Chapter 13: Demo Apriori

In [1]:

```
#!pip install mlxtend
```

In [2]:

```
import pandas as pd
from mlxtend.preprocessing import TransactionEncoder
from mlxtend.frequent_patterns import apriori
```

In [3]:

```
# sử dụng list để lưu danh sách các mục
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']
          ]
```

In [4]:

```
te = TransactionEncoder()
te_ary = te.fit(dataset).transform(dataset)
df = pd.DataFrame(te_ary, columns=te.columns_)
df
```

Out[4]:

	Apple	Coke	Corn	Dill	Eggs	Ice cream	Kidney Beans	Milk	Nutmeg	Onion	Orange	Unicorn	Yog
0	False	False	False	False	True	False	True	True	True	True	False	False	T
1	False	False	False	True	True	False	False	False	True	True	False	False	T
2	True	False	False	False	True	False	True	True	False	False	False	False	Fa
3	False	False	True	False	False	False	True	True	False	False	False	True	T
4	False	False	True	False	True	True	True	False	False	True	False	False	Fa
5	False	False	True	False	True	False	False	False	False	False	True	False	T
6	True	False	False	False	True	False	False	True	False	False	True	False	Fa
7	False	True	True	False	False	True	True	False	False	False	False	False	Fa
8	False	False	False	True	False	False	False	False	True	True	False	False	Fa
9	True	True	False	False	False	True	False	False	False	False	False	False	Fa

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
Onion           False
Orange          False
Unicorn         False
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       0.3              (Apple)
1       0.4               (Corn)
2       0.6               (Eggs)
3       0.3          (Ice cream)
4       0.5       (Kidney Beans)
5       0.4               (Milk)
6       0.3             (Nutmeg)
7       0.4              (Onion)
8       0.4             (Yogurt)
9       0.3 (Corn, Kidney Beans)
10      0.3 (Eggs, Kidney Beans)
11      0.3         (Eggs, Milk)
12      0.3        (Eggs, Onion)
13      0.3       (Eggs, Yogurt)
14      0.3 (Kidney Beans, Milk)
15      0.3      (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
0	(Corn)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.50	0.10	
1	(Kidney Beans)	(Corn)	0.5	0.4	0.3	0.60	1.50	0.10	
2	(Eggs)	(Kidney Beans)	0.6	0.5	0.3	0.50	1.00	0.00	
3	(Kidney Beans)	(Eggs)	0.5	0.6	0.3	0.60	1.00	0.00	
4	(Eggs)	(Milk)	0.6	0.4	0.3	0.50	1.25	0.06	
5	(Milk)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
6	(Eggs)	(Onion)	0.6	0.4	0.3	0.50	1.25	0.06	
7	(Onion)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
8	(Eggs)	(Yogurt)	0.6	0.4	0.3	0.50	1.25	0.06	
9	(Yogurt)	(Eggs)	0.4	0.6	0.3	0.75	1.25	0.06	
10	(Kidney Beans)	(Milk)	0.5	0.4	0.3	0.60	1.50	0.10	
11	(Milk)	(Kidney Beans)	0.4	0.5	0.3	0.75	1.50	0.10	
12	(Nutmeg)	(Onion)	0.3	0.4	0.3	1.00	2.50	0.18	
13	(Onion)	(Nutmeg)	0.4	0.3	0.3	0.75	2.50	0.18	

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	(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	

In [9]:

```
# print(rules.info())
```

In [10]:

```
# "Có Milk không? nó kết hợp với item nào?"
for row in rules.iterrows():
    if "Milk" in row[1][0]:
        print(row)
```

```
(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)
```

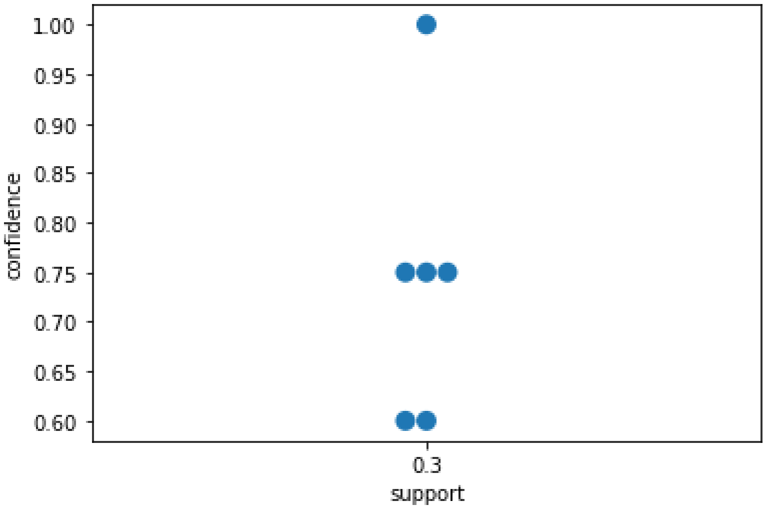
In [11]:

```
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()
```


confidence
support