Probabilistic Inductive Logic Programming Based on Answer Set Programming

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Abstract. Answer Set Programming (ASP) is a form of declarative programming based on the concept of so-called stable models of programs, with roots in logic programming and nonmonotonic reasoning. ASP has emerged as a fully declarative programming paradigm which provides significant advantages in areas such as search and optimization problem solving, common sense knowledge representation, and modeling of nondeterminism. In my talk, I will describe how ASP can be used as a basis for expressive probabilistic inductive logic programming, and the features (and challenges) of this direction. After introducing ASP and providing an overview of existing approaches to probabilistic declarative programming based on stable model semantics, I will present a recent framework for probabilistic inductive ASP which provides a high level of expressiveness (including the option to use first-order formulas with probabilities) in combination with a high degree of adaptability to a variety of tasks. I will discuss algorithms for inference and machine learning in this framework and their respective performance characteristics, and present possible applications of our framework. The last part of my talk will outline directions for future research in this area.