

Logical Induction Artificial Intelligence

This book constitutes the refereed proceedings of the 9th International Conference on Inductive Logic Programming, ILP-99, held in Bled, Slovenia, in June 1999. The 24 revised papers presented were carefully reviewed and selected from 40 submissions. Also included are abstracts of three invited contributions. The papers address all current issues in inductive logic programming and inductive learning, from foundational and methodological issues to applications, e.g. in natural language processing, knowledge discovery, and data mining. Inductive logic programming is a new research area formed at the intersection of machine learning and logic programming. While the influence of logic programming has encouraged the development of strong theoretical foundations, this new area is inheriting its experimental orientation from machine learning. Inductive Logic Programming will be an invaluable text for all students of computer science, machine learning and logic programming at an advanced level. * * Examination of the background to current developments within the area * Identification of the various goals and aspirations for the increasing body of researchers in inductive logic programming * Coverage of induction of first order theories, the application of inductive logic programming and discussion of several logic learning programs * Discussion of the applications of inductive logic programming to qualitative modelling, planning and finite element mesh design

The 18th International Conference on Inductive Logic Programming was held in Prague, September 10–12, 2008. ILP returned to Prague after 11 years, and it is tempting to look at how the topics of interest have evolved during that time. The ILP community clearly continues to cherish its beloved first-order logic representation framework. This is legitimate, as the work presented at ILP 2008 demonstrated that there is still room for both extending established ILP approaches (such as inverse entailment) and exploring novel logic induction frameworks (such as brave induction). Besides the topics lending ILP research its unique focus, we were glad to see in this year's proceedings a good number of papers contributing to areas such as statistical relational learning, graph mining, or the semantic web. To help open ILP to more mainstream research areas, the conference featured three excellent invited talks from the domains of the semantic web (Frank van Harmelen), bioinformatics (Mark Craven) and cognitive sciences (Josh Tenenbaum). We deliberately looked for speakers who are not directly involved in ILP research. We further invited a tutorial on statistical relational learning (Kristian Kersting) to meet the strong demand to have the topic presented from the ILP perspective. Lastly, Stefano Bertolo from the European Commission was invited to give a talk on the ideal niches for ILP in the current EU-supported research on intelligent content and semantics.

This book constitutes the refereed proceedings of the 13th International Conference on Inductive Logic Programming, ILP 2003, held in Szeged, Hungary in September/October 2003. The 23 revised full papers presented were carefully reviewed and selected from 53 submissions. Among the topics addressed are multirelational data mining, complexity issues, theory revision, clustering, mathematical discovery, relational reinforcement learning, multirelational learning, inductive inference, description logics, grammar systems, and inductive learning.

This book constitutes the thoroughly refereed post-proceedings of the 16th International Conference on Inductive Logic Programming, ILP 2006, held in Santiago de Compostela, Spain, in August 2006. The papers address all current topics in inductive logic programming, ranging from theoretical and methodological issues to advanced applications.

Futurists are certain that humanlike AI is on the horizon, but in fact engineers have no idea how to program human reasoning. AI reasons

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from statistical correlations across data sets, while common sense is based heavily on conjecture. Erik Larson argues that hyping existing methods will only hold us back from developing truly humanlike AI.

From the very beginning of their investigation of human reasoning, philosophers have identified two other forms of reasoning, besides deduction, which we now call abduction and induction. Deduction is now fairly well understood, but abduction and induction have eluded a similar level of understanding. The papers collected here address the relationship between abduction and induction and their possible integration. The approach is sometimes philosophical, sometimes that of pure logic, and some papers adopt the more task-oriented approach of AI. The book will command the attention of philosophers, logicians, AI researchers and computer scientists in general.

This book is useful for IGNOU MCA students. A perusal of past questions papers gives an idea of the type of questions asked, the paper pattern and so on, it is for this benefit, we provide these IGNOU MCSE-003: Artificial Intelligence and Knowledge Management Notes.

Students are advised to refer these solutions in conjunction with their reference books. It will help you to improve your exam preparations. This book covers Concept of intelligence, Artificial intelligence, definition turning test, areas of application. Search techniques, state space, Production rules, problem characteristics, production system characteristic, depth first, breadth first search methods and their analysis, Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking. Introduction to list and string processing and dynamic databases concept of knowledge, characteristics and representation schemes, Logic, prepositional and predicate calculus, resolution, semantics nets, frames, conceptual dependency, scripts Monotonic reasoning, logical reasoning induction, natural deduction. Nonmonotonic reasoning – default reasoning minimalist reasoning, statistical reasoning –Baye's theorem, certainty factors, dempster shafer theory, Fuzzy logic. Concept of expert system, need for an expert system, Component and categories of an expert system, need for an expert system, Stages in the development of an expert system. Published by MeetGoogle

This volume contains the proceedings of the European Conference on Machine Learning 1994, which continues the tradition of earlier meetings and which is a major forum for the presentation of the latest and most significant results in machine learning. Machine learning is one of the most important subfields of artificial intelligence and computer science, as it is concerned with the automation of learning processes. This volume contains two invited papers, 19 regular papers, and 25 short papers carefully reviewed and selected from in total 88 submissions. The papers describe techniques, algorithms, implementations, and experiments in the area of machine learning.

This book constitutes the refereed proceedings of the 13th International Conference on Logic for Programming, Artificial Intelligence, and Reasoning, LPAR 2006, held in Phnom Penh, Cambodia in November 2006. The 38 revised full papers presented together with one invited talk were carefully reviewed and selected from 96 submissions.

Abduction and Induction Essays on their Relation and Integration Springer Science & Business Media

This book provides an introduction to probabilistic inductive logic programming. It places emphasis on the methods based on logic programming principles and covers formalisms and systems, implementations and applications, as well as theory.

This book suggests that classification is a key to human commonsense reasoning and transforms traditional considerations of data

and knowledge communications, presenting an effective classification of logical rules used in the modeling of commonsense reasoning.

This exciting new text reveals both the evolution of this programming paradigm since its inception and the impressively broad scope of current research in the field. The contributors to this book are all leading world experts in Logic Programming, and they deal with both theoretical and practical issues. They address such diverse topics as: computational molecular biology, machine learning, mobile computing, multi-agent systems, planning, numerical computing and dynamical systems, database systems, an alternative to the "formulas as types" approach, program semantics and analysis, and natural language processing. XXXXXXXX
Neuer Text Logic Programming was founded 25 years ago. This exciting book reveals both the evolution of this programming paradigm and its impressively broad scope of current research. The contributions by leading computer scientists deal with both theoretical and practical issues. They address diverse topics such as: computational molecular biology, machine learning, mobile computing, multi-agent systems, numerical computing and dynamical systems, database systems, program semantics, natural language processing, and promising future directions.

This book constitutes the refereed proceedings of the 12th International Conference on Logic for Programming, Artificial Intelligence, and Reasoning, LPAR 2005, held in Montego Bay, Jamaica in December 2005. The 46 revised full papers presented together with abstracts of 3 invited talks were carefully reviewed and selected from 108 full paper submissions. The papers address all current issues in logic programming, logic-based program manipulation, formal method, automated reasoning, and various kinds of AI logics.

The Portuguese Association for Artificial Intelligence (APPIA) has been regularly organising the Portuguese Conference on Artificial Intelligence (EPIA). This ninth conference follows previous ones held in Porto (1985), Lisboa (1986), Braga (1987), Lisboa (1989), Albufeira (1991), Porto (1993), Funchal (1995) and Coimbra (1997). Starting in 1989, the conferences have been held biennially (alternating with an APPIA Advanced School on Artificial Intelligence) and become truly international: English has been adopted as the official language and the proceedings are published in Springer's LNAI series. The conference has reconformed its high international standard this year, largely due to its programme committee, composed of distinguished researchers in a variety of specialities in Artificial Intelligence, half of them from Portuguese universities. This has attracted a significant international interest, well expressed by the number of papers submitted (66), from 17 different countries, 29 of which are by Portuguese researchers. From the 66 papers submitted, about one third of them (23) were selected for oral presentation and have been published in this volume. The review process enabled the selection of high quality papers, each paper being reviewed by two or three reviewers, either from the programme committee or by their appointment. We would like to thank all of the reviewers for their excellent and hard work.

Personal motivation. The dream of creating artificial devices that reach or outperform human intelligence is an old one. It is also one of the dreams of my youth, which have never left me. What makes this challenge so interesting? A solution

would have enormous implications on our society, and there are reasons to believe that the AI problem can be solved in my expected lifetime. So, it's worth sticking to it for a lifetime, even if it takes 30 years or so to reap the benefits. The AI problem. The science of artificial intelligence (AI) may be defined as the construction of intelligent systems and their analysis. A natural definition of a system is anything that has an input and an output stream. Intelligence is more complicated. It can have many faces like creativity, solving problems, pattern recognition, classification, learning, induction, deduction, building analogies, optimization, surviving in an environment, language processing, and knowledge. A formal definition incorporating every aspect of intelligence, however, seems difficult. Most, if not all known facets of intelligence can be formulated as goal driven or, more precisely, as maximizing some utility function. It is, therefore, sufficient to study goal-driven AI; e. g. the (biological) goal of animals and humans is to survive and spread. The goal of AI systems should be to be useful to humans.

Program synthesis is a solution to the software crisis. If we had a program that develops correct programs from specifications, then program validation and maintenance would disappear from the software life-cycle, and one could focus on the more creative tasks of specification elaboration, validation, and maintenance, because replay of program development would be less costly. This monograph describes a novel approach to Inductive Logic Programming (ILP), which cross-fertilizes logic programming and machine learning. Aiming at the synthesis of recursive logic programs only, and this from incomplete information, we take a software engineering approach that is more appropriate than a pure artificial intelligence approach. This book is suitable as a secondary text for graduate level courses in software engineering and artificial intelligence, and as a reference for practitioners of program synthesis.

Half a century into the digital era, the profound impact of information technology on intellectual and cultural life is universally acknowledged but still poorly understood. The sheer complexity of the technology coupled with the rapid pace of change makes it increasingly difficult to establish common ground and to promote thoughtful discussion. Responding to this challenge, *Switching Codes* brings together leading American and European scholars, scientists, and artists—including Charles Bernstein, Ian Foster, Bruno Latour, Alan Liu, and Richard Powers—to consider how the precipitous growth of digital information and its associated technologies are transforming the ways we think and act. Employing a wide range of forms, including essay, dialogue, short fiction, and game design, this book aims to model and foster discussion between IT specialists, who typically have scant training in the humanities or traditional arts, and scholars and artists, who often understand little about the technologies that are so radically transforming their fields. *Switching Codes* will be an indispensable volume for anyone seeking to understand the impact of digital technology on contemporary culture, including scientists, educators, policymakers, and artists, alike.

This book constitutes the refereed proceedings of the 11th International Conference on Inductive Logic Programming, ILP 2001, held in Strasbourg, France in September 2001. The 21 revised full papers presented were carefully reviewed and selected from 37 submissions. Among the topics addressed are data mining issues for multi-relational databases, supervised learning, inductive inference, Bayesian reasoning, learning refinement operators, neural network learning, constraint satisfaction, genetic algorithms, statistical machine learning, transductive inference, etc.

Machine Learning

This volume is number ten in the 11-volume Handbook of the History of Logic. While there are many examples where a science split from philosophy and became autonomous (such as physics with Newton and biology with Darwin), and while there are, perhaps, topics that are of exclusively philosophical interest, inductive logic — as this handbook attests — is a research field where philosophers and scientists fruitfully and constructively interact. This handbook covers the rich history of scientific turning points in Inductive Logic, including probability theory and decision theory. Written by leading researchers in the field, both this volume and the Handbook as a whole are definitive reference tools for senior undergraduates, graduate students and researchers in the history of logic, the history of philosophy, and any discipline, such as mathematics, computer science, cognitive psychology, and artificial intelligence, for whom the historical background of his or her work is a salient consideration. • Chapter on the Port Royal contributions to probability theory and decision theory • Serves as a singular contribution to the intellectual history of the 20th century • Contains the latest scholarly discoveries and interpretative insights

The two-volume set LNCS 1842/1843 constitutes the refereed proceedings of the 6th European Conference on Computer Vision, ECCV 2000, held in Dublin, Ireland in June/July 2000. The 116 revised full papers presented were carefully selected from a total of 266 submissions. The two volumes offer topical sections on recognitions and modelling; stereoscopic vision; texture and shading; shape; structure from motion; image features; active, real-time, and robot vision; segmentation and grouping; vision systems engineering and evaluation; calibration; medical image understanding; and visual motion.

Contrary to general opinion, Artificial Intelligence research has often been carried out from a mathematical point of view, and frequently incorporates techniques of theoretical computer science. This book surveys various areas of Artificial Intelligence research, describing formal techniques. The areas chosen are most of those which have been - or can be - discussed with mathematical precision and clarity. The authors are all active researchers (in some cases international authorities) in their respective areas. The volume is much more than a collection of annotated bibliographies'. The papers survey the basic techniques of each field, giving information that will facilitate further reading. The areas covered are:

equations and identities in algebras, mechanical theorem proving, logical induction, intelligent data bases, qualitative reasoning, program verification and synthesis, automatic heuristic development and neural networks.

Two psychologists, a computer scientist, and a philosopher have collaborated to present a framework for understanding processes of inductive reasoning and learning in organisms and machines. Theirs is the first major effort to bring the ideas of several disciplines to bear on a subject that has been a topic of investigation since the time of Socrates. The result is an integrated account that treats problem solving and induction in terms of rulebased mental models. Induction is included in the Computational Models of Cognition and Perception Series. A Bradford Book.

The theory and practice of AI and ML in marketing saving time, money

This proceedings volume contains a selection of revised and extended papers presented at the Second International Workshop on Nonmonotonic and Inductive Logic, NIL '91, which took place at Reinhardsbrunn Castle, December 2-6, 1991. The volume opens with an extended version of a tutorial on nonmonotonic logic by G. Brewka, J. Dix, and K. Konolige. Fifteen selected papers follow, on a variety of topics. The majority of papers belong either to the area of nonmonotonic reasoning or to the field of inductive inference, but some papers integrate research from both areas. The first workshop in this series was held at the University of Karlsruhe in December 1990 and its proceedings were published as Lecture Notes in Artificial Intelligence Volume 543. The series of workshops was made possible by financial support from Volkswagen Stiftung, Hannover. This workshop was also supported by IBM Deutschland GmbH and Siemens AG.

Intended both as a text for advanced undergraduates and graduate students, and as a key reference work for AI researchers and developers, Logical Foundations of Artificial Intelligence is a lucid, rigorous, and comprehensive account of the fundamentals of artificial intelligence from the standpoint of logic. The first section of the book introduces the logicist approach to AI--discussing the representation of declarative knowledge and featuring an introduction to the process of conceptualization, the syntax and semantics of predicate calculus, and the basics of other declarative representations such as frames and semantic nets. This section also provides a simple but powerful inference procedure, resolution, and shows how it can be used in a reasoning system. The next several chapters discuss nonmonotonic reasoning, induction, and reasoning under uncertainty, broadening the logical approach to deal with the inadequacies of strict logical deduction. The third section introduces modal operators that facilitate representing and reasoning about knowledge. This section also develops the process of writing predicate calculus sentences to the metalevel--to permit sentences about sentences and about reasoning processes. The final three chapters discuss the representation of knowledge about states and actions, planning, and intelligent system architecture. End-of-chapter bibliographic and

historical comments provide background and point to other works of interest and research. Each chapter also contains numerous student exercises (with solutions provided in an appendix) to reinforce concepts and challenge the learner. A bibliography and index complete this comprehensive work.

"How often we recall, with regret", wrote Mark Twain about editors, "that Napoleon once shot at a magazine editor and missed him and killed a publisher. But we remember with charity, that his intentions were good. " Fortunately, we live in more forgiving times, and are openly able to express our pleasure at being the editors of this volume containing the papers selected for presentation at the 14th International Conference on Inductive Logic Programming. ILP 2004 was held in Porto from the 6th to the 8th of September, under the auspices of the Department of Electrical Engineering and Computing of the Faculty of Engineering of the University of Porto (FEUP), and the Laborat ? orio de Intelig? encia Arti?cial e Ci? encias da Computa ? c ? ao (LIACC). This annual me- ing of ILP practitioners and curious outsiders is intended to act as the premier forum for presenting the most recent and exciting work in the ?eld. Six invited talks--three from ?elds outside ILP, but nevertheless highly relevant to it-- and 20 full presentations formed the nucleus of the conference. It is the full-length papers of these 20 presentations that comprise the bulk of this volume. As is now common with the ILP conference, presentations made to a "Work-in-Progress" track will, hopefully, be available elsewhere. We gratefully acknowledge the continued support of Kluwer Academic Publishers for the "Best Student Paper" award on behalf of the Machine Learning journal; and Springer-Verlag for continuing to publish the proceedings of these conferences.

While assuming no prior knowledge of AI or logic, this book provides a clear and readable introduction to many of the most advanced developments in AI, as well as giving examples of their usage and critically assessing their applicability and effectiveness. Topics covered include planning, logic and inference, non-monotonic logic, reason maintenance, memory organization, probabilistic reasoning, induction and neural networks. By concentrating on inference as a central theme, the author is able to present material more sophisticated than that covered by other university textbooks in the subject. The book will therefore be particularly suitable for advanced undergraduate and graduate courses in AI.

The purpose of this work is to analyze the notion of induction, conceived as the class of rational non-truth preserving inferences, from the point of view of the nonmonotonic logical tradition raised inside the field of Artificial Intelligence (AI) in the last twenty-five years. By centering our efforts around what has been called the problem of description of induction, we intend to explicate (in Carnap's sense) the notion of induction through a purely descriptive and consequently justificatory-free approach to induction. Of fundamental importance for this enterprise is the notion of plausibility, here understood as the same as Carnap's notion of pragmatical probability. By providing a representational formal analysis of

the notion of induction, we also aim to explicate something akin to the ordinary notion of plausibility. One of the main features of this relationship between induction and plausibility concerns the two most basic approaches one can take when dealing with the contradictions that are sure to arise from the use of inductive inferences. These skeptical and credulous approaches to induction, as we have named them, give rise to two different plausibility notions which bear important relations to a domain of formal logic closely connected with AI, the field of paraconsistent and paracomplete logic: while the skeptical plausibility is a paracomplete notion, the credulous plausibility is a paraconsistent one. At the basis of our formal work is the result that in opposition to the formal approaches developed in philosophy, the justificatory-free aspect we are looking for is already present in most nonmonotonic logics. We pick two of these formalisms - Reiter's default logic and Pequeno's paraconsistent default logics - and extend them in such a way as to obtain a system able to perform the task a descriptive logic of induction is supposed to perform. To complete our formal work, we also develop a so-called paranormal (i.e., simultaneously paracomplete and paraconsistent) modal logic to represent the two notions of plausibility and act in conjunction with the mentioned nonmonotonic logic. In this way, our work is also a contribution to the field of modal logic. In order to show the applicability of our system, we present a formalization of the so-called abductive reasoning and hypothetico-deductive reasoning applied to the problem of confirmation of hypotheses in philosophy of science.

The use of mathematical logic as a formalism for artificial intelligence was recognized by John McCarthy in 1959 in his paper on Programs with Common Sense. In a series of papers in the 1960's he expanded upon these ideas and continues to do so to this date. It is now 41 years since the idea of using a formal mechanism for AI arose. It is therefore appropriate to consider some of the research, applications and implementations that have resulted from this idea. In early 1995 John McCarthy suggested to me that we have a workshop on Logic-Based Artificial Intelligence (LBAI). In June 1999, the Workshop on Logic-Based Artificial Intelligence was held as a consequence of McCarthy's suggestion. The workshop came about with the support of Ephraim Glinert of the National Science Foundation (IIS-9S2013S), the American Association for Artificial Intelligence who provided support for graduate students to attend, and Joseph JaJa, Director of the University of Maryland Institute for Advanced Computer Studies who provided both manpower and financial support, and the Department of Computer Science. We are grateful for their support. This book consists of refereed papers based on presentations made at the Workshop. Not all of the Workshop participants were able to contribute papers for the book. The common theme of papers at the workshop and in this book is the use of logic as a formalism to solve problems in AI.

The present book is primarily intended for undergraduate and postgraduate students of computer science and engineering,

information technology, and electrical and electronics engineering. It bridges the gaps in knowledge of the seemingly difficult areas of machine learning and nature inspired computing. The text is written in a highly interactive manner, which satisfies the learning curiosity of any reader. Content of the text has been diligently organized to offer seamless learning experience. The text begins with introduction to machine learning, which is followed by explanation of different aspects of machine learning. Various supervised, unsupervised, reinforced and nature inspired learning techniques are included in the text book with numerous examples and case studies. Different aspects of new machine learning and nature inspired learning algorithms are explained in-depth. The well-explained algorithms and pseudo codes for each topic make this book useful for students. The book also throws light on areas like prediction and classification systems. Key Features • Day to day examples and pictorial representations for deeper understanding of the subject • Helps readers easily create programs/applications • Research oriented approach • More case studies and worked-out examples for each machine learning algorithm than any other book

This book constitutes the thoroughly refereed post-conference proceedings of the 16th International Conference on Logic for Programming, Artificial Intelligence, and Reasoning, LPAR 2010, which took place in Dakar, Senegal, in April/May 2010. The 27 revised full papers and 9 revised short papers presented together with 1 invited talk were carefully revised and selected from 47 submissions. The papers address all current issues in automated reasoning, computational logic, programming languages and deal with logic programming, logic-based program manipulation, formal methods, and various kinds of AI logics. Subjects covered range from theoretical aspects to various applications such as automata, linear arithmetic, verification, knowledge representation, proof theory, quantified constraints, as well as modal and temporal logics.

This comprehensive encyclopedia, in A-Z format, provides easy access to relevant information for those seeking entry into any aspect within the broad field of Machine Learning. Most of the entries in this preeminent work include useful literature references. This book constitutes the refereed proceedings of the 10th International Conference on Inductive Logic Programming, ILP 2000, held in London, UK in July 2000 as part of CL 2000. The 15 revised full papers presented together with an invited paper were carefully reviewed and selected from 37 submissions. The papers address all current issues in inductive logic programming and inductive learning, from foundational aspects to applications in various fields like data mining, knowledge discovery, and ILP system design.

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