## 1.Import Library

In [1]:
```
import pandas as pd
from mlxtend.frequent_patterns import association_rules,apriori
```

## 2.Import Datasets

In [2]:
```
data=pd.read_csv("titnic.csv",sep=" ")
data.head()
```

Out[2]:

| | Class | Gender | Age | Survived |
|---|---|---|---|---|
| **1** | 3rd | Male | Child | No |
| **2** | 3rd | Male | Child | No |
| **3** | 3rd | Male | Child | No |
| **4** | 3rd | Male | Child | No |
| **5** | 3rd | Male | Child | No |

## 3.Data Prepration

In [3]:
```
dummy_data=pd.get_dummies(data)
dummy_data
```

Out[3]:

| | Class_1st | Class_2nd | Class_3rd | Class_Crew | Gender_Female | Gender_Male | Age_Adult | Age_Child | Survived_No | Survived_Yes |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **2** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **3** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **4** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **5** | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **2197** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| **2198** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| **2199** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| **2200** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| **2201** | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |

2201 rows × 10 columns

## 4.Apriori

In [4]:
```
frequent_items=apriori(dummy_data,min_support=0.1,use_colnames=True)
frequent_items
```

Out[4]:

| | support | itemsets |
|---|---|---|
| 0 | 0.147660 | (Class_1st) |
| 1 | 0.129487 | (Class_2nd) |
| 2 | 0.320763 | (Class_3rd) |
| 3 | 0.402090 | (Class_Crew) |
| 4 | 0.213539 | (Gender_Female) |
| 5 | 0.786461 | (Gender_Male) |
| 6 | 0.950477 | (Age_Adult) |
| 7 | 0.676965 | (Survived_No) |
| 8 | 0.323035 | (Survived_Yes) |
| 9 | 0.144934 | (Age_Adult, Class_1st) |
| 10 | 0.118582 | (Age_Adult, Class_2nd) |
| 11 | 0.231713 | (Gender_Male, Class_3rd) |
| 12 | 0.284871 | (Age_Adult, Class_3rd) |
| 13 | 0.239891 | (Survived_No, Class_3rd) |
| 14 | 0.391640 | (Gender_Male, Class_Crew) |
| 15 | 0.402090 | (Age_Adult, Class_Crew) |
| 16 | 0.305770 | (Survived_No, Class_Crew) |
| 17 | 0.193094 | (Gender_Female, Age_Adult) |
| 18 | 0.156293 | (Survived_Yes, Gender_Female) |
| 19 | 0.757383 | (Age_Adult, Gender_Male) |
| 20 | 0.619718 | (Survived_No, Gender_Male) |
| 21 | 0.166742 | (Survived_Yes, Gender_Male) |
| 22 | 0.653339 | (Survived_No, Age_Adult) |
| 23 | 0.297138 | (Survived_Yes, Age_Adult) |
| 24 | 0.209905 | (Age_Adult, Gender_Male, Class_3rd) |
| 25 | 0.191731 | (Survived_No, Gender_Male, Class_3rd) |
| 26 | 0.216265 | (Survived_No, Age_Adult, Class_3rd) |

| | support | itemsets |
|---|---|---|
| **27** | 0.391640 | (Age_Adult, Gender_Male, Class_Crew) |
| **28** | 0.304407 | (Survived_No, Gender_Male, Class_Crew) |
| **29** | 0.305770 | (Survived_No, Age_Adult, Class_Crew) |
| **30** | 0.143571 | (Age_Adult, Survived_Yes, Gender_Female) |
| **31** | 0.603816 | (Age_Adult, Survived_No, Gender_Male) |
| **32** | 0.153567 | (Age_Adult, Survived_Yes, Gender_Male) |
| **33** | 0.175829 | (Age_Adult, Survived_No, Gender_Male, Class_3rd) |
| **34** | 0.304407 | (Age_Adult, Survived_No, Gender_Male, Class_Crew) |

## 4.Association rules

In [5]:

```
rules=association_rules(frequent_items,min_threshold=0.7,    metric='lift')
rules
#Levrage values of  0 indicates independents  value range between -1 to 1
```

Out[5]:

| | antecedents | consequents | antecedent support | consequent support | support | confidence | lift | leverage | conviction |
|---|---|---|---|---|---|---|---|---|---|
| **0** | (Age_Adult) | (Class_1st) | 0.950477 | 0.147660 | 0.144934 | 0.152486 | 1.032680 | 0.004587 | 1.005694 |
| **1** | (Class_1st) | (Age_Adult) | 0.147660 | 0.950477 | 0.144934 | 0.981538 | 1.032680 | 0.004587 | 2.682493 |
| **2** | (Age_Adult) | (Class_2nd) | 0.950477 | 0.129487 | 0.118582 | 0.124761 | 0.963505 | -0.004492 | 0.994601 |
| **3** | (Class_2nd) | (Age_Adult) | 0.129487 | 0.950477 | 0.118582 | 0.915789 | 0.963505 | -0.004492 | 0.588085 |
| **4** | (Gender_Male) | (Class_3rd) | 0.786461 | 0.320763 | 0.231713 | 0.294627 | 0.918520 | -0.020555 | 0.962947 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **101** | (Gender_Male, Class_Crew) | (Survived_No, Age_Adult) | 0.391640 | 0.653339 | 0.304407 | 0.777262 | 1.189676 | 0.048533 | 1.556362 |
| **102** | (Age_Adult) | (Survived_No, Gender_Male, Class_Crew) | 0.950477 | 0.304407 | 0.304407 | 0.320268 | 1.052103 | 0.015075 | 1.023334 |
| **103** | (Survived_No) | (Class_Crew, Age_Adult, Gender_Male) | 0.676965 | 0.391640 | 0.304407 | 0.449664 | 1.148157 | 0.039280 | 1.105434 |
| **104** | (Gender_Male) | (Survived_No, Age_Adult, Class_Crew) | 0.786461 | 0.305770 | 0.304407 | 0.387060 | 1.265851 | 0.063931 | 1.132622 |
| **105** | (Class_Crew) | (Survived_No, Age_Adult, Gender_Male) | 0.402090 | 0.603816 | 0.304407 | 0.757062 | 1.253795 | 0.061619 | 1.630802 |

106 rows × 9 columns

In [6]:
```
rules.sort_values("lift",ascending=False)[0:20]
```

Out[6]:

| | antecedents | consequents | antecedent support | consequent support | support | confidence | lift | leverage | conviction |
|---|---|---|---|---|---|---|---|---|---|
| **65** | (Gender_Female, Age_Adult) | (Survived_Yes) | 0.193094 | 0.323035 | 0.143571 | 0.743529 | 2.301699 | 0.081195 | 2.639542 |
| **68** | (Survived_Yes) | (Gender_Female, Age_Adult) | 0.323035 | 0.193094 | 0.143571 | 0.444444 | 2.301699 | 0.081195 | 1.452431 |
| **18** | (Survived_Yes) | (Gender_Female) | 0.323035 | 0.213539 | 0.156293 | 0.483826 | 2.265745 | 0.087312 | 1.523634 |
| **19** | (Gender_Female) | (Survived_Yes) | 0.213539 | 0.323035 | 0.156293 | 0.731915 | 2.265745 | 0.087312 | 2.525187 |
| **69** | (Gender_Female) | (Survived_Yes, Age_Adult) | 0.213539 | 0.297138 | 0.143571 | 0.672340 | 2.262724 | 0.080121 | 2.145099 |
| **64** | (Survived_Yes, Age_Adult) | (Gender_Female) | 0.297138 | 0.213539 | 0.143571 | 0.483180 | 2.262724 | 0.080121 | 1.521732 |
| **100** | (Survived_No, Class_Crew) | (Age_Adult, Gender_Male) | 0.305770 | 0.757383 | 0.304407 | 0.995542 | 1.314450 | 0.072822 | 54.427079 |
| **97** | (Age_Adult, Gender_Male) | (Survived_No, Class_Crew) | 0.757383 | 0.305770 | 0.304407 | 0.401920 | 1.314450 | 0.072822 | 1.160764 |
| **51** | (Class_Crew) | (Age_Adult, Gender_Male) | 0.402090 | 0.757383 | 0.391640 | 0.974011 | 1.286022 | 0.087104 | 9.335480 |
| **46** | (Age_Adult, Gender_Male) | (Class_Crew) | 0.757383 | 0.402090 | 0.391640 | 0.517097 | 1.286022 | 0.087104 | 1.238157 |
| **53** | (Survived_No, Class_Crew) | (Gender_Male) | 0.305770 | 0.786461 | 0.304407 | 0.995542 | 1.265851 | 0.063931 | 47.903983 |
| **104** | (Gender_Male) | (Survived_No, Age_Adult, Class_Crew) | 0.786461 | 0.305770 | 0.304407 | 0.387060 | 1.265851 | 0.063931 | 1.132622 |
| **93** | (Survived_No, Age_Adult, Class_Crew) | (Gender_Male) | 0.305770 | 0.786461 | 0.304407 | 0.995542 | 1.265851 | 0.063931 | 47.903983 |
| **56** | (Gender_Male) | (Survived_No, Class_Crew) | 0.786461 | 0.305770 | 0.304407 | 0.387060 | 1.265851 | 0.063931 | 1.132622 |
| **105** | (Class_Crew) | (Survived_No, Age_Adult, Gender_Male) | 0.402090 | 0.603816 | 0.304407 | 0.757062 | 1.253795 | 0.061619 | 1.630802 |
| **92** | (Survived_No, Age_Adult, Gender_Male) | (Class_Crew) | 0.603816 | 0.402090 | 0.304407 | 0.504138 | 1.253795 | 0.061619 | 1.205800 |
| **50** | (Gender_Male) | (Age_Adult, Class_Crew) | 0.786461 | 0.402090 | 0.391640 | 0.497978 | 1.238474 | 0.075412 | 1.191004 |
| **11** | (Class_Crew) | (Gender_Male) | 0.402090 | 0.786461 | 0.391640 | 0.974011 | 1.238474 | 0.075412 | 8.216621 |
| **47** | (Age_Adult, Class_Crew) | (Gender_Male) | 0.402090 | 0.786461 | 0.391640 | 0.974011 | 1.238474 | 0.075412 | 8.216621 |
| **10** | (Gender_Male) | (Class_Crew) | 0.786461 | 0.402090 | 0.391640 | 0.497978 | 1.238474 | 0.075412 | 1.191004 |