Formalization and logical properties of the Maximal Ideal Recursive Semantics for Weighted Defeasible Logic Programming

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Authors | Alsinet T [1], Bejar R [2], Godo L [3], Guitart F [4]
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Possibilistic Defeasible Logic Programming (P-DeLP) is a logic programming framework which combines features from argumentation theory and logic programming, in which defeasible rules are attached with weights expressing their relative belief or preference strength. In P-DeLP a conclusion succeeds if there exists an argument that entails the conclusion and this argument is found to be undefeated by a warrant procedure that systematically explores the universe of arguments in order to present an exhaustive synthesis of the relevant chains of pros and cons for the given conclusion. Recently, we have proposed a new warrant recursive semantics for P-DeLP, called Recursive P-DeLP (RP-DeLP for short), based on the claim that the acceptance of an argument should imply also the acceptance of all its subarguments which reflect the different premises on which the argument is based. This paper explores the relationship between the exhaustive dialectical analysis based semantics of P-DeLP and the recursive based semantics of RP-DeLP, and analyzes a non-monotonic inference operator for RP-DeLP which models the expansion of a given program by adding new weighted facts associated with warranted conclusions. Given the recursive based semantics of RP-DeLP, we have also implemented an argumentation framework for RP-DeLP that is able to compute not only the output of warranted and blocked conclusions, but also explain the reasons behind the status of each conclusion. We have developed this framework as a stand-alone application with a simple text-based input/output interface to be able to use it as part of other AI systems.