Revision of Description Logic ABoxes

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It is generally accepted that any reasonable real-world knowledge representation system should be able to integrate new information and to deal with the inconsistencies that may result. This problem has been extensively studied in the propositional setting under the name of belief revision. Perhaps the most influential work in this field is that of Alchourron, Gardenfors, and Makinson, who proposed a set of postulates that, according to them, characterize the set of rational revision operators. The AGM postulates stipulate among other things that the new information must be accepted, that the current beliefs should be changed as little as possible, and that the result of the revision should be syntax-independent.

The widespread use of description logics in a variety of applications, most notably as a basis for the semantic web but also in medical informatics, configuration, and natural language processing, makes the revision of description logic knowledge bases a question of great practical interest. It is thus surprising that there has been relatively little work addressing this problem. In fact, the revision of the factual component of description logic knowledge bases (commonly known as the ABox) has, to the authors' knowledge, never been formally addressed in the literature, and it is this problem which is the subject of this talk.

We will begin the talk with a brief introduction to the description logic ALC. We will then consider how the propositional notion of prime implicates can be extended to ALC and will prove that our definition is a faithful generalization of the propositional case. We next propose a weaker notion, which we term relevant implicates, which we then use to define a class of ALC ABox revision operators. We discuss the properties of our operators, showing them to satisfy all basic AGM rationality postulates for belief revision.