Technische Universität Dresden

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Formal Concept Analysis
Exercise Sheet 8, Winter Semester 2016/17

Exercise 1 (frequent concept intents and closure systems)

Definition (frequent concept intent)**.** *Let $\mathbb{K} = (G, M, I)$ be a formal context.*

(a) The support *of a set $B \subseteq M$ of attributes in $\mathbb{K}$ is given by*

$$\operatorname{supp}(B) := \frac{|B'|}{|G|}.$$

(b) For a given minimal support minsupp the set of frequent concept intents *is given by*

$$\{B \subseteq M \mid \exists A \subseteq G : (A, B) \in \mathfrak{B}(G, M, I) \wedge \operatorname{supp}(B) \geq minsupp\}.$$

Show that the set of frequent concept intents together with the set M forms a closure system.

Exercise 2 (support)

Show the validity of the properties of the support function that are employed by the TITANIC algorithm:

Let (G, M, I) be a formal context $X, Y \subseteq M$. Then it holds:

1) $X \subseteq Y \implies \operatorname{supp}(X) \geq \operatorname{supp}(Y)$

2) $X'' = Y'' \implies \operatorname{supp}(X) = \operatorname{supp}(Y)$

3) $X \subseteq Y \wedge \operatorname{supp}(X) = \operatorname{supp}(Y) \implies X'' = Y''$

Exercise 3 (computing concept intents with TITANIC)

The following context contains transactions in a supermarket. Compute the closure system of all concept intents using the TITANIC algorithm. (hint: use the table structure from the example computation in the lecture slides)

	apples (a)	beer (b)	chips (c)	tv magazine (d)	toothpaste (e)
t_1	×	×	×		
t_2			×	×	
t_3		×	×	×	
t_4	×	×			×
t_5			×		×
t_6		×	×	×	
t_7	×	×			
t_8			×	×	