Started 'Python 3.9.7 64-bit' kernel
Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)]
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IPython 7.28.0 -- An enhanced Interactive Python. Type '?' for help.

In [ ]:

```
import numpy as np
import pandas as pd
from mlxtend.frequent_patterns import apriori, association_rules

#Datayı oku
data = pd.read_excel("./Online_Retail.xlsx")
print(data.head())

#Datanın sütunları
print(data.columns)
#Datadaki ülkeler
print(data.Country.unique())

#Data üzerinde temizlik işlmeleri
# Description(Ürün Adı) kısmındaki boşluklar fazladan boşluklar çıkartılıyor
data['Description'] = data['Description'].str.strip()

# fatura no olmayan veriler siliniyor
data.dropna(axis = 0, subset =['InvoiceNo'], inplace = True)
data['InvoiceNo'] = data['InvoiceNo'].astype('str')

# kredi ile yapılınan bütün işlemler siliniyor
data = data[~data['InvoiceNo'].str.contains('C')]


#Verileri işlem bölgesine göre sınıflandırma

def AddToBasket(CountryName):
    basket = (data[data['Country'] == CountryName]
                      .groupby(['InvoiceNo', 'Description'])['Quantity']
                      .sum().unstack().reset_index().fillna(0)
                      .set_index('InvoiceNo'))
    return basket

Transactions_France = AddToBasket("France")
Transactions_UK = AddToBasket("United Kingdom")
Transactions_Portugal = AddToBasket("Portugal")
Transactions_Sweden = AddToBasket("Sweden")

# Verileri ilgili kütüphanelere uygun hale getirmek için hot_enconde fonksiyonunu ta

def hot_enconde(x):
    if(x<=0):
        return 0
    if(x>= 1):
        return 1

#datasetleri encode etme

Transactions_Encoded = Transactions_France.applymap(hot_enconde)
Transactions_France = Transactions_Encoded

Transactions_Encoded = Transactions_UK.applymap(hot_enconde)
Transactions_UK = Transactions_Encoded

Transactions_Encoded = Transactions_Portugal.applymap(hot_enconde)
```

```
Transactions_Portugal = Transactions_Encoded

Transactions_Encoded = Transactions_Sweden.applymap(hot_enconde)
Transactions_Sweden = Transactions_Encoded

#Model oluşturma ve analiz etme
def ModelCreateAndAnalyze(Transactions):
    frequent_items = apriori(Transactions, min_support= 0.05, use_colnames=True)
    #Çıkarsanan kuralları bir dataframe içinde toplama
    rules = association_rules(frequent_items, metric="lift", min_threshold=1)
    rules = rules.sort_values(['confidence', 'lift'], ascending = [False, False])
    print(rules.head())

print("France")
ModelCreateAndAnalyze(Transactions_France)
print("UK")
ModelCreateAndAnalyze(Transactions_UK)
print("Portugal")
ModelCreateAndAnalyze(Transactions_Portugal)
print("Sweden")
ModelCreateAndAnalyze(Transactions_Sweden)
```

```
  InvoiceNo StockCode                          Description  Quantity  \
0    536365    85123A   WHITE HANGING HEART T-LIGHT HOLDER         6
1    536365     71053                  WHITE METAL LANTERN         6
2    536365    84406B       CREAM CUPID HEARTS COAT HANGER         8
3    536365    84029G  KNITTED UNION FLAG HOT WATER BOTTLE         6
4    536365    84029E       RED WOOLLY HOTTIE WHITE HEART.         6

          InvoiceDate  UnitPrice  CustomerID         Country
0 2010-12-01 08:26:00       2.55     17850.0  United Kingdom
1 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
2 2010-12-01 08:26:00       2.75     17850.0  United Kingdom
3 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
4 2010-12-01 08:26:00       3.39     17850.0  United Kingdom
Index(['InvoiceNo', 'StockCode', 'Description', 'Quantity', 'InvoiceDate',
       'UnitPrice', 'CustomerID', 'Country'],
      dtype='object')
['United Kingdom' 'France' 'Australia' 'Netherlands' 'Germany' 'Norway'
 'EIRE' 'Switzerland' 'Spain' 'Poland' 'Portugal' 'Italy' 'Belgium'
 'Lithuania' 'Japan' 'Iceland' 'Channel Islands' 'Denmark' 'Cyprus'
 'Sweden' 'Austria' 'Israel' 'Finland' 'Bahrain' 'Greece' 'Hong Kong'
 'Singapore' 'Lebanon' 'United Arab Emirates' 'Saudi Arabia'
 'Czech Republic' 'Canada' 'Unspecified' 'Brazil' 'USA'
 'European Community' 'Malta' 'RSA']
France
                                        antecedents  \
44                        (JUMBO BAG WOODLAND ANIMALS)
258  (RED TOADSTOOL LED NIGHT LIGHT, PLASTERS IN TI...
270  (RED TOADSTOOL LED NIGHT LIGHT, PLASTERS IN TI...
300  (SET/6 RED SPOTTY PAPER CUPS, SET/20 RED RETRO...
302  (SET/20 RED RETROSPOT PAPER NAPKINS, SET/6 RED...

                       consequents  antecedent support  consequent support  \
44                        (POSTAGE)            0.076531            0.765306
258                       (POSTAGE)            0.051020            0.765306
270                       (POSTAGE)            0.053571            0.765306
300  (SET/6 RED SPOTTY PAPER PLATES)            0.102041            0.127551
302    (SET/6 RED SPOTTY PAPER CUPS)            0.102041            0.137755

      support  confidence      lift  leverage  conviction
44   0.076531       1.000  1.306667  0.017961         inf
258  0.051020       1.000  1.306667  0.011974         inf
270  0.053571       1.000  1.306667  0.012573         inf
```

```
300  0.099490       0.975  7.644000  0.086474   34.897959
302  0.099490       0.975  7.077778  0.085433   34.489796
UK
Empty DataFrame
Columns: [antecedents, consequents, antecedent support, consequent support, support,
confidence, lift, leverage, conviction]
Index: []
Portugal
                              antecedents                          consequents  \
1170     (SET 12 COLOUR PENCILS SPACEBOY)  (SET 12 COLOUR PENCILS DOLLY GIRL)
1171   (SET 12 COLOUR PENCILS DOLLY GIRL)    (SET 12 COLOUR PENCILS SPACEBOY)
1172   (SET OF 4 KNICK KNACK TINS LONDON)  (SET 12 COLOUR PENCILS DOLLY GIRL)
1173   (SET 12 COLOUR PENCILS DOLLY GIRL)  (SET OF 4 KNICK KNACK TINS LONDON)
1174  (SET OF 4 KNICK KNACK TINS POPPIES)  (SET 12 COLOUR PENCILS DOLLY GIRL)

      antecedent support  consequent support   support  confidence       lift  \
1170            0.051724            0.051724  0.051724         1.0  19.333333
1171            0.051724            0.051724  0.051724         1.0  19.333333
1172            0.051724            0.051724  0.051724         1.0  19.333333
1173            0.051724            0.051724  0.051724         1.0  19.333333
1174            0.051724            0.051724  0.051724         1.0  19.333333

      leverage  conviction
1170  0.049049         inf
1171  0.049049         inf
1172  0.049049         inf
1173  0.049049         inf
1174  0.049049         inf
Sweden
                        antecedents                        consequents  \
0     (12 PENCILS SMALL TUBE SKULL)      (PACK OF 72 SKULL CAKE CASES)
1     (PACK OF 72 SKULL CAKE CASES)      (12 PENCILS SMALL TUBE SKULL)
4           (36 DOILIES DOLLY GIRL)     (ASSORTED BOTTLE TOP  MAGNETS)
5    (ASSORTED BOTTLE TOP  MAGNETS)            (36 DOILIES DOLLY GIRL)
180  (CHILDRENS CUTLERY DOLLY GIRL)  (CHILDRENS CUTLERY CIRCUS PARADE)

     antecedent support  consequent support   support  confidence  lift  \
0              0.055556            0.055556  0.055556         1.0  18.0
1              0.055556            0.055556  0.055556         1.0  18.0
4              0.055556            0.055556  0.055556         1.0  18.0
5              0.055556            0.055556  0.055556         1.0  18.0
180            0.055556            0.055556  0.055556         1.0  18.0

     leverage  conviction
0    0.052469         inf
1    0.052469         inf
4    0.052469         inf
5    0.052469         inf
180  0.052469         inf
```