

### Titanic Dataset (Apriori)

#### All Rules

Produces a set of 186 rules

#### Support = 0.01 & Confidence = 0.9

lhs	rhs	support	confidence	lift
ft				
1 {Class=2nd, Age=Child}	=> {Survived=Yes}	0.01090413	1.0000000	3.
095640				
2 {Class=1st, Sex=Female}	=> {Survived=Yes}	0.06406179	0.9724138	3.
010243				
3 {Class=2nd, Sex=Male, Age=Adult}	=> {Survived=No}	0.06996820	0.9166667	1.
354083				
4 {Class=1st, Sex=Female, Age=Adult}	=> {Survived=Yes}	0.06360745	0.9722222	3.
009650				

#### Removing Redundancies

1 {Class=2nd, Age=Child}	=> {Survived=Yes}	0.01090413	1.0000000	3.09
5640				
2 {Class=1st, Sex=Female}	=> {Survived=Yes}	0.06406179	0.9724138	3.01
0243				
3 {Class=2nd, Sex=Male, Age=Adult}	=> {Survived=No}	0.06996820	0.9166667	1.35
4083				

#### Sorted

1 {Class=2nd, Age=Child}	=> {Survived=Yes}	0.01090413	1.0000000	3.09
5640				
2 {Class=1st, Sex=Female}	=> {Survived=Yes}	0.06406179	0.9724138	3.01
0243				
3 {Class=2nd, Sex=Male, Age=Adult}	=> {Survived=No}	0.06996820	0.9166667	1.35
4083				

**Summary:** With the Titanic data set it is clear that after filtering for high confidence (and low support) as well as pruning for redundancies that those most likely to have survived the downfall of Titanic were 2<sup>nd</sup> class children as well as 2<sup>nd</sup> class male adults and female (adults and children) with a sizeable lift to support it.

### Retail Dataset (Apriori)

#### All Rules

Set of 6108 rules

#### Support = 0.01 & Confidence = 0.9

Set of 520 rules

\*\*1 - 500 omitted to save space \*\*

501 {Bread, CannedGoods, Dairy, Drink, Fruit, PaperGoods, Vegetable}	=> {PersonalCar}
e} 0.0158 0.9518072 1.644165	

```

502 {Bread,CannedGoods,Dairy,Drink,FrozenFood,Fruit,Vegetable} => {PersonalCar
e} 0.0314 0.9486405 1.638695
503 {Bread,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco} => {PersonalCar
e} 0.0211 0.9590909 1.656747
504 {Bread,Dairy,Drink,FrozenFood,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0216 0.9642857 1.665721
505 {Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0232 0.9666667 1.669834
506 {Bread,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0303 0.9711538 1.677585
507 {Bread,Dairy,Drink,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0408 0.9691211 1.674073
508 {Bread,Dairy,Drink,FrozenFood,Fruit,Tobacco,Vegetable} => {PersonalCar
e} 0.0459 0.9562500 1.651840
509 {Bread,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Vegetable} => {PersonalCar
e} 0.0232 0.9626556 1.662905
510 {Bread,Cleaner,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0114 0.9579832 1.654834
511 {Bread,Cleaner,Dairy,Drink,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0168 0.9655172 1.667848
512 {Bread,CannedGoods,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco} => {PersonalCar
e} 0.0120 0.9448819 1.632202
513 {Bread,CannedGoods,Dairy,Drink,FrozenFood,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0124 0.9465649 1.635109
514 {CannedGoods,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0130 0.9489051 1.639152
515 {Bread,CannedGoods,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0169 0.9602273 1.658710
516 {Bread,CannedGoods,Dairy,Drink,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0123 0.9461538 1.634399
517 {Bread,CannedGoods,Dairy,Drink,FrozenFood,Fruit,Tobacco,Vegetable} => {PersonalCar
e} 0.0252 0.9473684 1.636498
518 {Bread,CannedGoods,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Vegetable} => {PersonalCar
e} 0.0136 0.9444444 1.631447
519 {Bread,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0191 0.9597990 1.657970
520 {Bread,CannedGoods,Dairy,Drink,FrozenFood,Fruit,PaperGoods,Tobacco,Vegetable} => {PersonalCar
e} 0.0108 0.9391304 1.622267

```

### **Removing Redundancies**

```

lhs      rhs      support confidence lift
1 {Drink} => {PersonalCare} 0.2921 0.9675389 1.67134

```

### **Sorted**

```

lhs      rhs      support confidence lift
1 {Drink} => {PersonalCare} 0.2921 0.9675389 1.67134

```

**Summary:** A substantial amount of rules were generated when creating the entire rule set for the retail database. After filtering, PersonalCare seems to be the only product that gets chosen out of the three categories of Meat, Beverages and PersonalCare. Removing redundant rules led to one rule that was buying a “Drink” led to buying “PersonalCare” items with a decent amount of lift to support it.

## **Game of Thrones Dataset (Apriori)**

### **All Rules**

Set of 475 rules

### **Support = 0.01 & Confidence = 0.9**

Set of 83 rules

```

lhs      rhs      support confidence li
ft
1 {House=House Martell} => {Survives=1} 0.01199564 0.9166667 1.
373502
2 {House=House Tyrell} => {Survives=1} 0.01090513 0.9090909 1.
362151

```

3 {House=Tyrell}	=> {Survives=1} 0.01526718 0.9333333 1.
398475	
4 {House=Martell}	=> {Survives=1} 0.02508179 0.9200000 1.
378497	
5 {House=House Martell,Book4}	=> {Survives=1} 0.01199564 1.0000000 1.
498366	
6 {House=Targaryen,Book5}	=> {Survives=1} 0.01308615 0.9230769 1.
383107	
7 {House=Tyrell,Book4}	=> {Survives=1} 0.01308615 0.9230769 1.
383107	
8 {House=Tyrell,Nobility}	=> {Survives=1} 0.01526718 0.9333333 1.
398475	
9 {House=Arryn,Book4}	=> {Survives=1} 0.01635769 0.9375000 1.
404718	
10 {House=Arryn,Nobility}	=> {Survives=1} 0.01853871 0.9444444 1.
415123	
11 {House=Martell,Book3}	=> {Survives=1} 0.01526718 1.0000000 1.
498366	
12 {House=Martell,Nobility}	=> {Survives=1} 0.02071974 0.9500000 1.
423448	
13 {House=Greyjoy,Book4}	=> {Survives=1} 0.03925845 0.9230769 1.
383107	
14 {House=Stark,Gender=F}	=> {Survives=1} 0.02071974 0.9047619 1.
355664	
15 {House=Stark,Book5}	=> {Survives=1} 0.02944384 1.0000000 1.
498366	
16 {House=Lannister,Book4}	=> {Survives=1} 0.04252999 0.9285714 1.
391340	
17 {House=Lannister,Book5}	=> {Survives=1} 0.01199564 1.0000000 1.
498366	
18 {Gender=F,Book4}	=> {Survives=1} 0.05125409 0.9591837 1.
437208	
19 {Nobility,Book4}	=> {Survives=1} 0.14721919 0.9183673 1.
376050	
20 {House=Targaryen,Gender=M,Book5}	=> {Survives=1} 0.01199564 0.9166667 1.
373502	
21 {House=Tyrell,Nobility,Book4}	=> {Survives=1} 0.01308615 0.9230769 1.
383107	
22 {House=Arryn,Nobility,Book4}	=> {Survives=1} 0.01308615 1.0000000 1.
498366	
23 {House=Arryn,Gender=M,Book4}	=> {Survives=1} 0.01308615 0.9230769 1.
383107	
24 {House=Arryn,Gender=M,Nobility}	=> {Survives=1} 0.01635769 0.9375000 1.
404718	
25 {House=Martell,Nobility,Book3}	=> {Survives=1} 0.01308615 1.0000000 1.
498366	
26 {House=Martell,Gender=M,Book3}	=> {Survives=1} 0.01090513 1.0000000 1.
498366	
27 {House=Martell,Gender=M,Nobility}	=> {Survives=1} 0.01526718 0.9333333 1.
398475	
28 {House=Greyjoy,Nobility,Book4}	=> {Survives=1} 0.02944384 0.9310345 1.
395030	
29 {House=Greyjoy,Gender=M,Book4}	=> {Survives=1} 0.03489640 0.9142857 1.
369935	
30 {House=Stark,Gender=F,Book5}	=> {Survives=1} 0.01090513 1.0000000 1.
498366	
31 {House=Stark,Gender=F,Book3}	=> {Survives=1} 0.01090513 0.9090909 1.
362151	
32 {House=Stark,Nobility,Book5}	=> {Survives=1} 0.02835333 1.0000000 1.
498366	
33 {House=Stark,Gender=M,Book5}	=> {Survives=1} 0.01853871 1.0000000 1.
498366	
34 {House=Lannister,Book3,Book4}	=> {Survives=1} 0.02181025 0.9523810 1.
427015	
35 {House=Lannister,Nobility,Book4}	=> {Survives=1} 0.03707743 0.9189189 1.
376877	
36 {House=Lannister,Gender=M,Book4}	=> {Survives=1} 0.03707743 0.9444444 1.
415123	
37 {House=Lannister,Gender=M,Book5}	=> {Survives=1} 0.01090513 1.0000000 1.
498366	
38 {House=Night's Watch,Book1,Book5}	=> {Survives=1} 0.01308615 1.0000000 1.
498366	
39 {House=None,Gender=F,Nobility}	=> {Survives=1} 0.02181025 0.9523810 1.
427015	
40 {Gender=F,Book4,Book5}	=> {Survives=1} 0.01199564 1.0000000 1.
498366	
41 {Gender=F,Book2,Book4}	=> {Survives=1} 0.01090513 0.9090909 1.
362151	
42 {Gender=F,Book3,Book4}	=> {Survives=1} 0.02071974 1.0000000 1.
498366	

43 {Gender=F,Nobility,Book4}	=> {Survives=1}	0.03707743	0.9714286	1.
455556				
44 {Gender=F,Book3,Book5}	=> {Survives=1}	0.02071974	0.9500000	1.
423448				
45 {Gender=F,Nobility,Book5}	=> {Survives=1}	0.03162486	0.9666667	1.
448420				
46 {Book2,Book4,Book5}	=> {Survives=1}	0.02399128	0.9166667	1.
373502				
47 {Nobility,Book4,Book5}	=> {Survives=1}	0.02726281	0.9615385	1.
440737				
48 {Gender=M,Nobility,Book4}	=> {Survives=1}	0.11014177	0.9017857	1.
351205				
49 {Book1,Book3,Book5}	=> {Survives=1}	0.04034896	0.9024390	1.
352184				
50 {House=Arryn,Gender=M,Nobility,Book4}	=> {Survives=1}	0.01090513	1.0000000	1.
498366				
51 {House=Greyjoy,Gender=M,Nobility,Book4}	=> {Survives=1}	0.02726281	0.9259259	1.
387376				
52 {House=Stark,Gender=F,Nobility,Book5}	=> {Survives=1}	0.01090513	1.0000000	1.
498366				
53 {House=Stark,Gender=M,Nobility,Book5}	=> {Survives=1}	0.01744820	1.0000000	1.
498366				
54 {House=Lannister,Book2,Book3,Book4}	=> {Survives=1}	0.01635769	0.9375000	1.
404718				
55 {House=Lannister,Gender=M,Book2,Book4}	=> {Survives=1}	0.01962923	0.9000000	1.
348529				
56 {House=Lannister,Nobility,Book3,Book4}	=> {Survives=1}	0.01853871	0.9444444	1.
415123				
57 {House=Lannister,Gender=M,Book3,Book4}	=> {Survives=1}	0.01962923	0.9473684	1.
419505				
58 {House=Lannister,Gender=M,Nobility,Book4}	=> {Survives=1}	0.03162486	0.9354839	1.
401697				
59 {House=Lannister,Gender=M,Nobility,Book3}	=> {Survives=1}	0.02508179	0.9200000	1.
378497				
60 {House=Night's Watch,Book1,Book3,Book5}	=> {Survives=1}	0.01308615	1.0000000	1.
498366				
61 {House=Night's Watch,Gender=M,Book1,Book5}	=> {Survives=1}	0.01308615	1.0000000	1.
498366				
62 {House=None,Gender=F,Nobility,Book3}	=> {Survives=1}	0.01417666	0.9285714	1.
391340				
63 {Gender=F,Nobility,Book3,Book4}	=> {Survives=1}	0.01962923	1.0000000	1.
498366				
64 {Gender=F,Book2,Book3,Book5}	=> {Survives=1}	0.01308615	0.9230769	1.
383107				
65 {Gender=F,Nobility,Book3,Book5}	=> {Survives=1}	0.01199564	0.9166667	1.
373502				
66 {Nobility,Book1,Book4,Book5}	=> {Survives=1}	0.01090513	0.9090909	1.
362151				
67 {Nobility,Book2,Book4,Book5}	=> {Survives=1}	0.01744820	0.9411765	1.
410227				
68 {Nobility,Book3,Book4,Book5}	=> {Survives=1}	0.01417666	0.9285714	1.
391340				
69 {Gender=M,Nobility,Book4,Book5}	=> {Survives=1}	0.01744820	0.9411765	1.
410227				
70 {Nobility,Book2,Book3,Book4}	=> {Survives=1}	0.03598691	0.9166667	1.
373502				
71 {Gender=M,Book1,Book3,Book5}	=> {Survives=1}	0.03380589	0.9117647	1.
366157				
72 {House=Lannister,Nobility,Book2,Book3,Book4}	=> {Survives=1}	0.01308615	0.9230769	1.
383107				
73 {House=Lannister,Gender=M,Book2,Book3,Book4}	=> {Survives=1}	0.01635769	0.9375000	1.
404718				
74 {House=Lannister,Gender=M,Nobility,Book3,Book4}	=> {Survives=1}	0.01635769	0.9375000	1.
404718				
75 {House=Night's Watch,Gender=M,Book1,Book3,Book5}	=> {Survives=1}	0.01308615	1.0000000	1.
498366				
76 {Nobility,Book1,Book2,Book4,Book5}	=> {Survives=1}	0.01090513	0.9090909	1.
362151				
77 {Nobility,Book1,Book3,Book4,Book5}	=> {Survives=1}	0.01090513	0.9090909	1.
362151				
78 {Nobility,Book2,Book3,Book4,Book5}	=> {Survives=1}	0.01308615	0.9230769	1.
383107				
79 {Gender=M,Nobility,Book2,Book4,Book5}	=> {Survives=1}	0.01308615	0.9230769	1.
383107				
80 {Gender=M,Nobility,Book3,Book4,Book5}	=> {Survives=1}	0.01090513	0.9090909	1.
362151				
81 {Gender=M,Nobility,Book2,Book3,Book4}	=> {Survives=1}	0.02944384	0.9000000	1.
348529				
82 {House=Lannister,Gender=M,Nobility,Book2,Book3,Book4}	=> {Survives=1}	0.01308615	0.9230769	1.
383107				

```
83 {Nobility,Book1,Book2,Book3,Book4,Book5} => {Survives=1} 0.01090513 0.9090909 1.362151
```

### Removing Redundancies

Set of 21 rules

	lhs	rhs	support	confidence	lift
1	{House=House Martell}	=> {Survives=1}	0.01199564	0.9166667	1.373502
2	{House=House Tyrell}	=> {Survives=1}	0.01090513	0.9090909	1.362151
3	{House=Tyrell}	=> {Survives=1}	0.01526718	0.9333333	1.398475
4	{House=Martell}	=> {Survives=1}	0.02508179	0.9200000	1.378497
6	{House=Targaryen,Book5}	=> {Survives=1}	0.01308615	0.9230769	1.383107
9	{House=Arryn,Book4}	=> {Survives=1}	0.01635769	0.9375000	1.404718
10	{House=Arryn,Nobility}	=> {Survives=1}	0.01853871	0.9444444	1.415123
13	{House=Greyjoy,Book4}	=> {Survives=1}	0.03925845	0.9230769	1.383107
14	{House=Stark,Gender=F}	=> {Survives=1}	0.02071974	0.9047619	1.355664
15	{House=Stark,Book5}	=> {Survives=1}	0.02944384	1.0000000	1.498366
16	{House=Lannister,Book4}	=> {Survives=1}	0.04252999	0.9285714	1.391340
17	{House=Lannister,Book5}	=> {Survives=1}	0.01199564	1.0000000	1.498366
18	{Gender=F,Book4}	=> {Survives=1}	0.05125409	0.9591837	1.437208
19	{Nobility,Book4}	=> {Survives=1}	0.14721919	0.9183673	1.376050
38	{House=Night's Watch,Book1,Book5}	=> {Survives=1}	0.01308615	1.0000000	1.498366
39	{House=None,Gender=F,Nobility}	=> {Survives=1}	0.02181025	0.9523810	1.427015
44	{Gender=F,Book3,Book5}	=> {Survives=1}	0.02071974	0.9500000	1.423448
45	{Gender=F,Nobility,Book5}	=> {Survives=1}	0.03162486	0.9666667	1.448420
46	{Book2,Book4,Book5}	=> {Survives=1}	0.02399128	0.9166667	1.373502
49	{Book1,Book3,Book5}	=> {Survives=1}	0.04034896	0.9024390	1.352184
59	{House=Lannister,Gender=M,Nobility,Book3}	=> {Survives=1}	0.02508179	0.9200000	1.378497

### Sorted

Set of 21 rules

	lhs	rhs	support	confidence	lift
15	{House=Stark,Book5}	=> {Survives=1}	0.02944384	1.0000000	1.498366
17	{House=Lannister,Book5}	=> {Survives=1}	0.01199564	1.0000000	1.498366
38	{House=Night's Watch,Book1,Book5}	=> {Survives=1}	0.01308615	1.0000000	1.498366
45	{Gender=F,Nobility,Book5}	=> {Survives=1}	0.03162486	0.9666667	1.448420
18	{Gender=F,Book4}	=> {Survives=1}	0.05125409	0.9591837	1.437208
39	{House=None,Gender=F,Nobility}	=> {Survives=1}	0.02181025	0.9523810	1.427015
44	{Gender=F,Book3,Book5}	=> {Survives=1}	0.02071974	0.9500000	1.423448
10	{House=Arryn,Nobility}	=> {Survives=1}	0.01853871	0.9444444	1.415123
9	{House=Arryn,Book4}	=> {Survives=1}	0.01635769	0.9375000	1.404718
3	{House=Tyrell}	=> {Survives=1}	0.01526718	0.9333333	1.398475
16	{House=Lannister,Book4}	=> {Survives=1}	0.04252999	0.9285714	1.391340
6	{House=Targaryen,Book5}	=> {Survives=1}	0.01308615	0.9230769	1.383107
13	{House=Greyjoy,Book4}	=> {Survives=1}	0.03925845	0.9230769	1.383107
4	{House=Martell}	=> {Survives=1}	0.02508179	0.9200000	1.378497
59	{House=Lannister,Gender=M,Nobility,Book3}	=> {Survives=1}	0.02508179	0.9200000	1.378497
19	{Nobility,Book4}	=> {Survives=1}	0.14721919	0.9183673	1.376050
1	{House=House Martell}	=> {Survives=1}	0.01199564	0.9166667	1.373502
46	{Book2,Book4,Book5}	=> {Survives=1}	0.02399128	0.9166667	1.373502
2	{House=House Tyrell}	=> {Survives=1}	0.01090513	0.9090909	1.362151
14	{House=Stark,Gender=F}	=> {Survives=1}	0.02071974	0.9047619	1.355664
49	{Book1,Book3,Book5}	=> {Survives=1}	0.04034896	0.9024390	1.352184

**Summary:** Set of 475 rules were generated here to tell us the attributes needed for a character to survive in Game of Thrones. The entire rule set was generated under support and confidence values of 0.01 each. Values on the rhs were all possible values of whether the character survives or not in the series. After filtering and pruning, only rules of whether the character survives came back.

Nobility does not play a role in survival as there are only 5 rules (23.8% chance) that account for nobility leading to survival. Gender also does not play a rule in survival as there are only 6 (28.5% chance) rules that account for gender leading to survival. No rules state that Jon Snow should not live as he is part of

the Night's Watch and is in Books 1-5. The rule {House=Night's Watch, Book1, Book5} states that he survives with a high enough lift value. Arya Stark is of House Stark, a Female, exists in all the Books (1-5); the rules {House Stark, Book 5} and {House Stark, Gender = F} both apply to her and signifies that she does survive.