

NONMONOTONIC REASONING

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In this talk I will give an overview of nonmonotonic reasoning as background, and then address the question of its relevance and importance for theoretical issues in reasoning about knowledge and belief. In the past few years the area of nonmonotonic reasoning has grown tremendously, as witnessed by the increase in submitted and accepted papers to conferences such as this one. It would be impossible to give detailed accounts of the major formalisms and their application domains, so instead I will present very short overviews of the basic ideas, and then recount the issues that are currently being addressed, and their relevance for future research, especially regarding knowledge and belief. This should give a framework for understanding the significance of the papers presented at this conference.

Broadly speaking, there are two classes of nonmonotonic formalisms, consistency-based and model-based. Among the former are default logic, autoepistemic logic, and various types of inheritance and argument systems. The most prevalent model-based account is circumscription in several different forms, along with systems that have a model preference semantics, such as conditional logics. I will point out some of the major strengths and weaknesses of these approaches. In general the consistency-based logics, especially autoepistemic logic, have a strong relation to standard epistemic modal logics, and I will concentrate on these systems. Most of the nonmonotonic reasoning papers in this conference are influenced by this connection.

The nonmonotonic formalisms are meant to characterize certain forms of reasoning. I will discuss three general forms of reasoning: default or prototypical reasoning, reasoning about closure, and abductive and diagnostic reasoning. All of these, especially the last two, are important modes of reasoning either for an agent who has beliefs, or when reasoning about an agent's beliefs. I will show how nonmonotonic formalisms have been used for this purpose, and point out future directions.