

2.)

The titanic data was collected by the British Board of Trade to investigate the sinking. We perform analysis on this data. Characteristics for surviving passengers were analyzed in order to obtain evidence whether women and children were evacuated first.

For survived passengers, there are a set of 128 rules. The support threshold was taken as 0.01 to accommodate more rules and the confidence of 0.6.

set of 128 rules

rule length distribution (lhs + rhs):sizes

```
2 3 4 5 6
8 32 50 32 6
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Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.000	3.000	4.000	3.969	5.000	6.000

summary of quality measures:

support	confidence	lift	count
Min. :0.01053	Min. :0.6029	Min. :1.003	Min. : 11.0
1st Qu.:0.01627	1st Qu.:0.7128	1st Qu.:1.186	1st Qu.: 17.0
Median :0.03589	Median :0.7876	Median :1.311	Median : 37.5
Mean :0.11359	Mean :0.7992	Mean :1.330	Mean :118.7
3rd Qu.:0.13541	3rd Qu.:0.8965	3rd Qu.:1.492	3rd Qu.:141.5
Max. :0.53971	Max. :0.9697	Max. :1.614	Max. :564.0

mining info:

	data	ntransactions	support	confidence
titanic_data_matrix		1045	0.01	0.6

	lhs	rhs	support	confidence	lift	count
[1]	{Pclass=2,Sex=male,Age=adult,Sibsp=1}	=> {Survived=yes}	0.03062201	0.9696970	1.613588	32
[2]	{Pclass=2,Sex=male,Age=adult}	=> {Survived=yes}	0.12918660	0.9642857	1.604584	135
[3]	{Pclass=2,Sex=male,Age=adult,Sibsp=0}	=> {Survived=yes}	0.09282297	0.9603960	1.598111	97
[4]	{Pclass=2,Sex=male,Age=adult,Parch=0}	=> {Survived=yes}	0.11578947	0.9603175	1.597980	121
[5]	{Pclass=2,Sex=male,Age=adult,Sibsp=0,Parch=0}	=> {Survived=yes}	0.08995215	0.9591837	1.596094	94
[6]	{Pclass=2,Sex=male,Sibsp=1,Parch=0}	=> {Survived=yes}	0.02200957	0.9583333	1.594679	23
[7]	{Pclass=2,Sex=male,Age=adult,Sibsp=1,Parch=0}	=> {Survived=yes}	0.02105263	0.9565217	1.591664	22
[8]	{Pclass=2,Sex=male,Parch=0}	=> {Survived=yes}	0.12057416	0.9545455	1.588376	126
[9]	{Pclass=2,Sex=male,Sibsp=0,Parch=0}	=> {Survived=yes}	0.09377990	0.9514563	1.583235	98
[10]	{Sex=male,Age=adult,Sibsp=2}	=> {Survived=yes}	0.01531100	0.9411765	1.566130	16

By observed this we can conclude that rules with high confidence or lift, that is above 90%, of the surviving passengers describe very less about Women and Children being evacuated first or survived.

The next ten rules were also inspected in order to check whether there is any other evidence that can be captured to support the survived passengers.

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[11] {Pclass=3,Sex=male,Age=adult,Parch=1} => {Survived=yes} 0.01435407 0.9375000 1.560012 15
[12] {Pclass=2,Sex=male,SibSp=0} => {Survived=yes} 0.09760766 0.9357798 1.557150 102
[13] {Sex=male,SibSp=4} => {Survived=yes} 0.01339713 0.9333333 1.553079 14
[14] {Pclass=3,Sex=male,SibSp=4} => {Survived=yes} 0.01339713 0.9333333 1.553079 14
[15] {Sex=male,SibSp=2,Parch=0} => {Survived=yes} 0.01339713 0.9333333 1.553079 14
[16] {Sex=male,Age=adult,SibSp=2,Parch=0} => {Survived=yes} 0.01339713 0.9333333 1.553079 14
[17] {Sex=male,Age=child,SibSp=4} => {Survived=yes} 0.01148325 0.9230769 1.536012 12
[18] {Pclass=3,Sex=male,Age=child,SibSp=4} => {Survived=yes} 0.01148325 0.9230769 1.536012 12
[19] {Sex=male,Age=adult,SibSp=1,Parch=1} => {Survived=yes} 0.02296651 0.9230769 1.536012 24
[20] {Pclass=3,Sex=male,Age=adult,SibSp=1} => {Survived=yes} 0.03253589 0.9189189 1.529093 34
```

Summary: There are a set of 112 rules for passengers who did not survive the disaster. The support threshold was taken as 0.01 and confidence as 0.6.

set of 112 rules

rule length distribution (lhs + rhs):sizes

```
2 3 4 5 6
1 25 49 30 7
```

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
2.000	4.000	4.000	4.152	5.000	6.000

summary of quality measures:

support		confidence		lift		count	
Min.	:0.01053	Min.	:0.6000	Min.	:1.504	Min.	: 11.00
1st Qu.	:0.01603	1st Qu.	:0.7195	1st Qu.	:1.803	1st Qu.	: 16.75
Median	:0.02871	Median	:0.8562	Median	:2.146	Median	: 30.00
Mean	:0.04711	Mean	:0.8323	Mean	:2.086	Mean	: 49.23
3rd Qu.	:0.05478	3rd Qu.	:0.9353	3rd Qu.	:2.344	3rd Qu.	: 57.25
Max.	:0.31005	Max.	:1.0000	Max.	:2.506	Max.	:324.00

mining info:

	data	ntransactions	support	confidence
titanic_data_matrix		1045	0.01	0.6

	lhs	rhs	support	confidence	lift	count
[1]	{Sex=female, Age=senior}	=> {Survived=no}	0.01052632	1	2.505995	11
[2]	{Pclass=2, Sex=female, Parch=2}	=> {Survived=no}	0.01722488	1	2.505995	18
[3]	{Pclass=2, Sex=female, Age=child}	=> {Survived=no}	0.01339713	1	2.505995	14
[4]	{Pclass=1, Sex=female, Parch=1}	=> {Survived=no}	0.02679426	1	2.505995	28
[5]	{Pclass=2, Sex=female, Age=adult, Parch=2}	=> {Survived=no}	0.01148325	1	2.505995	12
[6]	{Pclass=1, Sex=female, Sibsp=1, Parch=1}	=> {Survived=no}	0.01148325	1	2.505995	12
[7]	{Pclass=1, Sex=female, Sibsp=0, Parch=1}	=> {Survived=no}	0.01531100	1	2.505995	16
[8]	{Pclass=1, Sex=female, Age=adult, Parch=1}	=> {Survived=no}	0.02583732	1	2.505995	27
[9]	{Pclass=1, Sex=female, Sibsp=1, Parch=0}	=> {Survived=no}	0.03444976	1	2.505995	36
[10]	{Pclass=1, Sex=female, Age=adult, Sibsp=1, Parch=1}	=> {Survived=no}	0.01052632	1	2.505995	11

All the above displayed rules produce a confidence of 100% for certain aspects of dead passengers.

[11]	{Pclass=1, Sex=female, Age=adult, Sibsp=0, Parch=1}	=> {Survived=no}	0.01531100	1.0000000	2.505995	16
[12]	{Pclass=1, Sex=female, Age=adult, Sibsp=1, Parch=0}	=> {Survived=no}	0.03062201	1.0000000	2.505995	32
[13]	{Pclass=1, Sex=female, Parch=0}	=> {Survived=no}	0.08229665	0.9885057	2.477191	86
[14]	{Pclass=1, Sex=female, Age=adult, Parch=0}	=> {Survived=no}	0.07655502	0.9876543	2.475057	80
[15]	{Pclass=1, Sex=female, Sibsp=0}	=> {Survived=no}	0.06602871	0.9857143	2.470195	69
[16]	{Pclass=1, Sex=female, Age=adult, Sibsp=0}	=> {Survived=no}	0.06315789	0.9850746	2.468592	66
[17]	{Pclass=1, Sex=female, Age=adult}	=> {Survived=no}	0.11578947	0.9837398	2.465247	121
[18]	{Pclass=1, Sex=female, Age=adult, Sibsp=1}	=> {Survived=no}	0.04497608	0.9791667	2.453787	47
[19]	{Pclass=1, Sex=female, Sibsp=0, Parch=0}	=> {Survived=no}	0.04497608	0.9791667	2.453787	47
[20]	{Pclass=1, Sex=female, Age=adult, Sibsp=0, Parch=0}	=> {Survived=no}	0.04306220	0.9782609	2.451517	45

These two evidences give enough evidence that Women and Children were not the first to be evacuated from the ship.