In [2]:

```
import pandas as pd
from mlxtend.frequent_patterns import apriori,association_rules
from mlxtend.preprocessing import TransactionEncoder
!pip install mlxtend
```

executed in 6.13s, finished 23:25:21 2021-11-25

```
Requirement already satisfied: mlxtend in c:\users\win\anaconda3\lib\site-pa
ckages (0.19.0)
Requirement already satisfied: joblib>=0.13.2 in c:\users\win\anaconda3\lib
\site-packages (from mlxtend) (1.0.1)
Requirement already satisfied: setuptools in c:\users\win\anaconda3\lib\site
-packages (from mlxtend) (52.0.0.post20210125)
Requirement already satisfied: matplotlib>=3.0.0 in c:\users\win\anaconda3\l
ib\site-packages (from mlxtend) (3.3.4)
Requirement already satisfied: scikit-learn>=0.20.3 in c:\users\win\anaconda
3\lib\site-packages (from mlxtend) (0.24.1)
Requirement already satisfied: scipy>=1.2.1 in c:\users\win\anaconda3\lib\si
te-packages (from mlxtend) (1.6.2)
Requirement already satisfied: pandas>=0.24.2 in c:\users\win\anaconda3\lib
\site-packages (from mlxtend) (1.2.4)
Requirement already satisfied: numpy>=1.16.2 in c:\users\win\anaconda3\lib\s
ite-packages (from mlxtend) (1.20.1)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\win\anaconda3\l
ib\site-packages (from matplotlib>=3.0.0->mlxtend) (1.3.1)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\win\anaconda
3\lib\site-packages (from matplotlib>=3.0.0->mlxtend) (2.8.1)
Requirement already satisfied: cycler>=0.10 in c:\users\win\anaconda3\lib\si
te-packages (from matplotlib>=3.0.0->mlxtend) (0.10.0)
Requirement already satisfied: pillow>=6.2.0 in c:\users\win\anaconda3\lib\s
ite-packages (from matplotlib>=3.0.0->mlxtend) (8.2.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in
c:\users\win\anaconda3\lib\site-packages (from matplotlib>=3.0.0->mlxtend)
(2.4.7)
Requirement already satisfied: six in c:\users\win\anaconda3\lib\site-packag
es (from cycler>=0.10->matplotlib>=3.0.0->mlxtend) (1.15.0)
Requirement already satisfied: pytz>=2017.3 in c:\users\win\anaconda3\lib\si
te-packages (from pandas>=0.24.2->mlxtend) (2021.1)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\win\anaconda
3\lib\site-packages (from scikit-learn>=0.20.3->mlxtend) (2.1.0)
```

In [3]:

```
book=pd.read_csv('book.csv')
book.head()
```

executed in 128ms, finished 23:26:33 2021-11-25

Out[3]:

	ChildBks	YouthBks	CookBks	DoItYBks	RefBks	ArtBks	GeogBks	ItalCook	ItalAtlas	Ital
0	0	1	0	1	0	0	1	0	0	
1	1	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	
3	1	1	1	0	1	0	1	0	0	
4	0	0	1	0	0	0	1	0	0	

In [4]:

```
df=pd.get_dummies(book)
df.head()
```

executed in 48ms, finished 23:27:04 2021-11-25

Out[4]:

	ChildBks	YouthBks	CookBks	DoItYBks	RefBks	ArtBks	GeogBks	ItalCook	ItalAtlas	Ital
0	0	1	0	1	0	0	1	0	0	
1	1	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	
3	1	1	1	0	1	0	1	0	0	
4	0	0	1	0	0	0	1	0	0	

In [5]:

```
frequent_itemsets = apriori(df, min_support=0.1, use_colnames=True)
frequent_itemsets
```

executed in 83ms, finished 23:28:09 2021-11-25

Out[5]:

	support	itemsets
0	0.4230	(ChildBks)
1	0.2475	(YouthBks)
2	0.4310	(CookBks)
3	0.2820	(DoItYBks)
4	0.2145	(RefBks)
5	0.2410	(ArtBks)
6	0.2760	(GeogBks)
7	0.1135	(ItalCook)
8	0.1085	(Florence)
9	0.1650	(ChildBks, YouthBks)
10	0.2560	(CookBks, ChildBks)
11	0.1840	(ChildBks, DoItYBks)
12	0.1515	(RefBks, ChildBks)
13	0.1625	(ArtBks, ChildBks)
14	0.1950	(ChildBks, GeogBks)
15	0.1620	(CookBks, YouthBks)
16	0.1155	(DoItYBks, YouthBks)
17	0.1010	(ArtBks, YouthBks)
18	0.1205	(GeogBks, YouthBks)
19	0.1875	(CookBks, DoItYBks)
20	0.1525	(CookBks, RefBks)
21	0.1670	(CookBks, ArtBks)
22	0.1925	(CookBks, GeogBks)
23	0.1135	(CookBks, ItalCook)
24	0.1055	(RefBks, DoItYBks)
25	0.1235	(ArtBks, DoItYBks)
26	0.1325	(GeogBks, DoItYBks)
27	0.1105	(RefBks, GeogBks)
28	0.1275	(ArtBks, GeogBks)
29	0.1290	(CookBks, ChildBks, YouthBks)
30	0.1460	(CookBks, ChildBks, DoItYBks)
31	0.1225	(CookBks, RefBks, ChildBks)
32	0.1265	(CookBks, ArtBks, ChildBks)
33	0.1495	(CookBks, ChildBks, GeogBks)

	support	itemsets
34	0.1045	(GeogBks, ChildBks, DoItYBks)
35	0.1020	(ArtBks, ChildBks, GeogBks)
36	0.1015	(CookBks, ArtBks, DoItYBks)
37	0.1085	(CookBks, GeogBks, DoItYBks)
38	0.1035	(CookBks, ArtBks, GeogBks)

In [6]:

```
rules = association_rules(frequent_itemsets, metric="lift", min_threshold=0.7)
rules
rules.sort_values('lift',ascending = False).head(10)
```

executed in 83ms, finished 23:28:52 2021-11-25

Out[6]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverag
28	(CookBks)	(ItalCook)	0.4310	0.1135	0.1135	0.263341	2.320186	0.06458
29	(ItalCook)	(CookBks)	0.1135	0.4310	0.1135	1.000000	2.320186	0.06458
76	(ArtBks, ChildBks)	(GeogBks)	0.1625	0.2760	0.1020	0.627692	2.274247	0.05715
81	(GeogBks)	(ArtBks, ChildBks)	0.2760	0.1625	0.1020	0.369565	2.274247	0.05715
86	(ArtBks)	(CookBks, DoItYBks)	0.2410	0.1875	0.1015	0.421162	2.246196	0.05631
83	(CookBks, DoItYBks)	(ArtBks)	0.1875	0.2410	0.1015	0.541333	2.246196	0.05631
99	(GeogBks)	(CookBks, ArtBks)	0.2760	0.1670	0.1035	0.375000	2.245509	0.05740
94	(CookBks, ArtBks)	(GeogBks)	0.1670	0.2760	0.1035	0.619760	2.245509	0.05740
98	(ArtBks)	(CookBks, GeogBks)	0.2410	0.1925	0.1035	0.429461	2.230964	0.05710
95	(CookBks, GeogBks)	(ArtBks)	0.1925	0.2410	0.1035	0.537662	2.230964	0.05710

In [7]:

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

executed in 89ms, finished 23:29:18 2021-11-25

Out[7]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverag
28	(CookBks)	(ItalCook)	0.4310	0.1135	0.1135	0.263341	2.320186	0.06458
29	(ItalCook)	(CookBks)	0.1135	0.4310	0.1135	1.000000	2.320186	0.06458
76	(ArtBks, ChildBks)	(GeogBks)	0.1625	0.2760	0.1020	0.627692	2.274247	0.05715
81	(GeogBks)	(ArtBks, ChildBks)	0.2760	0.1625	0.1020	0.369565	2.274247	0.05715
86	(ArtBks)	(CookBks, DoItYBks)	0.2410	0.1875	0.1015	0.421162	2.246196	0.05631
83	(CookBks, DoItYBks)	(ArtBks)	0.1875	0.2410	0.1015	0.541333	2.246196	0.05631
99	(GeogBks)	(CookBks, ArtBks)	0.2760	0.1670	0.1035	0.375000	2.245509	0.05740
94	(CookBks, ArtBks)	(GeogBks)	0.1670	0.2760	0.1035	0.619760	2.245509	0.05740
98	(ArtBks)	(CookBks, GeogBks)	0.2410	0.1925	0.1035	0.429461	2.230964	0.05710
95	(CookBks, GeogBks)	(ArtBks)	0.1925	0.2410	0.1035	0.537662	2.230964	0.05710
53	(CookBks, ChildBks)	(RefBks)	0.2560	0.2145	0.1225	0.478516	2.230842	0.06758
56	(RefBks)	(CookBks, ChildBks)	0.2145	0.2560	0.1225	0.571096	2.230842	0.06758
79	(ArtBks)	(ChildBks, GeogBks)	0.2410	0.1950	0.1020	0.423237	2.170444	0.05500
78	(ChildBks, GeogBks)	(ArtBks)	0.1950	0.2410	0.1020	0.523077	2.170444	0.05500
87	(DoItYBks)	(CookBks, ArtBks)	0.2820	0.1670	0.1015	0.359929	2.155264	0.05440
82	(CookBks, ArtBks)	(DoItYBks)	0.1670	0.2820	0.1015	0.607784	2.155264	0.05440
64	(CookBks, ChildBks)	(GeogBks)	0.2560	0.2760	0.1495	0.583984	2.115885	0.07884
69	(GeogBks)	(CookBks, ChildBks)	0.2760	0.2560	0.1495	0.541667	2.115885	0.07884
89	(CookBks, DoItYBks)	(GeogBks)	0.1875	0.2760	0.1085	0.578667	2.096618	0.05675
92	(GeogBks)	(CookBks, DoItYBks)	0.2760	0.1875	0.1085	0.393116	2.096618	0.05675

In [8]:

```
rules[rules.lift>1]
```

executed in 104ms, finished 23:29:46 2021-11-25

Out[8]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverag
0	(ChildBks)	(YouthBks)	0.4230	0.2475	0.1650	0.390071	1.576044	0.06030
1	(YouthBks)	(ChildBks)	0.2475	0.4230	0.1650	0.666667	1.576044	0.06030
2	(CookBks)	(ChildBks)	0.4310	0.4230	0.2560	0.593968	1.404179	0.07368
3	(ChildBks)	(CookBks)	0.4230	0.4310	0.2560	0.605201	1.404179	0.07368
4	(ChildBks)	(DoItYBks)	0.4230	0.2820	0.1840	0.434988	1.542511	0.06471
...	...	...	...	...	...	...	...	.
95	(CookBks, GeogBks)	(ArtBks)	0.1925	0.2410	0.1035	0.537662	2.230964	0.05710
96	(ArtBks, GeogBks)	(CookBks)	0.1275	0.4310	0.1035	0.811765	1.883445	0.04854
97	(CookBks)	(ArtBks, GeogBks)	0.4310	0.1275	0.1035	0.240139	1.883445	0.04854
98	(ArtBks)	(CookBks, GeogBks)	0.2410	0.1925	0.1035	0.429461	2.230964	0.05710
99	(GeogBks)	(CookBks, ArtBks)	0.2760	0.1670	0.1035	0.375000	2.245509	0.05740

100 rows × 9 columns