

1. Working with cliques:

- How many cliques are there on the given graph?
- Which neighbourhood relation on 13 vertices would result in the least possible number of cliques? What is the number of cliques in that case?
- Which neighbourhood relation on 13 vertices would result in the maximum possible number of cliques? What is the number of cliques in that case?
- Draw a neighbourhood relation that results in exactly 20 cliques.
- Is there any other way of representing the neighbourhood relation, other than an undirected graph?
- Is there any neighbourhood relation relevant for the regions of Czech Republic other than the one based on the common boundary?

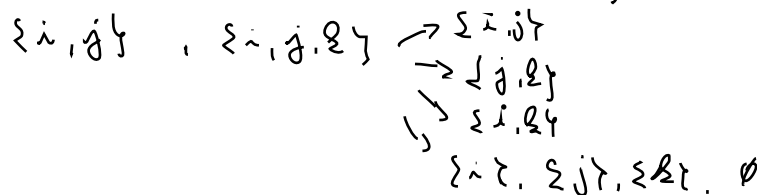
a) $\emptyset, 13 \times \{i\}, 24 \times \{i, j\}, 12 \times \{i, j, k\} \Rightarrow 50 \text{ cliques}$

b) $\emptyset, 13 \times \{i\} \Rightarrow 14$

c) $\frac{13 \cdot 12}{2} = \binom{13}{2} \times \{i, j\} \dots$ number of edges in complete graph

$2^{13} = 8192 \dots$ number of cliques $\dots 2^{|L|} \dots$ total number of subsets of L

$\binom{13}{0} + \binom{13}{1} + \binom{13}{2} + \binom{13}{3} + \dots + \binom{13}{13} = (1+1)^{13} = 2^{13}$



C clique,
 $A \subseteq C$ is also a clique

e) A matrix representation $A = (a_{ij})_{i,j=1}^n$ $a_{ij} = \begin{cases} 1 & \dots i \sim j \\ 0 & \dots i \not\sim j \end{cases}$

f) Euclidean distance, "temporal distance"