

```
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)
```

```
import csv
from mlxtend.preprocessing import TransactionEncoder
from mlxtend.frequent_patterns import apriori, association_rules
```

```
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```

```
!pip install mlxtend
```

```
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```

```
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: cyclor>=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->mlxtend)
```

```
data = []
with open('/content/Market_Basket_Optimisation.csv') as file:
    reader = csv.reader(file, delimiter=',')
    for row in reader:
        data +=[row]
```

```
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```

```
data[1:10]
```

```
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```

```
[[ '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)
```

```
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```

```
7501
```

```
te = TransactionEncoder()
x = te.fit_transform(data)
x
```

```
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```

```
array([[False,  True,  True, ...,  True, False, False],
```

```
[False, False, False, ..., False, False, False],
[False, False, False, ..., False, False, False],
...,
[False, False, False, ..., False, False, False],
[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',
'soup',
'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
```

```
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```

	asparagus	almonds	antioxydant juice	asparagus	avocado	babies food	bacon	barbecue sauce	black tea	blueberries	...	turkey	vegetables mix	wate	spra
0	False	True	True	False	True	False	False	False	False	False	...	False	True	Fals	
1	False	False	False	False	False	False	False	False	False	False	...	False	False	Fals	
2	False	False	False	False	False	False	False	False	False	False	...	False	False	Fals	
3	False	False	False	False	True	False	False	False	False	False	...	True	False	Fals	

```
# Finding frequent itemsets
freq_itemset = apriori(df, min_support=0.01, use_colnames=True)
```

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```
freq_itemset
```

```
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	support	itemsets	
0	0.020397	(almonds)	
1	0.033329	(avocado)	
2	0.010799	(barbecue sauce)	
3	0.014265	(black tea)	
4	0.011465	(body spray)	
...	
252	0.011065	(milk, ground beef, mineral water)	
253	0.017064	(ground beef, spaghetti, mineral water)	
254	0.015731	(milk, spaghetti, mineral water)	
255	0.010265	(olive oil, spaghetti, mineral water)	
256	0.011465	(pancakes, spaghetti, mineral water)	

257 rows × 2 columns

```
#Find the rules
rules = association_rules(freq_itemset, metric='confidence', min_threshold=0.10)
```

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

```
/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning:
rules[rules['antecedents'] == {'cake'}]['consequents']

/usr/local/lib/python3.10/dist-packages/ipykernel/ipkernel.py:283: DeprecationWarning: `should_run_async` will not call `transform_
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1      (burgers)
25      (chocolate)
26      (eggs)
28      (french fries)
30      (frozen vegetables)
32      (green tea)
35      (milk)
36      (mineral water)
39      (pancakes)
40      (spaghetti)
Name: consequents, dtype: object
```

317	(pancakes, mineral water)	(spaghetti)	0.011465	0.339921
318	(spaghetti, mineral water)	(pancakes)	0.011465	0.191964
319	(pancakes)	(spaghetti, mineral water)	0.011465	0.120617

320 rows × 4 columns