Technische Universität Dresden

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Formal Concept Analysis

Exercise Sheet 9, Winter Semester 2016/17

Exercise 1 (repetition)

Discuss with your neighbor the following concepts

- *closure system* and *closure operator*
- *frequent* concept intent
- *minimal generator*
- *implication* in a formal context $\mathbb{K} = (G, M, I)$
- *closed*, *complete* and *non-redundant* set of implications
- *stem base*

Further, describe the TITANIC algorithmus in three short sentences.

Exercise 2 (pseudo-closed sets)

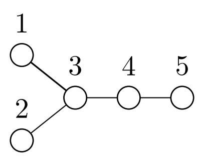
In the lecture the concept of *pseudo intents* was introduced. The following definition generalizes this concept in the context of closure systems:

Definition (pseudo-closed set)**.** *Let $\mathcal{C}$ be a closure system on (the finite set) M. A subset $P \subseteq M$ is* pseudo-closed*, iff*

(i) P is not closed (i.e., $P \notin \mathcal{C}$), and

(ii) for every proper pseudo-closed subset $Q \subset P$, its closure $\varphi(Q)$ is contained in P (i.e., $Q \subset P \wedge Q$ is pseudo-closed $\Longrightarrow \varphi(Q) \subseteq P$).

We are now regarding for the set of nodes $M := \{1, 2, \ldots, 5\}$ and the following tree T



the system $\mathcal{T} \subseteq \mathfrak{P}(M)$ of sets of nodes, which span a subtree of T, respectively (e.g., $\{1, 3, 4\} \in \mathcal{T}$ but $\{1, 2, 5\} \notin \mathcal{T}$).

a) Specify the set $\mathcal{T}$.

b) Verify that $\mathcal{T}$ is a closure system on M.

c) List six different pseudo-closed sets for $\mathcal{T}$.

Exercise 3 (computing the stem base with NEXT CLOSURE)

Determine the stem base for this context using the NEXT CLOSURE algorithm. Use the following table as help:

	Mobil (1)	Telefon (2)	Fax (3)	Fax m. N.-Adapter (4)
Sinus 44 (a)		×		
Nokia 6110 (b)	×	×		
T-Fax 301 (c)			×	×
T-Fax 360 PC (d)			×	

A	i	$A+i$	$\mathcal{L}^\bullet(A+i)$	$A<_i\mathcal{L}^\bullet(A+i)$?	$(\mathcal{L}^\bullet(A+i))''$	$\mathcal{L}$	intents