

Preface

Like my preceding book, [Bochman, 2001], the present study is also a systematic attempt to answer the question ‘what is nonmonotonic reasoning?’. It complements the previous book by giving a logical formalization to the original approach to nonmonotonic reasoning that includes default logic, autoepistemic and modal nonmonotonic logics, and logic programming. We call this approach *explanatory nonmonotonic reasoning*, since the notion of explanation can be seen as the ultimate and unifying basis behind these nonmonotonic formalisms.

Three aspects distinguish this book from previous studies in this area. First, the book provides a uniform generalized theory of explanatory nonmonotonic reasoning rather than a description of existing nonmonotonic logics. Though the latter are shown to be covered by this theory, the formalism of biconsequence relations, taken as a logical basis of this study, suggests a powerful generalization going in most cases far beyond existing nonmonotonic formalisms. Second, the book shifts attention to some relatively recent, non-epistemic approaches to nonmonotonic reasoning, such as four-valued biconsequence relations, causal reasoning and argumentation theory. These formalisms actually fill the gap between logic programming, on the one hand, and traditional nonmonotonic logics, on the other. Accordingly, default and modal nonmonotonic logics are covered only in the last two chapters, and only as parts of the more general formalism of epistemic biconsequence relations. Last but not least, the book focuses on the logical, monotonic basis of explanatory nonmonotonic reasoning. In this sense, it is as much about logic as it is about nonmonotonic reasoning. As the main benefit of this approach, it will be shown that different formalisms of explanatory nonmonotonic reasoning are based on essentially the same principles and models, the main distinction being the underlying logical

formalisms that host such a reasoning.

The intended audience of this book consists of graduate students and researchers in AI, on the one hand, and general logicians, on the other. In fact, one of the aims of the book consists in persuading the former about the need of logic, and the latter that nonmonotonic reasoning should be an integral part of general logical research.

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