Chapter 7.18
A Roadmap on Updates

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INTRODUCTION

Updates, is a central issue in relational databases and knowledge databases. In the last years, it has been well studied in the non-monotonic reasoning paradigm. Several semantics for logic program updates have been proposed (Brewka, Dix, & Knonolige 1997), (De Schreye, Hermanegildo, & Pereira, 1999) (Katsumo & Mendelzon, 1991). However, recently a set of proposals has been characterized to propose mechanisms of updates based on logic and logic programming. All these mechanisms are built on semantics based on structural properties (Eiter, Fink, Sabattini & Thompits, 2000) (Leite, 2002) (Banti, Alferes & Brogi, 2003) (Zacarias, 2005). Furthermore, all these semantic ones coincide in considering the AGM proposal as the standard model in the update theory, for their wealth in properties. The AGM approach, introduced in (Alchourron, Gardenfors & Makinson, 1985) is the dominating paradigm in the area, but in the context of monotonic logic. All these proposals analyze and reinterpret the AGM postulates under the Answer Set Programming (ASP) such as (Eiter, Fink, Sabattini & Thompits, 2000). However, the majority of the adapted AGM and update postulates are violated by update programs, as shown in (De Schreye, Hermanegildo, & Pereira, 1999).

UPDATES

Update theory deals with knowledge base represented by a propositional theory. Besides, deals with incorporating new knowledge about a
dynamic world. This dynamism is due to knowledge comes from the real world, what means that knowledge evolves over time. This exchange rate mainly deals with changes in the extensional part of knowledge bases. However, the problem of updating the intensional part of a knowledge base (rules and descriptions of actions) remains basically unexplored. However, the problem of updates has attracted the researchers’ attention in the last years who are dealing with such updates in the setting of logic programs. Though, some interesting proposals exist with foundation in Answer set programming (ASP), such as (Eiter, Fink, Sabattini & Thompits, 2000) (Leite, 2002) (Banti, Alferes & Brogi, 2003) (Osorio & Zacarias, 2003).

Answer set programming is a new paradigm used in the solution of the update issue. Particularly, this paradigm has taken a bigger force around of update theory. A lot of theoretical work around updates under ASP has been developed by connotated researchers such as: Pereira, Alferes, Eiter, Osorio, Leite, Zacarias, and others. In the last years, a lot of theoretical work was devoted to explore the relationships between intuitionistic logic and ASP (Pearce, 1999) (Lifschitz, Pearce & Valverde, 2001). These results have recently provided a characterization of ASP by intuitionistic logic as follows: a literal is entailed by a program in the answer set semantics if and only if it belongs to every intuitionistically complete and consistent extension of the program formed by adding only negated literals (Pearce, 1999).

The AGM approach proposes three basic operations on a belief set K: a) expansion K + Φ, which is simply adding the new information Φ ∈ L to K. b) revision K * Φ, which is sensibly revising K in the light of Φ (in particular, when K contradicts Φ); and c) contraction K — Φ, which is removing Φ from K.

On the other hand, AGM proposes a set of postulates, K*1 — K*8, that any revision operator * mapping a belief set K ⊆ L and a sentence Φ ∈ L into the revised belief set K * Φ should satisfy. We assume that K is represented by an epistemic state E, then the postulates K*1 — K*8