

CSCD84: Artificial Intelligence

Problem Set 2: CSP

Due: 11:59 PM EST, Sunday Feb 4

Q1: Formulating k -Clique problem as a CSP

Consider an undirected and unweighted graph $G = (V, E)$, where V is the set of vertices and $E \subseteq \{(v_i, v_j) \mid (v_i, v_j) \in V^2 \text{ and } v_i \neq v_j\}$ is the set of edges. A clique, C , in the graph G is a subset of the vertices, $C \subseteq V$, such that every two distinct vertices in C are adjacent.

In the k -clique problem, the input is the undirected and unweighted graph $G = (V, E)$ and a number k . The output is a clique with k vertices, if one exists, or a special value (e.g., "FAIL") indicating that there is no k -clique otherwise.

Formulate the k -clique problem as a Constraint Satisfaction Problem (CSP). Clearly specify the variables of your CSP and their domains, and formulate the constraints explicitly.

[**HINT:** The CSP can be constructed with binary constraints for most parts, except for one constraint.]

Submission Instruction

To facilitate grading, please follow the following guidelines when uploading your assignment to MarkUs¹:

- The assignment should be submitted electronically (on MarkUs) as a single ".pdf" file.
- The filename must be ps2.pdf. Anything other than that will not be accepted by the system.
- You can use any tool you want to generate these answers (e.g., word, LaTeX, scan your handwriting). If you decide to handwrite your assignment rather than typeset it, ensure your handwriting is readable otherwise TAs will have the discretion to not grade your answer.
- Note that, if you resubmit your assignment, the previous file will be overwritten.

¹<https://markus2.utsc.utoronto.ca/>