```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

dataset = pd.read_csv('Market_Basket.csv')
dataset
```

```
              shrimp            almonds      avocado    vegetables mix
\
0            burgers          meatballs         eggs               NaN

1            chutney               NaN          NaN               NaN

2             turkey            avocado          NaN               NaN

3      mineral water               milk   energy bar  whole wheat rice

4     low fat yogurt               NaN          NaN               NaN

...              ...               ...          ...               ...

7495          butter         light mayo  fresh bread               NaN

7496         burgers  frozen vegetables         eggs      french fries

7497         chicken               NaN          NaN               NaN

7498        escalope          green tea          NaN               NaN

7499            eggs    frozen smoothie  yogurt cake    low fat yogurt


     green grapes whole weat flour yams cottage cheese energy drink  \
0             NaN               NaN  NaN            NaN          NaN
1             NaN               NaN  NaN            NaN          NaN
2             NaN               NaN  NaN            NaN          NaN
3       green tea               NaN  NaN            NaN          NaN
4             NaN               NaN  NaN            NaN          NaN
...           ...               ...  ...            ...          ...
7495          NaN               NaN  NaN            NaN          NaN
7496    magazines        green tea  NaN            NaN          NaN
7497          NaN               NaN  NaN            NaN          NaN
7498          NaN               NaN  NaN            NaN          NaN
7499          NaN               NaN  NaN            NaN          NaN

     tomato juice low fat yogurt green tea honey salad mineral water
salmon  \
0             NaN            NaN       NaN   NaN   NaN            NaN
NaN
1             NaN            NaN       NaN   NaN   NaN            NaN
NaN
```

```
2              NaN             NaN        NaN   NaN   NaN            NaN
NaN
3              NaN             NaN        NaN   NaN   NaN            NaN
NaN
4              NaN             NaN        NaN   NaN   NaN            NaN
NaN
...            ...             ...        ...   ...   ...            ...
...
7495           NaN             NaN        NaN   NaN   NaN            NaN
NaN
7496           NaN             NaN        NaN   NaN   NaN            NaN
NaN
7497           NaN             NaN        NaN   NaN   NaN            NaN
NaN
7498           NaN             NaN        NaN   NaN   NaN            NaN
NaN
7499           NaN             NaN        NaN   NaN   NaN            NaN
NaN
```

```
     antioxydant juice frozen smoothie spinach  olive oil
0                   NaN              NaN      NaN         NaN
1                   NaN              NaN      NaN         NaN
2                   NaN              NaN      NaN         NaN
3                   NaN              NaN      NaN         NaN
4                   NaN              NaN      NaN         NaN
...                 ...              ...      ...         ...
7495                NaN              NaN      NaN         NaN
7496                NaN              NaN      NaN         NaN
7497                NaN              NaN      NaN         NaN
7498                NaN              NaN      NaN         NaN
7499                NaN              NaN      NaN         NaN

[7500 rows x 20 columns]
```

```
list_data = dataset.values.tolist()

list_data[:5]
```

```
[['burgers',
  'meatballs',
  'eggs',
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
```

```
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan],
 ['chutney',
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan],
 ['turkey',
  'avocado',
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan],
 ['mineral water',
```

```
  'milk',
  'energy bar',
  'whole wheat rice',
  'green tea',
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan],
 ['low fat yogurt',
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan,
  nan]]

cleaned_list = []
temp = []
for i in list_data:
    for j in i:
        if str(j) != 'nan':
            temp.append(j)

    cleaned_list.append(temp)
    temp = []
```

```
cleaned_list[:10]
```

```
[['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'],
 ['eggs', 'pet food']]
```

Training Apriori Model

```
#!pip install apyori

from apyori import apriori

rules = apriori(transactions=cleaned_list, min_support=0.04,
min_confidence=0.002,min_length=1)
result = list(rules)

result[:10]
```

```
[RelationRecord(items=frozenset({'burgers'}), support=0.0872,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'burgers'}), confidence=0.0872, lift=1.0)]),
 RelationRecord(items=frozenset({'cake'}),
support=0.08106666666666666,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'cake'}), confidence=0.08106666666666666,
lift=1.0)]),
 RelationRecord(items=frozenset({'champagne'}), support=0.0468,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'champagne'}), confidence=0.0468, lift=1.0)]),
 RelationRecord(items=frozenset({'chicken'}), support=0.06,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'chicken'}), confidence=0.06, lift=1.0)]),
 RelationRecord(items=frozenset({'chocolate'}),
support=0.16386666666666666,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'chocolate'}), confidence=0.16386666666666666,
lift=1.0)]),
 RelationRecord(items=frozenset({'cookies'}), support=0.0804,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'cookies'}), confidence=0.0804, lift=1.0)]),
```

```
 RelationRecord(items=frozenset({'cooking oil'}),
support=0.05106666666666667,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'cooking oil'}), confidence=0.05106666666666667,
lift=1.0)]),
 RelationRecord(items=frozenset({'eggs'}),
support=0.17973333333333333,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'eggs'}), confidence=0.17973333333333333,
lift=1.0)]),
 RelationRecord(items=frozenset({'escalope'}),
support=0.07933333333333334,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'escalope'}), confidence=0.07933333333333334,
lift=1.0)]),
 RelationRecord(items=frozenset({'french fries'}),
support=0.17093333333333333,
ordered_statistics=[OrderedStatistic(items_base=frozenset(),
items_add=frozenset({'french fries'}), confidence=0.17093333333333333,
lift=1.0)])]
```

Creating dataframe for:

item_set, support, lift, confidence

```
result_list = []
for items in result:
    temp_list = []
    temp_list.append(items[0]) # Frozen-set
    temp_list.append(items[1]) # Support

    temp_list.append(items[2][0][2]) # Confidence
    temp_list.append(items[2][0][3]) # Lift

    result_list.append(temp_list)

result_df = pd.DataFrame(result_list, columns=['Set', 'Support',
'Confidence', 'Lift'])

result_df
```

	Set	Support	Confidence	Lift
0	(burgers)	0.087200	0.087200	1.0
1	(cake)	0.081067	0.081067	1.0
2	(champagne)	0.046800	0.046800	1.0
3	(chicken)	0.060000	0.060000	1.0
4	(chocolate)	0.163867	0.163867	1.0
5	(cookies)	0.080400	0.080400	1.0

6	(cooking oil)	0.051067	0.051067	1.0
7	(eggs)	0.179733	0.179733	1.0
8	(escalope)	0.079333	0.079333	1.0
9	(french fries)	0.170933	0.170933	1.0
10	(fresh bread)	0.043067	0.043067	1.0
11	(frozen smoothie)	0.063200	0.063200	1.0
12	(frozen vegetables)	0.095333	0.095333	1.0
13	(grated cheese)	0.052400	0.052400	1.0
14	(green tea)	0.132000	0.132000	1.0
15	(ground beef)	0.098267	0.098267	1.0
16	(herb & pepper)	0.049467	0.049467	1.0
17	(honey)	0.047333	0.047333	1.0
18	(low fat yogurt)	0.076400	0.076400	1.0
19	(milk)	0.129600	0.129600	1.0
20	(mineral water)	0.238267	0.238267	1.0
21	(olive oil)	0.065733	0.065733	1.0
22	(pancakes)	0.095067	0.095067	1.0
23	(salmon)	0.042400	0.042400	1.0
24	(shrimp)	0.071333	0.071333	1.0
25	(soup)	0.050533	0.050533	1.0
26	(spaghetti)	0.174133	0.174133	1.0
27	(tomatoes)	0.068400	0.068400	1.0
28	(turkey)	0.062533	0.062533	1.0
29	(whole wheat rice)	0.058533	0.058533	1.0
30	(chocolate, mineral water)	0.052667	0.052667	1.0
31	(mineral water, eggs)	0.050933	0.050933	1.0
32	(ground beef, mineral water)	0.040933	0.040933	1.0
33	(mineral water, milk)	0.048000	0.048000	1.0
34	(spaghetti, mineral water)	0.059733	0.059733	1.0

Arranging Confidence values in ascending order

```
result_df.sort_values(by='Confidence')
```

	Set	Support	Confidence	Lift
32	(ground beef, mineral water)	0.040933	0.040933	1.0
23	(salmon)	0.042400	0.042400	1.0
10	(fresh bread)	0.043067	0.043067	1.0
2	(champagne)	0.046800	0.046800	1.0
17	(honey)	0.047333	0.047333	1.0
33	(mineral water, milk)	0.048000	0.048000	1.0
16	(herb & pepper)	0.049467	0.049467	1.0
25	(soup)	0.050533	0.050533	1.0
31	(mineral water, eggs)	0.050933	0.050933	1.0
6	(cooking oil)	0.051067	0.051067	1.0
13	(grated cheese)	0.052400	0.052400	1.0
30	(chocolate, mineral water)	0.052667	0.052667	1.0
29	(whole wheat rice)	0.058533	0.058533	1.0

34	(spaghetti, mineral water)	0.059733	0.059733	1.0
3	(chicken)	0.060000	0.060000	1.0
28	(turkey)	0.062533	0.062533	1.0
11	(frozen smoothie)	0.063200	0.063200	1.0
21	(olive oil)	0.065733	0.065733	1.0
27	(tomatoes)	0.068400	0.068400	1.0
24	(shrimp)	0.071333	0.071333	1.0
18	(low fat yogurt)	0.076400	0.076400	1.0
8	(escalope)	0.079333	0.079333	1.0
5	(cookies)	0.080400	0.080400	1.0
1	(cake)	0.081067	0.081067	1.0
0	(burgers)	0.087200	0.087200	1.0
22	(pancakes)	0.095067	0.095067	1.0
12	(frozen vegetables)	0.095333	0.095333	1.0
15	(ground beef)	0.098267	0.098267	1.0
19	(milk)	0.129600	0.129600	1.0
14	(green tea)	0.132000	0.132000	1.0
4	(chocolate)	0.163867	0.163867	1.0
9	(french fries)	0.170933	0.170933	1.0
26	(spaghetti)	0.174133	0.174133	1.0
7	(eggs)	0.179733	0.179733	1.0
20	(mineral water)	0.238267	0.238267	1.0