

Formal Concept Analysis

Exercise Sheet 4, Winter Semester 2016/17

Exercise 1 (the basic theorem of formal concept analysis)

1. Show that $\underline{L} := (L, |)$ with $L := \{2^i 3^j 5^k \in \mathbb{N} \mid 0 \leq i, j \leq 2; 0 \leq k \leq 3\}$ is a complete lattice ($a|b$ is shorthand for the relation “ a divides b ”).
2. Draw the line diagram for \underline{L} .
3. Which are the supremum-irreducible elements?
4. Which are the infimum-irreducible elements?
5. Give a formal context (G, M, I) such that its concept lattice is isomorphic to \underline{L} . Give the isomorphism explicitly.
6. How could the fact that \underline{L} and $\mathfrak{B}(G, M, I)$ are isomorphic be shown using the Basic Theorem of Formal Concept Analysis?

Exercise 2 (clarified and reduced contexts)

Consider the first formal context from the lecture, depicted in Table 1.

1. Provide a set of objects and a set of attributes which, when removed from the context, yield a clarified context whose concept lattice is isomorphic to that of the original context.
2. Considering the clarified context thus obtained, determine the reducible objects and attributes.

Tabelle 1: National Parks in California

National Parks in California	<i>NPS Guided Tours</i>	<i>Hiking</i>	<i>Horseback Riding</i>	<i>Swimming</i>	<i>Boating</i>	<i>Fishing</i>	<i>Bicycle Trail</i>	<i>Cross Country Trail</i>
Cabrillo Natl. Mon.						×	×	
Channel Islands Natl. Park		×		×		×		
Death Valley Natl. Mon.	×	×	×	×			×	
Devils Postpile Natl. Mon.	×	×	×	×		×		
Fort Point Natl. Historic Site	×					×		
Golden Gate Natl. Recreation Area	×	×	×	×		×	×	
John Muir Natl. Historic Site	×							
Joshua Tree Natl. Mon.	×	×	×					
Kings Canyon Natl. Park	×	×	×			×		×
Lassen Volcanic Natl. Park	×	×	×	×	×	×		×
Lava Beds Natl. Mon.	×	×						
Muir Woods Natl. Mon.		×						
Pinnacles Natl. Mon.		×						
Point Reyes Natl. Seashore	×	×	×	×		×	×	
Redwood Natl. Park	×	×	×	×		×		
Santa Monica Mts. Natl. Recr. Area	×	×	×	×	×	×		
Sequoia Natl. Park	×	×	×			×		×
Whiskeytown-Shasta-Trinity Natl. Recr. Area	×	×	×	×	×	×		
Yosemite Natl. Park	×	×	×	×	×	×	×	×