

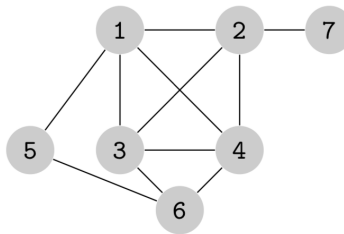
Programming Paradigms 2021-2022

Prolog Assignment: k-cliques

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1 Finding k-cliques

A k-clique is a subset of k vertices from a graph in which every vertex has an edge to every other vertex. For example, the graph below contains five 3-cliques and one 4-clique. Your assignment is to implement a Prolog solution for finding k-cliques in a given graph.



2 Prolog Program

Your Prolog program will be given a specification of a graph. This specification will be an adjacency matrix: a square matrix with a row and column for each vertex. It contains Boolean values representing whether there is an edge between two vertices or not. Note that, for an undirected graph, the adjacency matrix will be symmetric (e.g. $A = A^T$). Furthermore, we assume there are no self-loops, and thus the adjacency matrix will be hollow (e.g. zeros on the diagonal).

As an example, the graph above will be represented by the following adjacency matrix:

```
[[0,1,1,1,1,0,0],
 [1,0,1,1,0,0,1],
 [1,1,0,1,0,1,0],
 [1,1,1,0,0,1,0],
 [1,0,0,0,0,1,0],
 [0,0,1,1,1,0,0],
 [0,1,0,0,0,0,0]]
```

You will need to implement at least (A) a rule that finds a clique in a graph of a given size k , and (B) a rule that finds the largest clique in a graph. Other than that, you are free to use as many or as little ‘helper’ rules as you like. Make sure to clearly document the functionality of every rule you write.

3 Practical

Submit your solution before the imposed deadline through Blackboard in a zip archive. Don’t forget to add a README file that explains your project. You will only be able to make one submission on Blackboard. No solutions will be accepted via e-mail; only timely submissions posted on BlackBoard will be accepted and assessed; no extensions of the deadline will be granted. You are expected to work on this assignment individually. Recall that work submitted for grading must ultimately be your own work, reflecting your personal learning curve and performance. Cheating is a serious academic offense; we do not tolerate cheating, nor assisting others to do so.