

Proposal of a Tutorial on Answer Set Programming at EDBT 2004

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1 Proponent's competence

- Stefania Costantini has studied theoretical and practical aspects of answer set programming since its very beginning.
- Stefania Costantini has recently been in charge of giving a tutorial on answer set programming at *ASP'03, Workshop on Answer Set Programming: Advances in Theory and Implementation*, held in Messina, Italy, September 2003, in conjunction to the Meeting of WASP, Working Group on Answer Set Programming.
- Stefania Costantini is responsible on the *Education* workpackage of WASP, Working Group on Answer Set Programming (IST-2001-37004).
- Stefania Costantini has recently investigated the possible applications of answer set programming in the field of data integration systems.
- Other nodes of WASP are actively working in the application of answer set programming in the field of data integration systems, in the context of the INFOMIX project (namely, the Vienna University of Technology, Austria, with Prof. Thomas Eiter, and the University of Calabria, Italy, with Prof. Nicola Leone). Then, the tutorial can be prepared with contribution of participants to WASP.

2 Topic/Relevance

Answer Set Programming (ASP) is an emerging paradigm of logic programming based on the Answer Set (or equivalently Stable Model) semantics: each solution to a problem is represented by an Answer Set (also called a Stable Model) of a deductive database/function-free logic program encoding the problem itself. It is clearly related to deductive databases and knowledge bases, where the occurrence of several answer sets indicates the presence of uncertain or incomplete knowledge, and each answer set represents a possible plausible instance of the database/knowledge base.

Recent work demonstrates that Answer Set Programming is a suitable paradigm for defining and implementing data integration systems. In particular, the author of this proposal has defined a formalization in answer set programming, and a working inference engine, for the Global-as-View approach. The reason why answer set programming is

well suited for representing mappings between data models is exactly that the query answering problem can be coped with also in the presence of incomplete/ambiguous/inconsistent data sources: this by means of the advanced reasoning capabilities of computational logic, and by means of the possibility of making different plausible answers to queries explicit, as different answer set.

3 Prerequisites for the audience

The tutorial will introduce concepts and notions of computational logic, will describe the DATALOG⁻ language and the answer set semantics, and will outline a comparison with traditional logic programming. However, the level of the description will be accessible to the non-expert, by providing few formal details intermixed with several intuitive examples. Some hints and references will be proposed for those who may wish to go into deeper detail.

4 Contents Outline

Below an outline is given of the tutorial contents. The suggested length is 3 hours, although a 1.5 hours version is also feasible.

Introduction:

motivations, and relevance of the topic.

Comparison

between different computational logic languages on a sample problem.

Horn logic programming:

procedural and declarative semantics by examples, expressivity.

Datalog:

terminology, examples, expressivity.

Datalog⁻:

the meaning of negation, different proposals and their rationale, expressivity.

Answer Set Semantics:

underlying concepts, examples.

Answer Set Semantics:

motivations, difference from classical logic, relationships with other formalisms.

Answer Set Semantics:

how to find the answer sets, methods, techniques, and complexity.

Answer Set Semantics:

drawbacks and how to cope with them.

Answer Set Programming:

main features and constructs of the paradigm (rules, constraints, disjunction, choice, classical negation).

Answer Set Programming:

programming methodology, techniques and problems, by examples.

Answer set solvers:

main features, and how to use them.

Answer Set Programming (ASP):

dealing with uncertainty, a larger example.

Relation to Databases:

application to Data Integration Systems.

Conclusions