In [1]:

```
!pip install mlxtend
```

```
Collecting mlxtend
  Downloading mlxtend-0.19.0-py2.py3-none-any.whl (1.3 MB)
Requirement already satisfied: joblib>=0.13.2 in c:\users\kaama 5\anaconda3
\lib\site-packages (from mlxtend) (1.0.1)
Requirement already satisfied: scikit-learn>=0.20.3 in c:\users\kaama 5\anac
onda3\lib\site-packages (from mlxtend) (0.24.1)
Requirement already satisfied: setuptools in c:\users\kaama 5\anaconda3\lib
\site-packages (from mlxtend) (52.0.0.post20210125)
Requirement already satisfied: matplotlib>=3.0.0 in c:\users\kaama 5\anacond
a3\lib\site-packages (from mlxtend) (3.3.4)
Requirement already satisfied: numpy>=1.16.2 in c:\users\kaama 5\anaconda3\l
ib\site-packages (from mlxtend) (1.20.1)
Requirement already satisfied: scipy>=1.2.1 in c:\users\kaama 5\anaconda3\li
b\site-packages (from mlxtend) (1.6.2)
Requirement already satisfied: pandas>=0.24.2 in c:\users\kaama 5\anaconda3
\lib\site-packages (from mlxtend) (1.2.4)
Requirement already satisfied: pillow>=6.2.0 in c:\users\kaama 5\anaconda3\l
ib\site-packages (from matplotlib>=3.0.0->mlxtend) (8.2.0)
Requirement already satisfied: cycler>=0.10 in c:\users\kaama 5\anaconda3\li
b\site-packages (from matplotlib>=3.0.0->mlxtend) (0.10.0)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\kaama 5\anacond
a3\lib\site-packages (from matplotlib>=3.0.0->mlxtend) (1.3.1)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.3 in
c:\users\kaama 5\anaconda3\lib\site-packages (from matplotlib>=3.0.0->mlxten
d) (2.4.7)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\kaama 5\anac
onda3\lib\site-packages (from matplotlib>=3.0.0->mlxtend) (2.8.1)
Requirement already satisfied: six in c:\users\kaama 5\anaconda3\lib\site-pa
ckages (from cycler>=0.10->matplotlib>=3.0.0->mlxtend) (1.15.0)
Requirement already satisfied: pytz>=2017.3 in c:\users\kaama 5\anaconda3\li
b\site-packages (from pandas>=0.24.2->mlxtend) (2021.1)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\kaama 5\anac
onda3\lib\site-packages (from scikit-learn>=0.20.3->mlxtend) (2.1.0)
Installing collected packages: mlxtend
Successfully installed mlxtend-0.19.0
```

In [2]:

```
import pandas as pd
import numpy as np
import seaborn as sns
from matplotlib import pyplot as plt
from mlxtend.frequent_patterns import apriori,association_rules
from mlxtend.preprocessing import TransactionEncoder
```

In [5]:

```
dt = pd.read_csv('my_movies.csv')
dt
```

Out[5]:

	V1	V2	V3	V4	V5	Sixth Sense	Gladiator	LOTR1	Harry Potter1	Patriot	LOT
0	Sixth Sense	LOTR1	Harry Potter1	Green Mile	LOTR2	1	0	1	1	0	
1	Gladiator	Patriot	Braveheart	NaN	NaN	0	1	0	0	1	
2	LOTR1	LOTR2	NaN	NaN	NaN	0	0	1	0	0	
3	Gladiator	Patriot	Sixth Sense	NaN	NaN	1	1	0	0	1	
4	Gladiator	Patriot	Sixth Sense	NaN	NaN	1	1	0	0	1	
5	Gladiator	Patriot	Sixth Sense	NaN	NaN	1	1	0	0	1	
6	Harry Potter1	Harry Potter2	NaN	NaN	NaN	0	0	0	1	0	
7	Gladiator	Patriot	NaN	NaN	NaN	0	1	0	0	1	
8	Gladiator	Patriot	Sixth Sense	NaN	NaN	1	1	0	0	1	
9	Sixth Sense	LOTR	Gladiator	Green Mile	NaN	1	1	0	0	0	

In [6]:

```
dt.shape
```

Out[6]:

```
(10, 15)
```

In [7]:

```
dt.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10 entries, 0 to 9
Data columns (total 15 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   V1             10 non-null     object
 1   V2             10 non-null     object
 2   V3             7 non-null      object
 3   V4             2 non-null      object
 4   V5             1 non-null      object
 5   Sixth Sense    10 non-null     int64 
 6   Gladiator      10 non-null     int64 
 7   LOTR1          10 non-null     int64 
 8   Harry Potter1  10 non-null     int64 
 9   Patriot        10 non-null     int64 
 10  LOTR2          10 non-null     int64 
 11  Harry Potter2  10 non-null     int64 
 12  LOTR           10 non-null     int64 
 13  Braveheart     10 non-null     int64 
 14  Green Mile     10 non-null     int64 
dtypes: int64(10), object(5)
memory usage: 1.3+ KB
```

In [8]:

```
dt.isna().sum()
```

Out[8]:

```
V1              0
V2              0
V3              3
V4              8
V5              9
Sixth Sense     0
Gladiator       0
LOTR1           0
Harry Potter1   0
Patriot         0
LOTR2           0
Harry Potter2   0
LOTR            0
Braveheart      0
Green Mile      0
dtype: int64
```

In [9]:

```
dt2 = dt.iloc[:,5:]
dt2
```

Out[9]:

	Sixth Sense	Gladiator	LOTR1	Harry Potter1	Patriot	LOTR2	Harry Potter2	LOTR	Braveheart	Green Mile
0	1	0	1	1	0	1	0	0	0	1
1	0	1	0	0	1	0	0	0	1	0
2	0	0	1	0	0	1	0	0	0	0
3	1	1	0	0	1	0	0	0	0	0
4	1	1	0	0	1	0	0	0	0	0
5	1	1	0	0	1	0	0	0	0	0
6	0	0	0	1	0	0	1	0	0	0
7	0	1	0	0	1	0	0	0	0	0
8	1	1	0	0	1	0	0	0	0	0
9	1	1	0	0	0	0	0	1	0	1

In [10]:

```
dt2.describe()
```

Out[10]:

	Sixth Sense	Gladiator	LOTR1	Harry Potter1	Patriot	LOTR2	Harry Potter2	LOTR
count	10.000000	10.000000	10.000000	10.000000	10.000000	10.000000	10.000000	10.000000
mean	0.600000	0.700000	0.200000	0.200000	0.600000	0.200000	0.100000	0.100000
std	0.516398	0.483046	0.421637	0.421637	0.516398	0.421637	0.316228	0.316228
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.250000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
50%	1.000000	1.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000
75%	1.000000	1.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

In [11]:

```
# Apriori Algorithum
```

In [12]:

```
## 1. Association rules with 10% support and 70% confidence
```

In [13]:

```
itemsets = apriori(dt2,min_support=0.1,use_colnames=True)
itemsets
```

Out[13]:

	support	itemsets
0	0.6	(Sixth Sense)
1	0.7	(Gladiator)
2	0.2	(LOTR1)
3	0.2	(Harry Potter1)
4	0.6	(Patriot)
5	0.2	(LOTR2)
6	0.1	(Harry Potter2)
7	0.1	(LOTR)
8	0.1	(Braveheart)
9	0.2	(Green Mile)
10	0.5	(Sixth Sense, Gladiator)
11	0.1	(LOTR1, Sixth Sense)
12	0.1	(Sixth Sense, Harry Potter1)
13	0.4	(Sixth Sense, Patriot)
14	0.1	(Sixth Sense, LOTR2)
15	0.1	(Sixth Sense, LOTR)
16	0.2	(Sixth Sense, Green Mile)
17	0.6	(Gladiator, Patriot)
18	0.1	(Gladiator, LOTR)
19	0.1	(Gladiator, Braveheart)
20	0.1	(Green Mile, Gladiator)
21	0.1	(LOTR1, Harry Potter1)
22	0.2	(LOTR1, LOTR2)
23	0.1	(LOTR1, Green Mile)
24	0.1	(Harry Potter1, LOTR2)
25	0.1	(Harry Potter1, Harry Potter2)
26	0.1	(Green Mile, Harry Potter1)
27	0.1	(Braveheart, Patriot)
28	0.1	(Green Mile, LOTR2)
29	0.1	(Green Mile, LOTR)
30	0.4	(Sixth Sense, Gladiator, Patriot)
31	0.1	(Sixth Sense, Gladiator, LOTR)
32	0.1	(Sixth Sense, Gladiator, Green Mile)
33	0.1	(LOTR1, Sixth Sense, Harry Potter1)

	support	itemsets
34	0.1	(LOTR1, Sixth Sense, LOTR2)
35	0.1	(LOTR1, Sixth Sense, Green Mile)
36	0.1	(Sixth Sense, Harry Potter1, LOTR2)
37	0.1	(Sixth Sense, Green Mile, Harry Potter1)
38	0.1	(Sixth Sense, Green Mile, LOTR2)
39	0.1	(Sixth Sense, Green Mile, LOTR)
40	0.1	(Gladiator, Braveheart, Patriot)
41	0.1	(Green Mile, Gladiator, LOTR)
42	0.1	(LOTR1, Harry Potter1, LOTR2)
43	0.1	(LOTR1, Green Mile, Harry Potter1)
44	0.1	(LOTR1, Green Mile, LOTR2)
45	0.1	(Green Mile, Harry Potter1, LOTR2)
46	0.1	(Sixth Sense, Gladiator, Green Mile, LOTR)
47	0.1	(LOTR1, Sixth Sense, Harry Potter1, LOTR2)
48	0.1	(LOTR1, Sixth Sense, Green Mile, Harry Potter1)
49	0.1	(LOTR1, Sixth Sense, Green Mile, LOTR2)
50	0.1	(LOTR2, Sixth Sense, Green Mile, Harry Potter1)
51	0.1	(LOTR1, Green Mile, Harry Potter1, LOTR2)
52	0.1	(LOTR2, Green Mile, Harry Potter1, LOTR1, Sixt...

In [14]:

```
rule= association_rules(itemsets,metric='lift',min_threshold=0.7)
rule
```

Out[14]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverag
0	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.(
1	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.(
2	(LOTR1)	(Sixth Sense)	0.2	0.6	0.1	0.500000	0.833333	-0.(
3	(Sixth Sense)	(LOTR1)	0.6	0.2	0.1	0.166667	0.833333	-0.(
4	(Sixth Sense)	(Harry Potter1)	0.6	0.2	0.1	0.166667	0.833333	-0.(
...	...	...	...	...	...	...	...	
245	(LOTR2)	(LOTR1, Green Mile, Sixth Sense, Harry Potter1)	0.2	0.1	0.1	0.500000	5.000000	0.(
246	(Green Mile)	(LOTR1, Sixth Sense, Harry Potter1, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
247	(Harry Potter1)	(LOTR1, Green Mile, Sixth Sense, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
248	(LOTR1)	(Sixth Sense, Green Mile, Harry Potter1, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
249	(Sixth Sense)	(LOTR1, Green Mile, Harry Potter1, LOTR2)	0.6	0.1	0.1	0.166667	1.666667	0.(

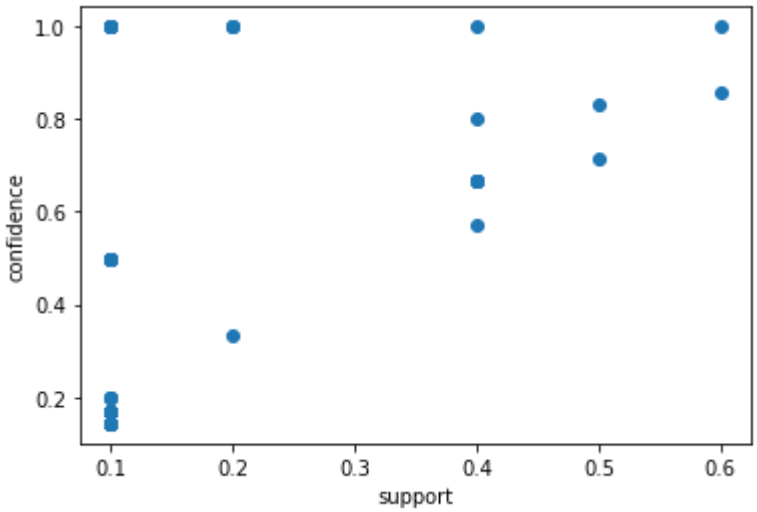
250 rows × 9 columns

In [15]:

```
# visualization of obtained rule
```

In [18]:

```
plt.scatter(rule['support'],rule['confidence'])
plt.xlabel('support')
plt.ylabel('confidence')
plt.show()
```



In [20]:

```
#Association rules with 5% support and 90% confidence
```

In [21]:

```
itemsets1 = apriori(dt2,min_support=0.05,use_colnames=True)
itemsets1
```

Out[21]:

	support	itemsets
0	0.6	(Sixth Sense)
1	0.7	(Gladiator)
2	0.2	(LOTR1)
3	0.2	(Harry Potter1)
4	0.6	(Patriot)
5	0.2	(LOTR2)
6	0.1	(Harry Potter2)
7	0.1	(LOTR)
8	0.1	(Braveheart)
9	0.2	(Green Mile)
10	0.5	(Sixth Sense, Gladiator)
11	0.1	(LOTR1, Sixth Sense)
12	0.1	(Sixth Sense, Harry Potter1)
13	0.4	(Sixth Sense, Patriot)
14	0.1	(Sixth Sense, LOTR2)
15	0.1	(Sixth Sense, LOTR)
16	0.2	(Sixth Sense, Green Mile)
17	0.6	(Gladiator, Patriot)
18	0.1	(Gladiator, LOTR)
19	0.1	(Gladiator, Braveheart)
20	0.1	(Green Mile, Gladiator)
21	0.1	(LOTR1, Harry Potter1)
22	0.2	(LOTR1, LOTR2)
23	0.1	(LOTR1, Green Mile)
24	0.1	(Harry Potter1, LOTR2)
25	0.1	(Harry Potter1, Harry Potter2)
26	0.1	(Green Mile, Harry Potter1)
27	0.1	(Braveheart, Patriot)
28	0.1	(Green Mile, LOTR2)
29	0.1	(Green Mile, LOTR)
30	0.4	(Sixth Sense, Gladiator, Patriot)
31	0.1	(Sixth Sense, Gladiator, LOTR)
32	0.1	(Sixth Sense, Gladiator, Green Mile)
33	0.1	(LOTR1, Sixth Sense, Harry Potter1)

	support	itemsets
34	0.1	(LOTR1, Sixth Sense, LOTR2)
35	0.1	(LOTR1, Sixth Sense, Green Mile)
36	0.1	(Sixth Sense, Harry Potter1, LOTR2)
37	0.1	(Sixth Sense, Green Mile, Harry Potter1)
38	0.1	(Sixth Sense, Green Mile, LOTR2)
39	0.1	(Sixth Sense, Green Mile, LOTR)
40	0.1	(Gladiator, Braveheart, Patriot)
41	0.1	(Green Mile, Gladiator, LOTR)
42	0.1	(LOTR1, Harry Potter1, LOTR2)
43	0.1	(LOTR1, Green Mile, Harry Potter1)
44	0.1	(LOTR1, Green Mile, LOTR2)
45	0.1	(Green Mile, Harry Potter1, LOTR2)
46	0.1	(Sixth Sense, Gladiator, Green Mile, LOTR)
47	0.1	(LOTR1, Sixth Sense, Harry Potter1, LOTR2)
48	0.1	(LOTR1, Sixth Sense, Green Mile, Harry Potter1)
49	0.1	(LOTR1, Sixth Sense, Green Mile, LOTR2)
50	0.1	(LOTR2, Sixth Sense, Green Mile, Harry Potter1)
51	0.1	(LOTR1, Green Mile, Harry Potter1, LOTR2)
52	0.1	(LOTR2, Green Mile, Harry Potter1, LOTR1, Sixt...

In [22]:

```
rule1 = association_rules(itemsets,metric='lift',min_threshold=0.9)
rule1
```

Out[22]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverag
0	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.(
1	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.(
2	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.(
3	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.(
4	(Sixth Sense)	(LOTR)	0.6	0.1	0.1	0.166667	1.666667	0.(
...	...	...	...	...	...	...	...	
233	(LOTR2)	(LOTR1, Green Mile, Sixth Sense, Harry Potter1)	0.2	0.1	0.1	0.500000	5.000000	0.(
234	(Green Mile)	(LOTR1, Sixth Sense, Harry Potter1, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
235	(Harry Potter1)	(LOTR1, Green Mile, Sixth Sense, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
236	(LOTR1)	(Sixth Sense, Green Mile, Harry Potter1, LOTR2)	0.2	0.1	0.1	0.500000	5.000000	0.(
237	(Sixth Sense)	(LOTR1, Green Mile, Harry Potter1, LOTR2)	0.6	0.1	0.1	0.166667	1.666667	0.(

238 rows × 9 columns

In [ ]: