TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Computer Science Institute for Theoretical Computer Science, Chair for Automata Theory

Formal Concept Analysis and Logic

Exercise Sheet 4

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Summer Semester 2012

Exercise 13

Use Next-Closure to compute the Duquenne-Guigues Base of the following context.

	equilateral	isoceles	acute-angled	obtuse angled	right-angled
D_1		×		×	
D_2		×			×
D_3			×		
D_4	×	×	×		
D_5				×	
D_6		×	×		
D_7					×

Exercise 14

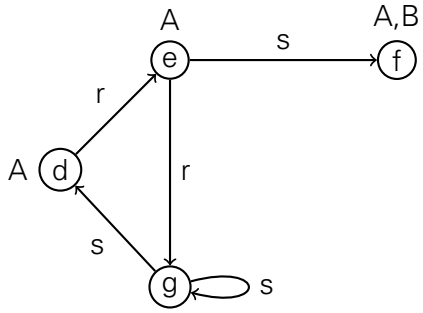
Recall that the description logic $\mathcal{ALC}$ is equipped with the concept constructors negation ($\neg$), conjunction ($\sqcap$), disjunction ($\sqcup$), existential restriction ($\exists r.C$), and universal restriction ($\forall r.C$). Each subset of this set of constructors gives rise to a fragment of $\mathcal{ALC}$.

Identify all minimal fragments that are equivalent to $\mathcal{ALC}$ in the sense that for every $\mathcal{ALC}$-concept, there is an equivalent concept in the fragment.

Two concepts are equivalent iff the concepts have the same extension in every interpretation.

Exercise 15

Consider the (graphical representation of the) interpretation $\mathcal{I}$ with $\Delta^{\mathcal{I}} = \{d, e, f, g\}$:



For each of the following $\mathcal{ALC}$-concepts C, list all elements x of $\Delta^{\mathcal{I}}$ such that $x \in C^{\mathcal{I}}$:

a) $A \sqcup B$

b) $\exists s.\neg A$

c) $\forall s.A$

d) $\exists s.\exists s.\exists s.\exists s.A$

e) $\neg\exists r.(\neg A \sqcap \neg B)$

f) $\exists s.(A \sqcap \forall s.\neg B) \sqcap \neg\forall r.\exists r.(A \sqcup \neg A)$