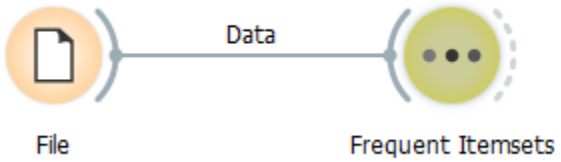
Business Analytics minor

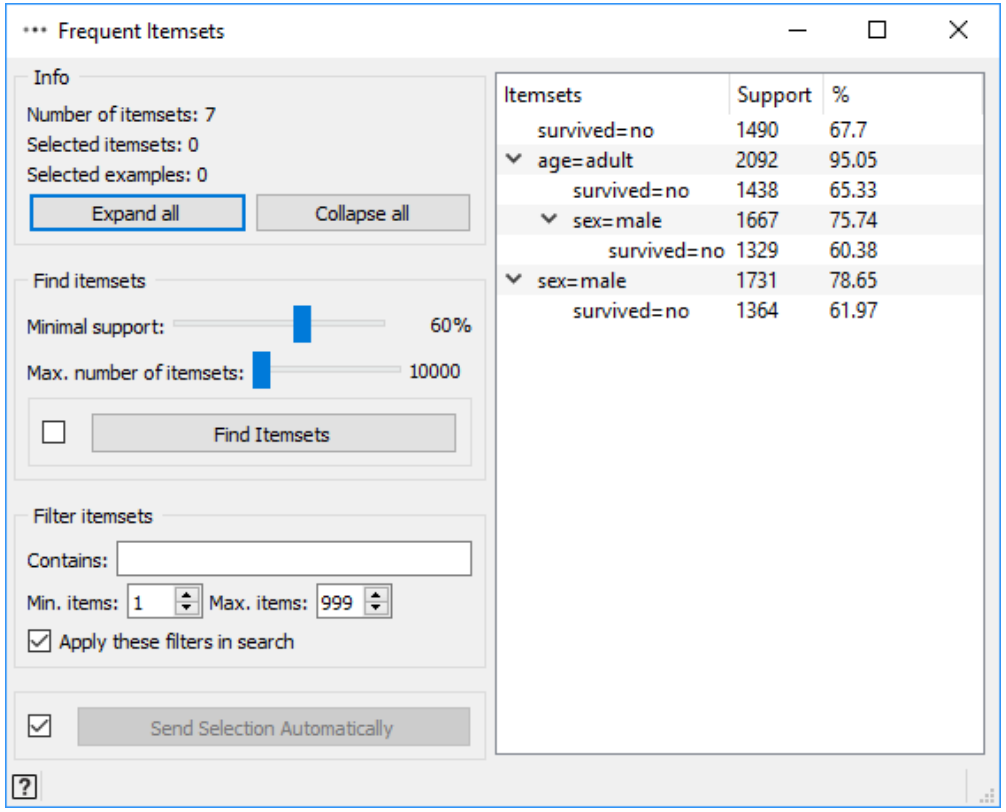
UC Leuven Limburg
MOVING MINDS

Week 7: Exercises

Exercise 9.1: Titanic

1. Get the itemsets with minimal support of 60%:
   - Install the Associate Add-On to Orange
     - Options > Add-Ons > Associate
   - File
     - Titanic
   - Frequent Itemsets
     - Minimal support: 60%
     - Click Find Itemsets





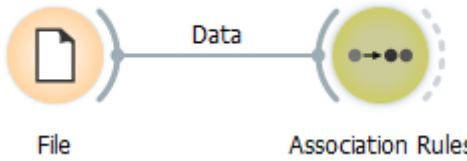
Exercise 9.1: Titanic

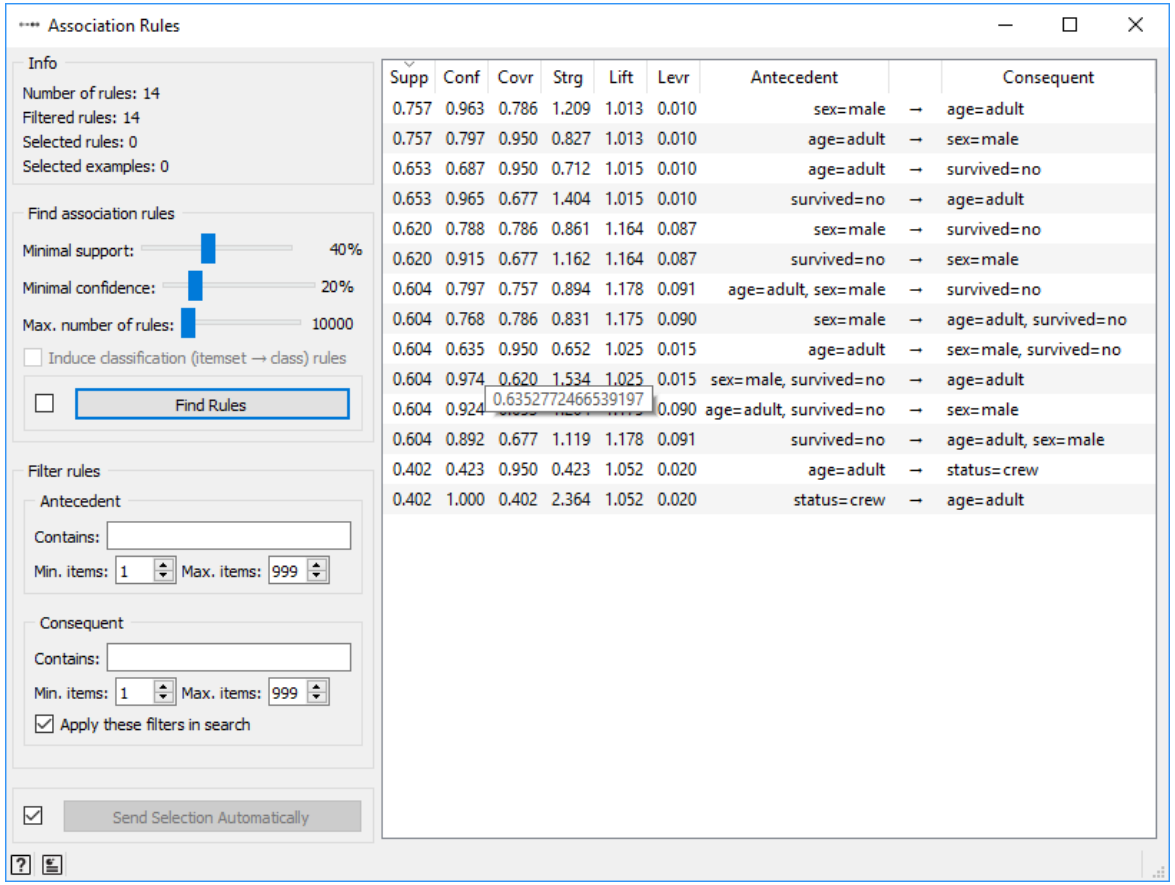
1. Get the itemsets with minimal support of 60%:
   - Frequent 1-itemsets?
     - Survived = no
     - Sex = male
     - Age = adult
   - Frequent 2-itemsets?
     - Adult and Did-Not-Survive
     - Adult and Male
     - Male and Did-Not-Survive
   - Frequent 3-itemset?
     - Adult and Male and Did-Not-Survive
     - Monotonicity: all subsets of a frequent set must be frequent
   - How many people did not survive?
     - 1490

Itemsets	Support	%
survived=no	1490	67.7
age=adult	2092	95.05
survived=no	1438	65.33
sex=male	1667	75.74
survived=no	1329	60.38
sex=male	1731	78.65
survived=no	1364	61.97

Exercise 9.1: Titanic

2. Find the association rules with minimal support 40% and minimal confidence 20%.
   - File
     - Titanic
   - Association Rules
     - Minimal support: 40%
     - Minimal Confidence: 20%
     - Click Find Rules





Exercise 9.1: Titanic

2. Find the association rules with minimal support 40% and minimal confidence 20%.

Supp	Conf	Covr	Strg	Lift	Levr	Antecedent		Consequent
0.757	0.963	0.786	1.209	1.013	0.010	sex=male	→	age=adult
0.757	0.797	0.950	0.827	1.013	0.010	age=adult	→	sex=male
0.653	0.687	0.950	0.712	1.015	0.010	age=adult	→	survived=no
0.653	0.965	0.677	1.404	1.015	0.010	survived=no	→	age=adult
0.620	0.788	0.786	0.861	1.164	0.087	sex=male	→	survived=no
0.620	0.915	0.677	1.162	1.164	0.087	survived=no	→	sex=male
0.604	0.797	0.757	0.894	1.178	0.091	age=adult, sex=male	→	survived=no
0.604	0.768	0.786	0.831	1.175	0.090	sex=male	→	age=adult, survived=no
0.604	0.635	0.950	0.652	1.025	0.015	age=adult	→	sex=male, survived=no
0.604	0.974	0.620	1.534	1.025	0.015	sex=male, survived=no	→	age=adult
0.604	0.924	0.653	1.204	1.175	0.090	age=adult, survived=no	→	sex=male
0.604	0.892	0.677	1.119	1.178	0.091	survived=no	→	age=adult, sex=male
0.402	0.423	0.950	0.423	1.052	0.020	age=adult	→	status=crew
0.402	1.000	0.402	2.364	1.052	0.020	status=crew	→	age=adult

Exercise 9.1: Titanic

3. In your opinion, which association rules are the strongest?
   - Consider the following measures:

$$\text{Support} = \frac{count(A \text{ and } C)}{total}$$

$$\text{Confidence} = \frac{count\ (A \text{ and } C)}{count\ (A)}$$

$$\text{Coverage} = support\ (A)$$

$$\text{Strength} = \frac{support\ (C)}{support\ (A)}$$

$$\text{Lift} = \frac{support(A \rightarrow C)}{support(A) * support\ (C)}$$

$$\text{Leverage} = support(A \rightarrow C) - support(A) * support\ (C)$$

Exercise 9.1: Titanic

4. Calculate the conditional probability of a male not surviving. *(If a passenger is male, what are the chances of not surviving?)*

   - Conditional probability: $P(A|B) = P(A \cap B) / P(B)$
     $P(\text{DNS} \mid \text{Male}) = P(\text{DNS} \cap \text{Male}) / P(\text{Male})$
     $= 0.6197 / 0.7865 = 0.788$

   - Compare to the confidence of Rule: Male → Does not survive
     0.788

Exercise 9.1: Titanic

5. Look at the rules more in depth.

   - Which two rules would you choose?
   - How do these findings compare to the exercise using Naïve Bayes Classification?
   - Any conclusions?

Exercise 9.1: Titanic

The following options are no longer available in Orange:

- Association Rules Filter (question 2)
- Association Rules Explorer (question 5)

Want more practice?

- Check out this multiple choice quiz from the University of British Columbia:
  - https://www.ugrad.cs.ubc.ca/~cs100/2016W2/exercises/apriori.html

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Any questions?