```
import numpy as np # linear algebra
import pandas as pd
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should run async` will not call `transform
          and should run async(code)
      4
import csv
from mlxtend.preprocessing import TransactionEncoder
from mlxtend.frequent_patterns import apriori, association_rules
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
          and should run async(code)
!pip install mlxtend
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
          and should_run_async(code)
       Requirement already satisfied: mlxtend in /usr/local/lib/python3.10/dist-packages (0.22.0)
       Requirement already satisfied: scipy>=1.2.1 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (1.11.3)
       Requirement already satisfied: numpy>=1.16.2 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (1.23.5)
       Requirement already satisfied: pandas>=0.24.2 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (1.5.3)
       Requirement already satisfied: scikit-learn>=1.0.2 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (1.2.2)
       Requirement already satisfied: matplotlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (3.7.1)
       Requirement already satisfied: joblib>=0.13.2 in /usr/local/lib/python3.10/dist-packages (from mlxtend) (1.3.2)
       Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from mlxtend) (67.7.2)
       Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (1.1.1
       Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (0.12.1)
       Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (4.43
       Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (1.4.
       Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (23.2)
       Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (9.4.0)
       Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (3.1.1
       Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.0.0->mlxtend) (2
       Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=0.24.2->mlxtend) (2023.3.post1
       Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn>=1.0.2->mlxtend)
       Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib>=3.0.0->m
data = []
with open('/content/Market_Basket_Optimisation.csv') as file:
      reader = csv.reader(file, delimiter=',')
      for row in reader:
           data +=[row]
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
          and should run async(code)
      4
data[1:10]
       /usr/local/lib/python 3.10/dist-packages/ipykernel/ipkernel.py: 283: \ Deprecation Warning: `should_run_async` will not call `transform_lib/python and the state of the stat
          and should\_run\_async(code)
       [['burgers', 'meatballs', 'eggs'],
         ['chutney'],
['turkey', 'avocado'],
         ['mineral water', 'milk', 'energy bar', 'whole wheat rice', 'green tea'],
         ['low fat yogurt'],
         ['whole wheat pasta',
                                         'french fries'],
        ['soup', 'light cream', 'shallot'],
['frozen vegetables', 'spaghetti', 'green tea'],
         ['french fries']]
len(data)
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
          and should_run_async(code)
       7501
      4
te = TransactionEncoder()
x = te.fit_transform(data)
Х
       /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
          and should_run_async(code)
       array([[False, True, True, ..., True, False, False],
```

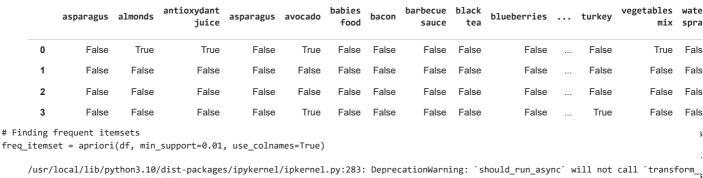
```
[False, False, False, ..., False, False, False], [False, False, True, False]]
```

```
te.columns_
```

```
'light cream',
'light mayo',
'low fat yogurt',
'magazines',
'mashed potato',
'mayonnaise',
'meatballs',
'melons',
'milk',
'mineral water',
'mint',
'mint green tea',
'muffins',
'mushroom cream sauce',
'napkins',
'nonfat milk',
'oatmeal',
'oil',
'olive oil',
'pancakes',
'parmesan cheese',
'pasta',
'pepper',
'pet food',
'pickles',
'protein bar',
'red wine',
'rice',
'salad',
'salmon',
'salt',
'sandwich',
'shallot',
'shampoo',
'shrimp',
'soda',
'spaghetti',
'sparkling water',
'spinach',
'strawberries',
'strong cheese',
'tea',
'tomato juice',
'tomato sauce',
'tomatoes',
'toothpaste',
'turkey',
'vegetables mix',
'water spray',
'white wine',
'whole weat flour',
'whole wheat pasta',
'whole wheat rice',
'yams',
'yogurt cake',
'zucchini']
```

```
df = pd.DataFrame(x, columns=te.columns_)
df
```

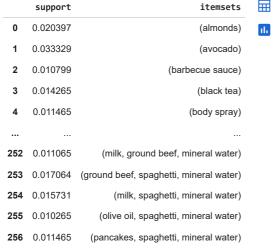
/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_c and should_run_async(code)



/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: should_run_async will not call transform and should_run_async(code)

freq_itemset

/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_c and should_run_async(code)



257 rows × 2 columns

#Find the rules

rules = association_rules(freq_itemset, metric='confidence', min_threshold=0.10)

/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_ and should_run_async(code)

rules = rules[['antecedents','consequents','support','confidence']]
rules

١,

3

```
rules[rules['antecedents'] == {'cake'}]['consequents']
    /usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
     and should_run_async(code)
                   (burgers)
    25
                 (chocolate)
             (eggs)
(french fries)
    26
    28
         (frozen vegetables)
    30
    32
                 (green tea)
    35
                     (milk)
    36
             (mineral water)
                 (pancakes)
    40
                 (spaghetti)
    Name: consequents, dtype: object
    4
                                         (spaghetti) 0.011465
                                                             0.339921
     317 (pancakes, mineral water)
     318 (spaghetti, mineral water)
                                         (pancakes) 0.011465
                                                             0.191964
     319
                    (pancakes) (spaghetti, mineral water) 0.011465
                                                             0.120617
    320 rows × 4 columns
```