Chapter 13: Demo Apriori

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In [1]:
          #!pip install mlxtend
In [2]:
          import pandas as pd
          from mlxtend.preprocessing import TransactionEncoder
          from mlxtend.frequent patterns import apriori
          # sử dụng list để lưu danh sách các mục
In [3]:
          dataset = [['Eggs', 'Milk', 'Onion', 'Nutmeg', 'Kidney Beans', 'Yogurt'],
                       ['Dill', 'Onion', 'Nutmeg', 'Eggs', 'Yogurt'], ['Milk', 'Apple', 'Kidney Beans', 'Eggs'],
                       ['Milk', 'Unicorn', 'Corn', 'Kidney Beans', 'Yogurt'],
                       ['Corn', 'Onion', 'Kidney Beans', 'Ice cream', 'Eggs'],
                       ['Orange', 'Corn', 'Eggs', 'Yogurt'],
                       ['Milk', 'Apple', 'Orange', 'Eggs'],
['Corn', 'Coke', 'Kidney Beans', 'Ice cream'],
                       ['Dill', 'Onion', 'Nutmeg'],
                       ['Coke', 'Apple', 'Ice cream']
          te = TransactionEncoder()
In [4]:
          te ary = te.fit(dataset).transform(dataset)
          df = pd.DataFrame(te ary, columns=te.columns )
          df
Out[4]:
                                                   Ice
                                                       Kidney
                     Coke
                            Corn
                                                                               Onion Orange Unicorn Yog
              Apple
                                    Dill Eggs
                                                                      Nutmeg
                                                        Beans
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In [5]:
        df.isnull().any()
Out[5]: Apple
                          False
         Coke
                          False
         Corn
                          False
         Dill
                          False
         Eggs
                          False
         Ice cream
                          False
         Kidney Beans
                          False
        Milk
                          False
        Nutmeg
                          False
                          False
         Onion
         Orange
                          False
                          False
        Unicorn
         Yogurt
                          False
         dtype: bool
In [6]: frequent_itemsets = apriori(df, min_support=0.3, use_colnames=True) # dat nguong
         print (frequent_itemsets)
             support
                                   itemsets
                 0.3
         0
                                    (Apple)
        1
                 0.4
                                      (Corn)
         2
                 0.6
                                      (Eggs)
         3
                 0.3
                                (Ice cream)
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                 0.5
                             (Kidney Beans)
         5
                                      (Milk)
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                                   (Nutmeg)
         7
                 0.4
                                    (Onion)
         8
                 0.4
                                   (Yogurt)
                 0.3
         9
                      (Corn, Kidney Beans)
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0.3

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0.3

(Eggs, Kidney Beans)

(Kidney Beans, Milk)

(Eggs, Milk)

(Eggs, Onion)

(Eggs, Yogurt)

(Nutmeg, Onion)

In [7]: from mlxtend.frequent_patterns import association_rules
 association_rules(frequent_itemsets, metric="confidence", min_threshold=0.3)

Out[7]:

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	convi
(Corn)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.50	0.10	
(Kidney Beans)	(Corn)	0.5	0.4	0.3	0.60	1.50	0.10	
(Eggs)	(Kidney Beans)	0.6	0.5	0.3	0.50	1.00	0.00	
(Kidney Beans)	(Eggs)	0.5	0.6	0.3	0.60	1.00	0.00	
(Eggs)	(Milk)	0.6	0.4	0.3	0.50	1.25	0.06	
(Milk)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
(Eggs)	(Onion)	0.6	0.4	0.3	0.50	1.25	0.06	
(Onion)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
(Eggs)	(Yogurt)	0.6	0.4	0.3	0.50	1.25	0.06	
(Yogurt)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
(Kidney Beans)	(Milk)	0.5	0.4	0.3	0.60	1.50	0.10	
(Milk)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.50	0.10	
(Nutmeg)	(Onion)	0.3	0.4	0.3	1.00	2.50	0.18	
(Onion)	(Nutmeg)	0.4	0.3	0.3	0.75	2.50	0.18	
	(Corn) (Kidney Beans) (Eggs) (Kidney Beans) (Eggs) (Milk) (Eggs) (Onion) (Eggs) (Yogurt) (Kidney Beans) (Milk) (Kidney Beans)	(Corn) (Kidney Beans) (Kidney Beans) (Corn) (Eggs) (Kidney Beans) (Kidney Beans) (Eggs) (Milk) (Milk) (Eggs) (Eggs) (Onion) (Onion) (Eggs) (Eggs) (Yogurt) (Yogurt) (Eggs) (Kidney Beans) (Kidney Beans) (Kidney Beans) (Milk) (Kidney Beans) (Nutmeg) (Onion)	antecedents consequents support (Corn) (Kidney Beans) 0.4 (Kidney Beans) (Corn) 0.5 (Eggs) (Kidney Beans) 0.6 (Kidney Beans) (Eggs) 0.5 (Eggs) (Milk) 0.6 (Milk) (Eggs) 0.4 (Eggs) (Onion) 0.6 (Onion) (Eggs) 0.4 (Eggs) (Yogurt) 0.6 (Yogurt) (Eggs) 0.4 (Kidney Beans) (Milk) 0.5 (Milk) (Kidney Beans) 0.4 (Nutmeg) (Onion) 0.3	Antecedents Consequents support support (Corn) (Kidney Beans) 0.4 0.5 (Kidney Beans) (Corn) 0.5 0.4 (Eggs) (Kidney Beans) 0.6 0.5 (Kidney Beans) (Eggs) 0.5 0.6 (Eggs) (Milk) 0.6 0.4 (Milk) (Eggs) 0.4 0.6 (Eggs) (Onion) 0.6 0.4 (Onion) (Eggs) 0.4 0.6 (Eggs) (Yogurt) 0.6 0.4 (Yogurt) (Eggs) 0.4 0.6 (Kidney Beans) (Milk) 0.5 0.4 (Milk) (Kidney Beans) 0.4 0.5 (Nutmeg) (Onion) 0.3 0.4	antecedents consequents support support support (Corn) (Kidney Beans) 0.4 0.5 0.3 (Kidney Beans) 0.6 0.5 0.3 (Kidney Beans) 0.6 0.5 0.3 (Kidney Beans) (Eggs) 0.5 0.6 0.3 (Eggs) (Milk) 0.6 0.4 0.3 (Milk) (Eggs) 0.4 0.6 0.3 (Eggs) (Onion) 0.6 0.4 0.3 (Onion) (Eggs) 0.4 0.6 0.3 (Eggs) (Yogurt) 0.6 0.4 0.3 (Yogurt) (Eggs) 0.4 0.6 0.3 (Kidney Beans) (Milk) 0.5 0.4 0.3 (Milk) (Kidney Beans) 0.4 0.5 0.3 (Nutmeg) (Onion) 0.3 0.4 0.5 0.3	antecedents consequents support support support confidence (Corn) (Kidney Beans) 0.4 0.5 0.3 0.75 (Kidney Beans) (Corn) 0.5 0.4 0.3 0.60 (Eggs) (Kidney Beans) 0.6 0.5 0.3 0.50 (Kidney Beans) (Eggs) 0.5 0.6 0.3 0.60 (Eggs) (Milk) 0.6 0.4 0.3 0.50 (Milk) (Eggs) 0.4 0.6 0.3 0.75 (Eggs) (Onion) 0.6 0.4 0.3 0.50 (Eggs) (Onion) 0.6 0.4 0.3 0.75 (Eggs) (Yogurt) 0.6 0.4 0.3 0.75 (Eggs) (Yogurt) 0.6 0.4 0.3 0.75 (Kidney Beans) 0.4 0.6 0.3 0.75 (Nutmeg) (Onion) 0.3 0.4 0.5 0.3 0.75	amecedents consequents support support support confidence line (Corn) (Kidney Beans) 0.4 0.5 0.3 0.75 1.50 (Kidney Beans) (Corn) 0.5 0.4 0.3 0.60 1.50 (Kidney Beans) (Eggs) 0.6 0.5 0.3 0.50 1.00 (Kidney Beans) (Eggs) 0.5 0.6 0.3 0.60 1.00 (Kidney Beans) (Milk) 0.6 0.4 0.3 0.50 1.25 (Milk) (Eggs) 0.4 0.6 0.3 0.50 1.25 (Eggs) (Onion) 0.6 0.4 0.3 0.50 1.25 (Onion) (Eggs) 0.4 0.6 0.3 0.75 1.25 (Eggs) (Yogurt) 0.6 0.4 0.3 0.50 1.25 (Yogurt) (Eggs) 0.4 0.6 0.3 0.75 1.25 (Kidney Beans) 0.4<	American (Corn) (Kidney Beans) (Corn) 0.4 (Kidney Beans) 0.4 (Kidney Beans) 0.5 (Corn) 0.5 (Midney Beans) 0.6 (Midney Beans) 0.7 (Midney Beans) 0.4 (Midney Bea

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In [8]: rules = association_rules(frequent_itemsets, metric="lift", min_threshold=1.4)
rules
```

Out[8]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	convicti
0	(Corn)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.5	0.10	1
1	(Kidney Beans)	(Corn)	0.5	0.4	0.3	0.60	1.5	0.10	
2	(Kidney Beans)	(Milk)	0.5	0.4	0.3	0.60	1.5	0.10	
3	(Milk)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.5	0.10	:
4	(Nutmeg)	(Onion)	0.3	0.4	0.3	1.00	2.5	0.18	
5	(Onion)	(Nutmeg)	0.4	0.3	0.3	0.75	2.5	0.18	:
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In [9]: | # print(rules.info())
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In [10]: # "Có Milk không? nó kết hợp với item nào?"
for row in rules.iterrows():
    if "Milk" in row[1][0]:
        print(row)
```

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(3, antecedents
                                   (Milk)
consequents
                       (Kidney Beans)
antecedent support
                                  0.4
consequent support
                                  0.5
support
                                  0.3
confidence
                                 0.75
lift
                                  1.5
leverage
                                  0.1
conviction
                                    2
Name: 3, dtype: object)
```

```
In [11]: support=rules['support'].values
    confidence=rules['confidence'].values
    lift = rules['lift'].values
```

```
In [12]: import matplotlib.pyplot as plt
import seaborn as sns
```

```
In [13]: sns.swarmplot(x = support, y= confidence, size=10)
    plt.xlabel('support')
    plt.ylabel('confidence')
    plt.show()
```

