

# Preferences, Contexts and Answer Sets

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**Abstract.** Answer set programming (ASP) is a declarative programming paradigm based on logic programs under stable model semantics, respectively its generalization to answer set semantics. Besides the availability of rather efficient answer set solvers, one of the major reasons for the success of ASP in recent years was the shift from a theorem proving to a constraint programming view: problems are represented such that stable models, respectively answer sets, rather than theorems correspond to solutions.

It is obvious that preferences play an important role in everyday decision making - and in many AI applications. For this reason a number of approaches combining answer set programming with explicit representations of preferences have been developed over the last years. The approaches can be roughly categorized according to the preference representation (quantitative vs. qualitative) the type of preferences they allow (static vs. dynamic) and the objects of prioritization (rules vs. atoms/formulas).

We will focus on qualitative dynamic formula preferences, give an account of existing approaches and show that by adding adequate optimization constructs one obtains interesting solutions to problems in belief merging, consistency handling, game theory and social choice.

Explicit representations of contexts also have quite a tradition in AI, going back to foundational work of John McCarthy. A context, intuitively, is a particular view of a state of affairs. Contexts can also be used as representations of beliefs of multiple agents.

We show how multi-context systems based on bridge rules, as developed by Fausto Giunchiglia and colleagues in Trento, can be extended to nonmonotonic context systems. We first discuss multi-context logic programming systems, and then generalize the ideas underlying these systems to a general framework for integrating arbitrary logics, monotonic or nonmonotonic. Techniques from answer set programming are at the heart of the framework.

We finally give a brief outlook on how the two main topics of the talk, preferences and contexts, can be combined fruitfully.

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