

```
In [1]: !pip install apyori
```

Requirement already satisfied: apyori in c:\users\91902\anaconda3\lib\site-packages
(1.1.2)

```
In [2]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from apyori import apriori
```

Read data and Display

```
In [3]: store_data = pd.read_csv("store_data.csv", header=None)
display(store_data.head())
print(store_data.shape)
```

	0	1	2	3	4	5	6	7	8	9	10
0	shrimp	almonds	avocado	vegetables mix	green grapes	whole wheat flour	yams	cottage cheese	energy drink	tomato juice	low fat yogurt
1	burgers	meatballs	eggs	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2	chutney		NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	turkey	avocado	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
4	mineral water	milk	energy bar	whole wheat rice	green tea	NaN	NaN	NaN	NaN	NaN	NaN
(7501, 20)											



```
In [4]: records = []
for i in range(1, 7501):
    records.append([str(store_data.values[i, j]) for j in range(0, 20)])
```

```
In [5]: print(type(records))

<class 'list'>
```

```
In [6]: association_rules = apriori(records, min_support=0.0045, min_confidence=0.2, min_lif
```

```
In [7]: #print(association_results)
```

How many relation derived

```
In [8]: print("There are {} Relation derived.".format(len(association_results)))
```

There are 48 Relation derived.

Association Rules Derived

```
In [9]: for i in range(0, len(association_results)):
    print(association_results[i][0])
```

```
frozenset({'chicken', 'light cream'})
frozenset({'mushroom cream sauce', 'escalope'})
frozenset({'pasta', 'escalope'})
frozenset({'herb & pepper', 'ground beef'})
frozenset({'tomato sauce', 'ground beef'})
frozenset({'olive oil', 'whole wheat pasta'})
frozenset({'shrimp', 'pasta'})
frozenset({'chicken', 'light cream', 'nan'})
frozenset({'shrimp', 'frozen vegetables', 'chocolate'})
frozenset({'cooking oil', 'spaghetti', 'ground beef'})
frozenset({'mushroom cream sauce', 'nan', 'escalope'})
frozenset({'pasta', 'nan', 'escalope'})
frozenset({'frozen vegetables', 'spaghetti', 'ground beef'})
frozenset({'frozen vegetables', 'olive oil', 'milk'})
frozenset({'shrimp', 'frozen vegetables', 'mineral water'})
frozenset({'frozen vegetables', 'olive oil', 'spaghetti'})
frozenset({'shrimp', 'frozen vegetables', 'spaghetti'})
frozenset({'frozen vegetables', 'spaghetti', 'tomatoes'})
frozenset({'grated cheese', 'spaghetti', 'ground beef'})
frozenset({'mineral water', 'herb & pepper', 'ground beef'})
frozenset({'herb & pepper', 'nan', 'ground beef'})
frozenset({'spaghetti', 'herb & pepper', 'ground beef'})
frozenset({'olive oil', 'milk', 'ground beef'})
frozenset({'tomato sauce', 'nan', 'ground beef'})
frozenset({'shrimp', 'spaghetti', 'ground beef'})
frozenset({'olive oil', 'spaghetti', 'milk'})
frozenset({'soup', 'mineral water', 'olive oil'})
frozenset({'olive oil', 'whole wheat pasta', 'nan'})
frozenset({'shrimp', 'pasta', 'nan'})
frozenset({'pancakes', 'olive oil', 'spaghetti'})
frozenset({'shrimp', 'frozen vegetables', 'chocolate', 'nan'})
frozenset({'cooking oil', 'spaghetti', 'nan', 'ground beef'})
frozenset({'frozen vegetables', 'spaghetti', 'nan', 'ground beef'})
frozenset({'frozen vegetables', 'mineral water', 'spaghetti', 'milk'})
frozenset({'olive oil', 'frozen vegetables', 'nan', 'milk'})
frozenset({'shrimp', 'frozen vegetables', 'mineral water', 'nan'})
frozenset({'frozen vegetables', 'olive oil', 'spaghetti', 'nan'})
frozenset({'shrimp', 'frozen vegetables', 'spaghetti', 'nan'})
frozenset({'frozen vegetables', 'spaghetti', 'nan', 'tomatoes'})
frozenset({'grated cheese', 'spaghetti', 'nan', 'ground beef'})
frozenset({'mineral water', 'herb & pepper', 'nan', 'ground beef'})
frozenset({'spaghetti', 'herb & pepper', 'nan', 'ground beef'})
frozenset({'olive oil', 'nan', 'milk', 'ground beef'})
frozenset({'shrimp', 'spaghetti', 'nan', 'ground beef'})
frozenset({'olive oil', 'nan', 'spaghetti', 'milk'})
frozenset({'soup', 'mineral water', 'olive oil', 'nan'})
frozenset({'pancakes', 'olive oil', 'spaghetti', 'nan'})
frozenset({'spaghetti', 'frozen vegetables', 'mineral water', 'milk', 'nan})
```

Rules Generated

In [10]:

```
for item in association_results:
    # first index of the inner list
    # Contains base item and add item
    pair = item[0]
    items = [x for x in pair]
    print("Rule: " + items[0] + " -> " + items[1])

    # second index of the inner list
    print("Support: " + str(item[1]))

    # third index of the list located at 0th
```

```
# of the third index of the inner list

print("Confidence: " + str(item[2][0][2]))
print("Lift: " + str(item[2][0][3]))
print("=====")
```

```
Rule: chicken -> light cream
Support: 0.00453333333333334
Confidence: 0.2905982905982906
Lift: 4.843304843304844
=====
Rule: mushroom cream sauce -> escalope
Support: 0.00573333333333333
Confidence: 0.30069930069930073
Lift: 3.7903273197390845
=====
Rule: pasta -> escalope
Support: 0.005866666666666667
Confidence: 0.37288135593220345
Lift: 4.700185158809287
=====
Rule: herb & pepper -> ground beef
Support: 0.016
Confidence: 0.3234501347708895
Lift: 3.2915549671393096
=====
Rule: tomato sauce -> ground beef
Support: 0.00533333333333333
Confidence: 0.37735849056603776
Lift: 3.840147461662528
=====
Rule: olive oil -> whole wheat pasta
Support: 0.008
Confidence: 0.2714932126696833
Lift: 4.130221288078346
=====
Rule: shrimp -> pasta
Support: 0.005066666666666666
Confidence: 0.3220338983050848
Lift: 4.514493901473151
=====
Rule: chicken -> light cream
Support: 0.00453333333333334
Confidence: 0.2905982905982906
Lift: 4.843304843304844
=====
Rule: shrimp -> frozen vegetables
Support: 0.00533333333333333
Confidence: 0.23255813953488372
Lift: 3.260160834601174
=====
Rule: cooking oil -> spaghetti
Support: 0.0048
Confidence: 0.5714285714285714
Lift: 3.281557646029315
=====
Rule: mushroom cream sauce -> nan
Support: 0.00573333333333333
Confidence: 0.30069930069930073
Lift: 3.7903273197390845
=====
Rule: pasta -> nan
Support: 0.005866666666666667
Confidence: 0.37288135593220345
Lift: 4.700185158809287
=====
Rule: frozen vegetables -> spaghetti
Support: 0.008666666666666666
Confidence: 0.3110047846889952
Lift: 3.164906221394116
```

```
=====
Rule: frozen vegetables -> olive oil
Support: 0.0048
Confidence: 0.20338983050847456
Lift: 3.094165778526489
=====

Rule: shrimp -> frozen vegetables
Support: 0.0072
Confidence: 0.3068181818181818
Lift: 3.2183725365543547
=====

Rule: frozen vegetables -> olive oil
Support: 0.005733333333333333
Confidence: 0.20574162679425836
Lift: 3.1299436124887174
=====

Rule: shrimp -> frozen vegetables
Support: 0.006
Confidence: 0.21531100478468898
Lift: 3.0183785717479763
=====

Rule: frozen vegetables -> spaghetti
Support: 0.006666666666666667
Confidence: 0.23923444976076555
Lift: 3.497579674864993
=====

Rule: grated cheese -> spaghetti
Support: 0.005333333333333333
Confidence: 0.3225806451612903
Lift: 3.282706701098612
=====

Rule: mineral water -> herb & pepper
Support: 0.006666666666666667
Confidence: 0.390625
Lift: 3.975152645861601
=====

Rule: herb & pepper -> nan
Support: 0.016
Confidence: 0.3234501347708895
Lift: 3.2915549671393096
=====

Rule: spaghetti -> herb & pepper
Support: 0.0064
Confidence: 0.3934426229508197
Lift: 4.003825878061259
=====

Rule: olive oil -> milk
Support: 0.004933333333333333
Confidence: 0.22424242424242424
Lift: 3.411395906324912
=====

Rule: tomato sauce -> nan
Support: 0.005333333333333333
Confidence: 0.37735849056603776
Lift: 3.840147461662528
=====

Rule: shrimp -> spaghetti
Support: 0.006
Confidence: 0.5232558139534884
Lift: 3.004914704939635
=====

Rule: olive oil -> spaghetti
Support: 0.0072
Confidence: 0.20300751879699247
```

Lift: 3.0883496774390333

=====

Rule: soup -> mineral water

Support: 0.0052

Confidence: 0.2254335260115607

Lift: 3.4295161157945335

=====

Rule: olive oil -> whole wheat pasta

Support: 0.008

Confidence: 0.2714932126696833

Lift: 4.130221288078346

=====

Rule: shrimp -> pasta

Support: 0.005066666666666666

Confidence: 0.3220338983050848

Lift: 4.514493901473151

=====

Rule: pancakes -> olive oil

Support: 0.0050666666666666

Confidence: 0.20105820105820105

Lift: 3.0586947422647217

=====

Rule: shrimp -> frozen vegetables

Support: 0.0053333333333333

Confidence: 0.23255813953488372

Lift: 3.260160834601174

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Lift: 3.281557646029315

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Rule: frozen vegetables -> spaghetti

Support: 0.0086666666666666

Confidence: 0.3110047846889952

Lift: 3.164906221394116

=====

Rule: frozen vegetables -> mineral water

Support: 0.0045333333333333

Confidence: 0.28813559322033905

Lift: 3.0224013274860737

=====

Rule: olive oil -> frozen vegetables

Support: 0.0048

Confidence: 0.20338983050847456

Lift: 3.094165778526489

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Lift: 3.2183725365543547

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Lift: 3.1299436124887174

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Confidence: 0.23923444976076555

Lift: 3.49759674864993

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Rule: grated cheese -> spaghetti

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Confidence: 0.3225806451612903

Lift: 3.282706701098612

=====

Rule: mineral water -> herb & pepper

Support: 0.006666666666666666

Confidence: 0.390625

Lift: 3.975152645861601

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Rule: spaghetti -> herb & pepper

Support: 0.0064

Confidence: 0.3934426229508197

Lift: 4.003825878061259

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Rule: olive oil -> nan

Support: 0.004933333333333333

Confidence: 0.2242424242424242

Lift: 3.411395906324912

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Rule: shrimp -> spaghetti

Support: 0.006

Confidence: 0.5232558139534884

Lift: 3.004914704939635

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Rule: olive oil -> nan

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Confidence: 0.20300751879699247

Lift: 3.0883496774390333

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