

Cognitive Reasoning

A Formal Approach

Bearbeitet von
Oleg M. Anshakov, Tamás Gergely

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Preface

Understanding cognition and modelling, designing and building artificial cognitive systems are challenging and long-term research problems. In this book authors wish to take a step towards a better understanding of cognition and its modelling by providing a well-founded integrated theory. Though this book is primarily not on cognitive system development, the need for an account of a genuine, logically well-founded formal framework seems to us especially important for system designers too. The authors' belief is that the practice of even those who most explicitly reject the need for theoretical foundation of intelligent systems on a constructive cognitive reasoning framework inevitably involves tacit appeal to insights and modes of reasoning that can be understood, designed and implemented.

This book had a long prehistory intertwined with the development of an important new method of plausible reasoning. The authors both participated in the development of the plausible reasoning technique which was called by its initiator V. K. Finn the JSM method of automatic generation of hypotheses in honour of the British thinker John Stuart Mill. This development has a long history of several decades, having already started in the former Soviet Union at the All-Russia Institute of Scientific and Technical Information (VINITI), Russian Academy of Sciences, Moscow. Some intensive periods of this development took place in co-operation with VINITI and the Applied Logic Laboratory, Budapest, Hungary.

The authors not only participated in the development of this method but also played key roles in the elaboration of the main results of this method.

Earlier, around the millennium, a book was planned to be written on the results obtained in the area of plausible reasoning provided by this method. Intensive and productive joint work was started with the participation of V. K. Finn, T. Gergely, S. O. Kuznetsov and D. P. Skvortsov on the preparation of the manuscript. It proved difficult at first, because coherence among the different viewpoints and techniques was not easy to establish. Soon after O. M. Anshakov joined the author team, replacing D. P. Skvortsov. The authors of this present book felt a pressing demand for the development of a new integrated approach that could provide a logic foundation for the entire area of cognitive reasoning. While working on the manuscript this feeling became stronger and stronger. Finally, having almost completed the manuscript,

work on it was suspended and the two authors started to realise their general goals. This took place around 2006. From then on the majority of the work was done in Budapest at the Applied Logic Laboratory. Authors wished to contribute to a better understanding of cognition and its modelling by developing a formal approach. This could provide a platform on which various existing approaches could be presented and handled.

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Tamás Gergely
Oleg Anshakov