

5. Exercise on

Formal Concept Analysis

Exercise 1

	<i>small</i>	<i>medium</i>	<i>large</i>	<i>near</i>	<i>far</i>	<i>moon</i>	<i>inhibited</i>
Earth	×			×		×	×
Jupiter		×		×	×	×	
Mars	×			×		×	×
Mercury	×			×			

- Clarify the formal context.
- Reduce the clarified context.
- Draw a line diagram of the reduced context.
- Draw a line diagram of the original context.

Exercise 2

	old	young	male	female
Father	×		×	
Mother	×			×
Sun		×	×	
Daughter		×		×

Draw the concept lattice of the family context (see also first exercise sheet) as additive line diagram

- with the set representation

$$X := G, \quad (A, B) \mapsto A$$

and the grid projection

$$\text{Sun} \mapsto (-6, 4), \text{ Daughter} \mapsto (-1, 4), \text{ Father} \mapsto (1, 4), \text{ Mother} \mapsto (6, 4).$$

- with the dual set representation

$$X := M, \quad (A, B) \mapsto B$$

and the grid projection

$$\text{young} \mapsto (-6, -4), \text{ male} \mapsto (-1, -4), \text{ female} \mapsto (1, -4), \text{ old} \mapsto (6, -4).$$

Exercise 3

	Father	Mother	Son	Daughter
old	×	×		
young			×	×
male	×		×	
female		×		×

- Draw the concept lattice of the dual of the family context.
- State explicitly the isomorphism between the dual concept lattice of the family context (see previous exercise) and the concept lattice of the dual context.

Exercise 4

	< 60	≥ 60	1 term	2 terms	CDU	SPD	FDP
Heuss		×		×			×
Lübke		×		×	×		
Heinemann		×	×			×	
Scheel	×		×				×
Carstens	×		×		×		
Weizsäcker		×		×	×		

- Draw a nested line diagram of the concept lattice of the Bundespräsidenten context with $M_1 := \{< 60, \geq 60, 1 \text{ term}, 2 \text{ terms}\}$ and $M_2 := \{ \text{CDU}, \text{SPD}, \text{FDP} \}$.
- Draw a non-nested diagram of the concept lattice.

Exercise 5 *

	Latin America	Europe	Canada	Asia Pacific	Middle East	Africa	Mexico	Caribbean	United States
Air Canada	×	×	×	×	×	×	×	×	×
Air New Zealand		×							×
All Nippon Airways		×							×
Ansett Australia				×					
The Austrian Airlines Group		×	×	×	×	×			×
British Midland		×							
Lufthansa	×	×	×	×	×	×	×	×	×
Mexicana	×		×				×	×	×
Scandinavian Airlines	×	×	×	×	×				×
Singapore Airlines		×	×	×	×	×			×
Thai Airways International	×	×	×					×	×
United Airlines	×	×	×	×			×	×	×
VARIG	×	×	×	×		×	×	×	×

- Draw a nested line diagram of the concept lattice of the Star Alliance context with $M_1 := \{ \text{Europe}, \text{Asia Pacific}, \text{Africa}, \text{Middle East} \}$ and $M_2 := \{ \text{United States}, \text{Canada}, \text{Latin America}, \text{Mexico}, \text{Caribbean} \}$.
- Draw a non-nested diagram of the concept lattice.