Constraint databases and quantifier elimination.

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The framework of *constraint databases* provides an elegant and powerful model for database applications, like spatial databases, that deal with infinite sets of points in some real space $\mathbb{R}^n$. In the constraint database model, infinite relations are finitely represented as boolean combinations of polynomial equalities and inequalities.

First-order logic over the reals augmented with predicates to address the database relations is used as a basic constraint database query language. Since first-order logic queries typically introduce quantifiers, the evaluation of such queries critically relies on efficient quantifier-elimination algorithms.

We discuss various aspects that influence the evaluation of queries expressible in first-order logic over the reals. We especially focus on the importance of data structures and their effect on the complexity of query evaluation [HK].

It also turned out that there is an influence in the other direction: the constraint database formalism provides a meta-language to specify elimination tasks.

References

[HK] Joos Heintz, Bart Kuijpers, "Constraint Databases, Data Structures and Efficient Query Evaluation", in the *Proceedings of the 1st International Symposium "Applications of Constraint Databases"*, Lecture Notes in Computer Science, Vol. 3074, 1–24, Springer-Verlag, 2004.