

Linear Datalog \neq Symmetric Datalog

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Linear Datalog programs can be evaluated in non-deterministic logarithmic space (**NL**) and Dalmau characterized all constraint satisfaction problems (CSPs) whose complements are definable in linear Datalog [1]. He conjectured that linear Datalog might be a unifying explanation for families of CSPs lying in **NL**.

In [2] a new restriction of linear Datalog called symmetric Datalog has been identified. Symmetric Datalog programs can be evaluated in logarithmic space (**L**) using Reingold's algorithm for the undirected ST-connectivity problem [3]. In [2] some classes of CSPs whose complements are expressible in symmetric Datalog are identified. Over the two-element domain and under a standard complexity-theoretic assumption, expressibility of $\neg\text{CSP}(\Gamma)$ in symmetric Datalog corresponds exactly to the class of CSPs that can be evaluated in **L**. Symmetric Datalog might be a unifying explanation for families of CSPs lying in **L**.

In this talk we separate linear Datalog from symmetric Datalog by showing that $\neg\text{CSP}(\{\leq, \{0\}, \{1\}\})$ is definable in linear Datalog but not in symmetric Datalog.

References

- [1] V. Dalmau. Linear datalog and bounded path duality of relational structures. *Logical Methods in Computer Science*, 1(1), 2005.
- [2] L. Egri, B. Larose, and P. Tesson. Symmetric datalog and constraint satisfaction problems in logspace. Submitted, 2007.
- [3] O. Reingold. Undirected ST-connectivity in log-space. pages 376–385, 2005.

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