

# Quantitative Logic Programming Revisited

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## **Abstract**

Uncertainty in Logic Programming has been investigated since about 25 years, publishing papers dealing with various approaches to semantics and different applications.

This paper is intended as a first step towards the investigation of uncertainty in Constraint Functional Logic Programming. We revise an early proposal, namely van Emden's Quantitative Logic Programming, and we improve it in two ways. Firstly, we generalize van Emden's QLP to a generic scheme  $QLP(D)$  parameterized by any given Qualification Domain  $D$ , which must be a lattice satisfying certain natural axioms. We present several interesting instances for  $D$ , one of which corresponds to van Emden's QLP.

Secondly, we generalize van Emden's results by providing stronger ones, concerning both semantics and goal solving. We present Qualified SLD Resolution over  $D$ , a sound and strongly complete goal solving procedure for  $QLP(D)$ , which is applicable to open goals and can be efficiently implemented using C LP technology over any constraint domain  $CD$  able to deal with qualification constraints over  $D$ . We have developed a prototype implementation for van Emden's QLP as an instance of  $QLP(D)$ , on top of the CFLP system TOY.