In [42]:
```python
import pandas as pd
import matplotlib.pyplot as plt
from mlxtend.frequent_patterns import apriori,association_rules
```

In [43]:
```python
movie_data=pd.read_csv('my_movies.csv')
movie_data
```

Out[43]:

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

In [44]:
```python
movie_data.shape
```

Out[44]: (10, 15)

In [45]:
```python
movie_data.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 [46]:
```python
movie=movie_data.iloc[:,5:]
movie
```

Out[46]:

	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

Apriori Algorithm

Association rules with 10% Support and 70% Confidence

In [47]:
```python
#With 10% support
frequent_itemsets=apriori(movie,min_support=0.1,use_colnames=True)
frequent_itemsets
```

Out[47]:

	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	(Gladiator, Sixth Sense)
11	0.1	(LOTR1, Sixth Sense)
12	0.1	(Harry Potter1, Sixth Sense)
13	0.4	(Patriot, Sixth Sense)
14	0.1	(LOTR2, Sixth Sense)
15	0.1	(LOTR, Sixth Sense)
16	0.2	(Green Mile, Sixth Sense)
17	0.6	(Patriot, Gladiator)
18	0.1	(Gladiator, LOTR)
19	0.1	(Gladiator, Braveheart)
20	0.1	(Gladiator, Green Mile)
21	0.1	(LOTR1, Harry Potter1)
22	0.2	(LOTR1, LOTR2)
23	0.1	(LOTR1, Green Mile)
24	0.1	(LOTR2, Harry Potter1)
25	0.1	(Harry Potter2, Harry Potter1)
26	0.1	(Harry Potter1, Green Mile)
27	0.1	(Patriot, Braveheart)
28	0.1	(LOTR2, Green Mile)
29	0.1	(LOTR, Green Mile)
30	0.4	(Patriot, Gladiator, Sixth Sense)
31	0.1	(Gladiator, LOTR, Sixth Sense)
32	0.1	(Green Mile, Gladiator, Sixth Sense)
33	0.1	(LOTR1, Harry Potter1, Sixth Sense)
34	0.1	(LOTR1, LOTR2, Sixth Sense)
35	0.1	(Green Mile, LOTR1, Sixth Sense)
36	0.1	(LOTR2, Harry Potter1, Sixth Sense)
37	0.1	(Green Mile, Harry Potter1, Sixth Sense)
38	0.1	(Green Mile, LOTR2, Sixth Sense)
39	0.1	(Green Mile, LOTR, Sixth Sense)
40	0.1	(Patriot, Gladiator, Braveheart)
41	0.1	(Gladiator, LOTR, Green Mile)
42	0.1	(LOTR1, LOTR2, Harry Potter1)
43	0.1	(LOTR1, Harry Potter1, Green Mile)
44	0.1	(LOTR1, LOTR2, Green Mile)
45	0.1	(LOTR2, Harry Potter1, Green Mile)
46	0.1	(Green Mile, Gladiator, LOTR, Sixth Sense)
47	0.1	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)
48	0.1	(Green Mile, LOTR1, Harry Potter1, Sixth Sense)
49	0.1	(Green Mile, LOTR1, LOTR2, Sixth Sense)
50	0.1	(Green Mile, LOTR2, Harry Potter1, Sixth Sense)
51	0.1	(LOTR1, LOTR2, Harry Potter1, Green Mile)
52	0.1	(Harry Potter1, Green Mile, LOTR2, LOTR1, Sixt...

In [48]:
```python
# With 70% confidence
rules=association_rules(frequent_itemsets,metric='lift',min_threshold=0.7)
rules
```

Out[48]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.40
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.80
2	(LOTR1)	(Sixth Sense)	0.2	0.6	0.1	0.500000	0.833333	-0.02	0.80
3	(Sixth Sense)	(LOTR1)	0.6	0.2	0.1	0.166667	0.833333	-0.02	0.96
4	(Harry Potter1)	(Sixth Sense)	0.2	0.6	0.1	0.500000	0.833333	-0.02	0.80
...	...	...	...	...	...	...	...	...	...
245	(Harry Potter1)	(LOTR1, LOTR2, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
246	(Green Mile)	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
247	(LOTR2)	(LOTR1, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
248	(LOTR1)	(LOTR2, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
249	(Sixth Sense)	(LOTR1, LOTR2, Harry Potter1, Green Mile)	0.6	0.1	0.1	0.166667	1.666667	0.04	1.08

250 rows × 9 columns

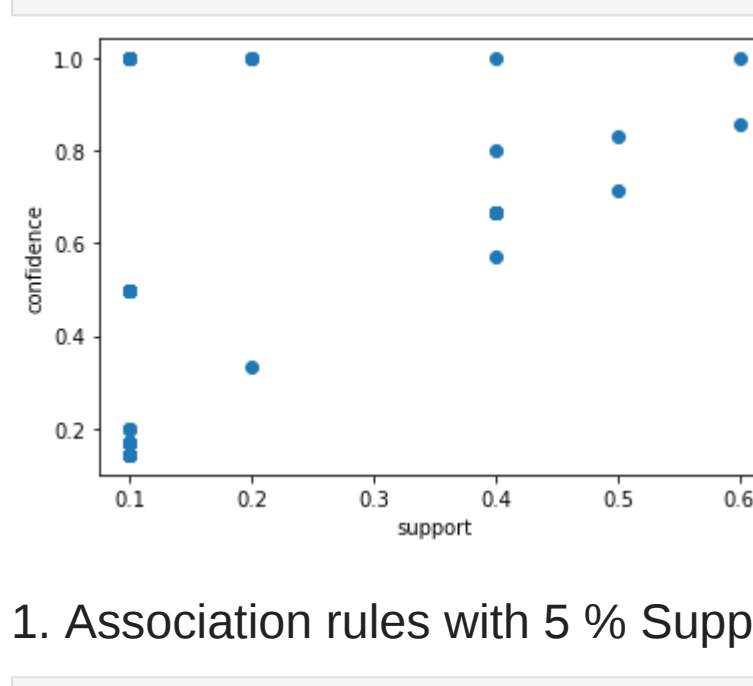
In [49]:
```python
rules[rules.lift>1]
```

Out[49]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.40
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.80
6	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
7	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
10	(LOTR)	(Sixth Sense)	0.1	0.6	0.1	1.000000	1.666667	0.04	inf
...	...	...	...	...	...	...	...	...	...
245	(Harry Potter1)	(LOTR1, LOTR2, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
246	(Green Mile)	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
247	(LOTR2)	(LOTR1, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
248	(LOTR1)	(LOTR2, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
249	(Sixth Sense)	(LOTR1, LOTR2, Harry Potter1, Green Mile)	0.6	0.1	0.1	0.166667	1.666667	0.04	1.08

236 rows × 9 columns

In [50]:
```python
# visualization of obtained rule
plt.scatter(rules['support'],rules['confidence'])
plt.xlabel('support')
plt.ylabel('confidence')
plt.show()
```



1. Association rules with 5 % Support and 90% Confidence

In [51]:
```python
# with 5% support
frequent_itemsets2=apriori(movie,min_support=0.05,use_colnames=True)
frequent_itemsets2
```

Out[51]:

	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	(Gladiator, Sixth Sense)
11	0.1	(LOTR1, Sixth Sense)
12	0.1	(Harry Potter1, Sixth Sense)
13	0.4	(Patriot, Sixth Sense)
14	0.1	(LOTR2, Sixth Sense)
15	0.1	(LOTR, Sixth Sense)
16	0.2	(Green Mile, Sixth Sense)
17	0.6	(Patriot, Gladiator)
18	0.1	(Gladiator, LOTR)
19	0.1	(Gladiator, Braveheart)
20	0.1	(Gladiator, Green Mile)
21	0.1	(LOTR1, Harry Potter1)
22	0.2	(LOTR1, LOTR2)
23	0.1	(LOTR1, Green Mile)
24	0.1	(LOTR2, Harry Potter1)
25	0.1	(Harry Potter2, Harry Potter1)
26	0.1	(Harry Potter1, Green Mile)
27	0.1	(Patriot, Braveheart)
28	0.1	(LOTR2, Green Mile)
29	0.1	(LOTR, Green Mile)
30	0.4	(Patriot, Gladiator, Sixth Sense)
31	0.1	(Gladiator, LOTR, Sixth Sense)
32	0.1	(Green Mile, Gladiator, Sixth Sense)
33	0.1	(LOTR1, Harry Potter1, Sixth Sense)
34	0.1	(LOTR1, LOTR2, Sixth Sense)
35	0.1	(Green Mile, LOTR1, Sixth Sense)
36	0.1	(LOTR2, Harry Potter1, Sixth Sense)
37	0.1	(Green Mile, Harry Potter1, Sixth Sense)
38	0.1	(Green Mile, LOTR2, Sixth Sense)
39	0.1	(Green Mile, LOTR, Sixth Sense)
40	0.1	(Patriot, Gladiator, Braveheart)
41	0.1	(Gladiator, LOTR, Green Mile)
42	0.1	(LOTR1, LOTR2, Harry Potter1)
43	0.1	(LOTR1, Harry Potter1, Green Mile)
44	0.1	(LOTR1, LOTR2, Green Mile)
45	0.1	(LOTR2, Harry Potter1, Green Mile)
46	0.1	(Green Mile, Gladiator, LOTR, Sixth Sense)
47	0.1	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)
48	0.1	(Green Mile, LOTR1, Harry Potter1, Sixth Sense)
49	0.1	(Green Mile, LOTR1, LOTR2, Sixth Sense)
50	0.1	(Green Mile, LOTR2, Harry Potter1, Sixth Sense)
51	0.1	(LOTR1, LOTR2, Harry Potter1, Green Mile)
52	0.1	(Harry Potter1, Green Mile, LOTR2, LOTR1, Sixt...

In [52]:
```python
# With 90% confidence
rules=association_rules(frequent_itemsets,metric='lift',min_threshold=0.9)
rules
```

Out[52]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.40
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.80
2	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
3	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
4	(LOTR)	(Sixth Sense)	0.1	0.6	0.1	1.000000	1.666667	0.04	inf
...	...	...	...	...	...	...	...	...	...
233	(Harry Potter1)	(LOTR1, LOTR2, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
234	(Green Mile)	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
235	(LOTR2)	(LOTR1, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
236	(LOTR1)	(LOTR2, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
237	(Sixth Sense)	(LOTR1, LOTR2, Harry Potter1, Green Mile)	0.6	0.1	0.1	0.166667	1.666667	0.04	1.08

238 rows × 9 columns

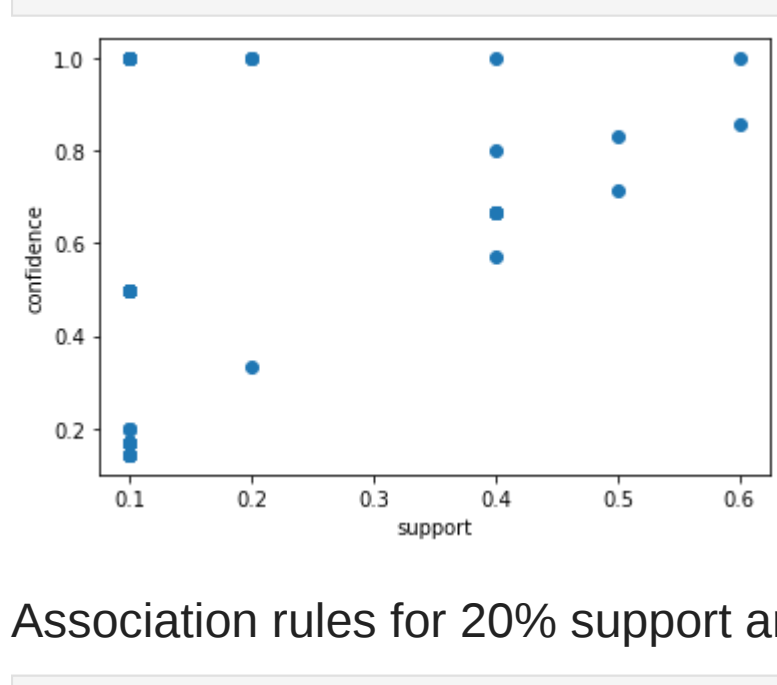
In [53]:
```python
rules[rules.lift>1]
```

Out[53]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.40
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.80
2	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
3	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.20
4	(LOTR)	(Sixth Sense)	0.1	0.6	0.1	1.000000	1.666667	0.04	inf
...	...	...	...	...	...	...	...	...	...
233	(Harry Potter1)	(LOTR1, LOTR2, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
234	(Green Mile)	(LOTR1, LOTR2, Harry Potter1, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
235	(LOTR2)	(LOTR1, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
236	(LOTR1)	(LOTR2, Harry Potter1, Green Mile, Sixth Sense)	0.2	0.1	0.1	0.500000	5.000000	0.08	1.80
237	(Sixth Sense)	(LOTR1, LOTR2, Harry Potter1, Green Mile)	0.6	0.1	0.1	0.166667	1.666667	0.04	1.08

236 rows × 9 columns

In [54]:
```python
plt.scatter(rules['support'],rules['confidence'])
plt.xlabel('support')
plt.ylabel('confidence')
plt.show()
```



Association rules for 20% support and 80 % confidence

In [55]:
```python
# with 20% support
frequent_itemsets2=apriori(movie,min_support=0.20,use_colnames=True)
frequent_itemsets2
```

Out[55]:

	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	0.2	(Green Mile)
7	0.5	(Gladiator, Sixth Sense)
8	0.4	(Patriot, Sixth Sense)
9	0.2	(Green Mile, Sixth Sense)
10	0.6	(Patriot, Gladiator)
11	0.2	(LOTR1, LOTR2)
12	0.4	(Patriot, Gladiator, Sixth Sense)

In [39]:
```python
# With 80% confidence
rules2=association_rules(frequent_itemsets2,metric='lift',min_threshold=0.8)
rules2
```

Out[39]:

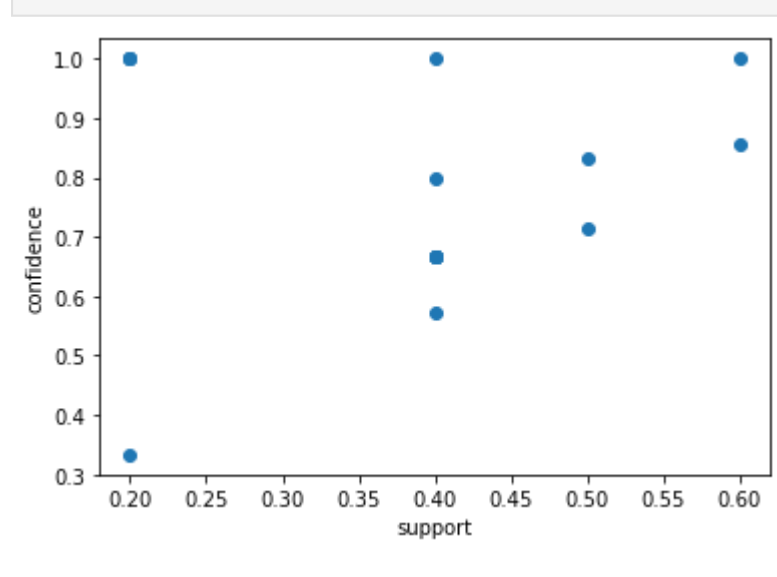
	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.4
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.8
2	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
3	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
4	(Green Mile)	(Sixth Sense)	0.2	0.6	0.2	1.000000	1.666667	0.08	inf
5	(Sixth Sense)	(Green Mile)	0.6	0.2	0.2	0.333333	1.666667	0.08	1.2
6	(Patriot)	(Gladiator)	0.6	0.7	0.6	1.000000	1.428571	0.18	inf
7	(Gladiator)	(Patriot)	0.7	0.6	0.6	0.857143	1.428571	0.18	2.8
8	(LOTR1)	(LOTR2)	0.2	0.2	0.2	1.000000	5.000000	0.16	inf
9	(LOTR2)	(LOTR1)	0.2	0.2	0.2	1.000000	5.000000	0.16	inf
10	(Patriot, Gladiator)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
11	(Patriot, Sixth Sense)	(Gladiator)	0.4	0.7	0.4	1.000000	1.428571	0.12	inf
12	(Gladiator, Sixth Sense)	(Patriot)	0.5	0.6	0.4	0.800000	1.333333	0.10	2.0
13	(Patriot)	(Gladiator, Sixth Sense)	0.6	0.5	0.4	0.666667	1.333333	0.10	1.5
14	(Gladiator)	(Patriot, Sixth Sense)	0.7	0.4	0.4	0.571429	1.428571	0.12	1.4
15	(Sixth Sense)	(Patriot, Gladiator)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2

In [56]:
```python
rules2[rules2.lift>1]
```

Out[56]:

	antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction
0	(Gladiator)	(Sixth Sense)	0.7	0.6	0.5	0.714286	1.190476	0.08	1.4
1	(Sixth Sense)	(Gladiator)	0.6	0.7	0.5	0.833333	1.190476	0.08	1.8
2	(Patriot)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
3	(Sixth Sense)	(Patriot)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
4	(Green Mile)	(Sixth Sense)	0.2	0.6	0.2	1.000000	1.666667	0.08	inf
5	(Sixth Sense)	(Green Mile)	0.6	0.2	0.2	0.333333	1.666667	0.08	1.2
6	(Patriot)	(Gladiator)	0.6	0.7	0.6	1.000000	1.428571	0.18	inf
7	(Gladiator)	(Patriot)	0.7	0.6	0.6	0.857143	1.428571	0.18	2.8
8	(LOTR1)	(LOTR2)	0.2	0.2	0.2	1.000000	5.000000	0.16	inf
9	(LOTR2)	(LOTR1)	0.2	0.2	0.2	1.000000	5.000000	0.16	inf
10	(Patriot, Gladiator)	(Sixth Sense)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2
11	(Patriot, Sixth Sense)	(Gladiator)	0.4	0.7	0.4	1.000000	1.428571	0.12	inf
12	(Gladiator, Sixth Sense)	(Patriot)	0.5	0.6	0.4	0.800000	1.333333	0.10	2.0
13	(Patriot)	(Gladiator, Sixth Sense)	0.6	0.5	0.4	0.666667	1.333333	0.10	1.5
14	(Gladiator)	(Patriot, Sixth Sense)	0.7	0.4	0.4	0.571429	1.428571	0.12	1.4
15	(Sixth Sense)	(Patriot, Gladiator)	0.6	0.6	0.4	0.666667	1.111111	0.04	1.2

In [57]:
```python
plt.scatter(rules2['support'],rules2['confidence'])
plt.xlabel('support')
plt.ylabel('confidence')
plt.show()
```



In [ ]: