

# Preface

The problems of representing, and working with, uncertain knowledge are ancient problems dating, at least, from Leibnitz, and later explored by a number of distinguished scholars—Jacob Bernoulli, Abraham de Moivre, Thomas Bayes, Johann Heinrich Lambert, Pierre-Simon Laplace, Bernard Bolzano, Augustus De Morgan, George Boole, just to name a few of them. In the last decades there is a growing interest in the field connected with applications to computer science and artificial intelligence. Researchers from those areas have studied uncertain reasoning using different tools, and have used many methods for reasoning about uncertainty: Bayesian network, non-monotonic logic, Dempster–Shafer Theory, possibilistic logic, rule-based expert systems with certainty factors, argumentation systems, etc.

Some of the proposed formalisms for handling uncertain knowledge are based on probability logics. The present book grew out a sequence of papers on probability logics written by the authors since 1985. Also, some of our papers, from 2001 onwards, were coauthored by (in alphabetical order): Branko Boričić, Tatjana Davidović, Dragan Doder, Radosav Đorđević, Silvia Ghilezan, John Grant, Nebojša Ikodinović, Angelina Ilić Stepić, Jelena Ivetić, Dejan Jovanović, Ana Kaplarević-Mališić, Ioannis Kokkinis, Jozef Kratica, Petar Maksimović, Bojan Marinković, Uroš Midić, Miloš Milovanović, Miloš Milošević, Nenad Mladenović, Aleksandar Perović, Nenad Savić, Tatjana Stojanović, Thomas Studer, Siniša Tomović. Two chapters in this book, five and six, are written in collaboration with Aleksandar Perović, Dragan Doder, Angelina Ilić Stepić, and Nebojša Ikodinović.

Although the earliest of those papers were motivated by the work of H.J. Keisler on probability quantifiers, our focus in this book is on latter results about probability logics with probability operators. The aim of this book is to provide an introduction to probability logic-based formalization of uncertain reasoning. So, our primary interest is related to mathematical techniques for infinitary probability logics used to obtain results about proof-theoretical and model-theoretical issues: axiomatizations, completeness, compactness, decidability, etc., including solutions of some problems from literature. This text might serve as a base for further research projects and as a reference text for researchers wishing to use probability

logic, but also as a textbook for graduate logic courses. An extensive bibliography is provided to point to related works.

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Probability Logics

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