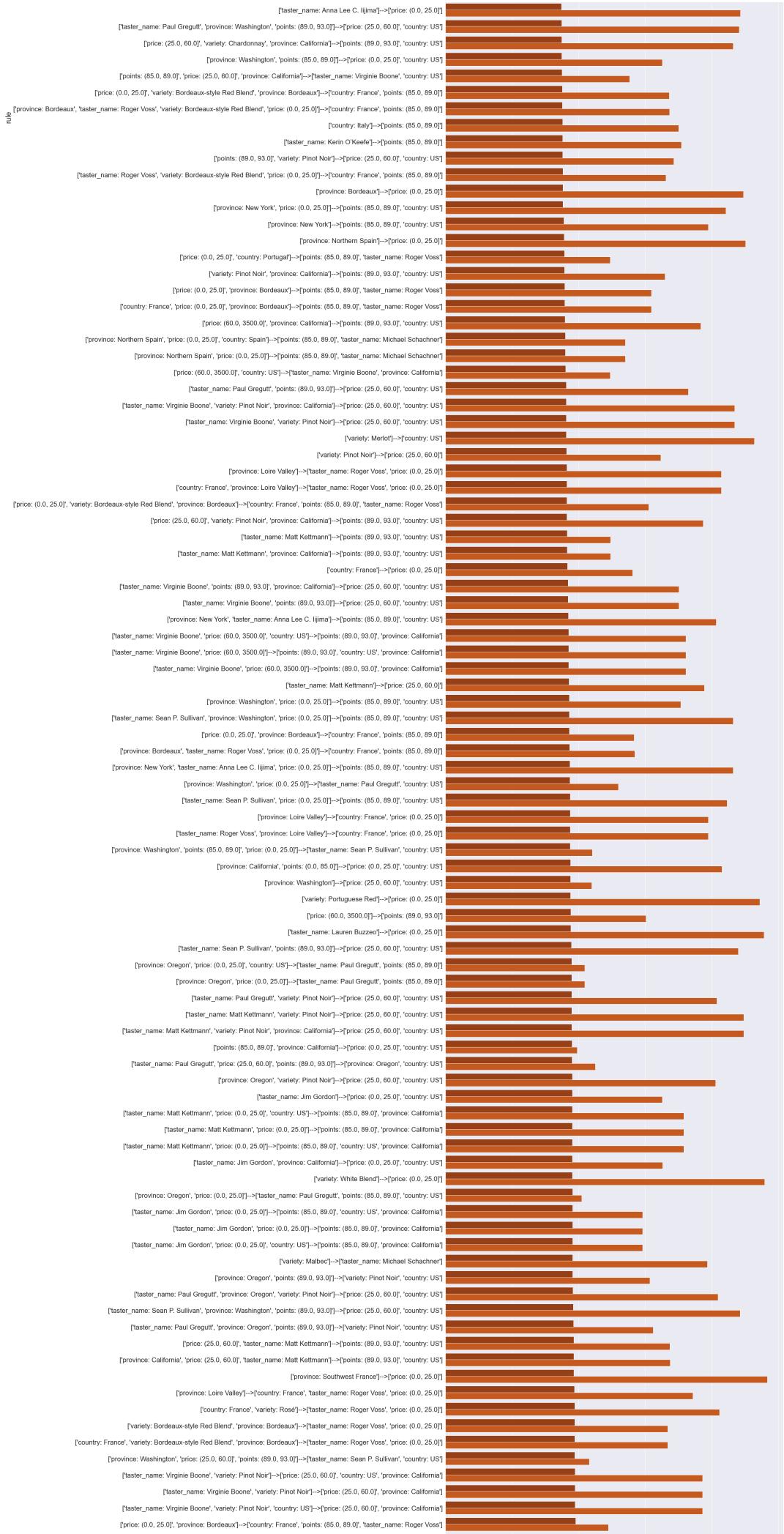


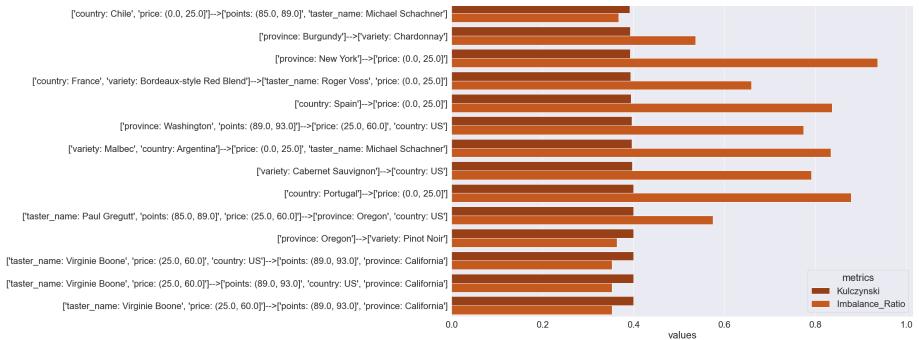




```
drawBarPlotMulti(itemSet, ['rule', 'Kulczynski', 'Imbalance_Ratio'], ['Kulczynski', 'Imbalance_Ratio'],
'rule', 'Kulczynski', nums=200, fig_size=(20, 200), ascending=True)
```







根据Lift和Kulczynski的（前200个关联规则）可视化结果，可以得到如下结论：

- 1、某些国家和省份字段的关联规则值较高，说明该国家的某个省份盛产葡萄酒
- 2、某些国家、省份和品鉴师字段的关联规则值较高，说明品鉴师喜欢品鉴某个国家和省份的葡萄酒，甚至可以推断该品鉴师所在的国家和省份
- 3、某些国家、省份和品种字段的关联规则值较高，说明国家、省份盛产的葡萄酒品种
- 4、某些品鉴师、品种字段的关联规则值较高，说明该品鉴师经常品鉴某个品种的葡萄酒
- 5、某些国家、省份和价格字段的关联规则值较高，说明该省份葡萄酒的大部分价位
- 6、某些品鉴师、国家、省份、价格和评分的关联规则值较高，说明该品鉴师对该国该省的某个价位的葡萄酒的满意度

观察后200个关联规则的可视化结果，可以得到如下结论：

- 1、某些品种和分数字段的关联规则值较小，说明了某些品种的分数分布情况
- 2、某些品鉴师和价格字段的关联规则值较小，说明了该品鉴师的价格喜好
- 3、某些品鉴师和分数字段的关联规则值较小，说明了该品鉴师的打分喜好
- 4、某些国家、省份和价格字段的关联规则值较小，说明了该国家生产葡萄酒的地位