1. **Confidence and Lift Calculations.**

**For survival: “Yes”**

**Itemset**:{'2nd', 'Child'},

**Confidence**:1.0,

**Lift**:3.09563994374121

**Itemset**:{'2nd', 'Female', 'Child'},

**Confidence**:1.0,

**Lift**:3.09563994374121

**Itemset**:{'Female', '1st'},

**Confidence**:0.9724137931034481,

**Lift**:3.0102429797759345

**Itemset**:{'Adult', 'Female', '1st'},

**Confidence**:0.9722222222222221,

**Lift**:3.0096499453039534

**Itemset**:{'2nd', 'Female'},

**Confidence**:0.8773584905660378,

**Lift**:2.7159859883767217

**Itemset**:{'Crew', 'Female'},

**Confidence**:0.8695652173913044,

**Lift**:2.6918608206445307

**Itemset**:{'Adult', 'Female', 'Crew'},

**Confidence**:0.8695652173913044,

**Lift**:2.6918608206445307

**Itemset**:{'Adult', '2nd', 'Female'},

**Confidence**:0.8602150537634409,

A screen shot of a computer code

Description automatically generated**Lift**:2.6629160806375998

*Screenshot: Confidence and Lift Calculations*

**Report on Factors Affecting Titanic Passenger Survival**

The analysis conducted on the Titanic dataset using the Apriori algorithm with specific parameters yielded insightful results regarding factors influencing passenger survival. The parameters utilized were a minimum support of 0.005, a minimum confidence of 0.8, and a minimum item length of 2 as aassociation rule.

**Factors Impacting Titanic Passenger Survival:**

**1. Age Group:** From the association result, it can be inferred that children (referred to as 'Child') from 2nd class, had a higher chance of survival. The association results holds confidence of 1.0 with lift value of 3.095 for passenger who is child , and is from 2nd class. This indicates high likelihood of survival of child passenger if child is from 2nd class, and lift value of 3.095 ( greater than 1) indicates that these factors (Child and 2nd class) are positively correlated or associated. Similarly, after Child, Adult is the next age group that has survival chance.

**2.** **Gender:** The analysis revealed a strong association between Female gender and survival. Female passengers had a notably higher chance of survival compared to males. This is evident from the high confidence levels observed in the association result involving females, such as 'Female' and '1st' class, and '2nd' class with 'Female'. The confidence levels ranging from 0.86 to 0.97 indicate a high likelihood of survival in contrast to male passengers. Similarly, the lift value (greater than 1) ranging from 2.66 to 3.095 indicates positive association between the presence of female passengers and survival (positive correlation).

**3. Class:** The association result involving '2nd' class, 'Female', and 'Child' indicates a high likelihood of survival, with a confidence of 1.0 and a lift of 3.0956. Similarly, it is also evident that first-class passengers ('1st') had the highest survival chance compared to other classes. The association result with the highest confidence for survival ('Yes') involves 'Female' and '1st' class, with a confidence of approximately 0.9724 and a lift of 3.0102.

**Impact of Lift Measure:**

The lift measure provides insight into the strength of association between different factors and survival. A lift value greater than 1 indicates that the presence of one item increases the likelihood of the presence of another in the consequent. In this analysis, the lift values ranged from approximately **2.66 to 3.095**, indicating a positive association between the antecedent and consequent items.

**Reflection on Lift Measure:**

The lift measure helped in identifying the strength of association between factors and survival. It helped in understanding not only the presence of association but also the degree to which one factor influences another. The value of lift > 1 , helped in understanding that the correlation between factors were positive. However, it should be noted that while lift provides valuable insights, it does not imply causation. Therefore, while we can observe strong associations between factors such as gender, class, and survival, further analysis would be needed to establish causal relationships definitively.

**In conclusion, gender (Female), class( 2nd, and 1st Class), and age group (particularly children, and adult respectively) were significant factors influencing Titanic passenger survival. The lift measure aided in understanding the strength of association between these factors and survival, providing valuable insights for further analysis and interpretation of the data.**