

Formal Concept Analysis

Exercise Sheet 4, Winter Semester 2015/16

Exercise 1 (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	×	×	×	×	×	×	×	×

Solution:

1. Removing the following objects leads to a clarified context:

- Pinnacles Natl. Mon.
- Point Reyes Natl. Seashore
- Redwood Natl. Park
- Sequoia Natl. Park
- Wiskeytown-Shasta-Trinity Natl. Recr. Area

No attributes need to be removed.

2. The reducible objects of the remaining context are

- Devils Postpile Natl. Mon.
- John Muir Natl. Historic Site
- Joshua Tree Natl. Mon.
- Yosemite Natl. Park

There are no reducible attributes.

Exercise 2 (drawing line diagrams)

Given the formal context in Table 2, draw an additive line diagram of its concept lattice using the mapping

$$vec : \left\{ \begin{array}{l} \text{older} \mapsto (-5, -2) \\ \text{middle} \mapsto (3, -2) \\ \text{younger} \mapsto (-1, -2) \\ \text{male} \mapsto (1, -2) \\ \text{female} \mapsto (-1, -2) \\ \text{rich} \mapsto (1, -2) \\ \text{carefree} \mapsto (-1, -2) \\ \text{indebted} \mapsto (1, -2) \end{array} \right.$$

You may adjust the position the lattice's bottom element.

Tabelle 2: Grobian Gans: *Die Ducks. Psychogramm einer Sippe*. Rowohlt, Reinbek bei Hamburg 1972, ISBN 3-499-11481-X

	generation			sex		financial status		
	older	middle	younger	male	female	rich	carefree	indebted
Tick			×	×			×	
Trick			×	×			×	
Track			×	×			×	
Donald		×		×				×
Daisy		×			×		×	
Gustav		×		×			×	
Dagobert	×			×		×		
Annette	×				×		×	
Primus v. Quack	×			×			×	

Solution:

