What S Right Knowledge Representation

JILLIAN JOHN

Knowledge Representation Springer Science & Business Media
Most researchers to date in artificial intelligence has been based on the knowledge representation hypothesis, that is, the assumption that in any artificial intelligence (AI) programme there is a separate module which represents the information that the programme has about the world. As a result, a number of so-called knowlege representation formalisms have been developed for representing this kind of information in a computer.
Principles of Knowledge Representation and Reasoning AAAI Press
Principles of Semantic Networks: Explorations in the Representation of Knowledge provides information pertinent to the theory and applications of semantic networks. This book deals with issues in knowledge representation, which discusses theoretical topics independent of particular implementations. Organized into three parts encompassing 19 chapters, this book begins with an overview of semantic network structure for representing knowledge as a pattern of interconnected nodes and arcs. This text then analyzes the concepts of subsumption and taxonomy and synthesizes a framework that integrates many previous approaches and goes beyond them to provide an account of abstract and partially defines concepts. Other chapters consider formal analyses, which treat the methods of reasoning with semantic networks and their computational complexity. This book discusses as well encoding linguistic knowledge. The final chapter deals with a formal approach to knowledge representation that builds on ideas originating outside the artificial intelligence literature in research on foundations for programming languages. This book is a valuable resource for mathematicians.
Expert Systems Morgan Kaufmann
Chapter one presents the Cyc "philosophy" or paradigm. Chapter 2 presents a global overview of Cyc, including its representation language, the ontology f its knowledge base, and teh environment which it functions. Chapter 3 goes into much more detail on the representation language, including the structure and function of Cyc's metalevel agenda mechanism. Chapter 4 presents heuristics for ontological engineering, the pricnples upon whcihc Cyc's ontology is based. Chapter 5 the provides a glimpse into the global ontology of knowledge. Chapter 6 explains how we "solve" (i.e., adequately handle) the various tough representation thorns (substances, time, space, structures, composite mental/physical objects, beliefs, uncertainty, etc.). Chapter 7 surveys the mistakes that new knowledge tnereres most often commit. Chapter 8, the concluding chapter, includes a brief status report on the project, and a statement of goals and a timetable for the coming five years.
Proceedings of the First International Conference on Principles of Knowledge Representation and Reasoning Morgan Kaufmann
Representation and Understanding
The Logic of Knowledge Bases Springer Science & Business Media

Knowledge representation is perhaps the most central problem confronting artificial intelligence. Expert systems need knowledge of their domain of expertise in order to function properly. Computer vIslOn systems need to know characteristics of what they are "seeing" in order to be able to fully interpret scenes. Natural language systems are invaluably aided by knowledge of the subject of the natural language discourse and knowledge of the participants in the discourse. Knowledge can guide learning systems towards better understanding and can aid problem solving systems in creating plans to solve various problems. Applications such as intelligent tutoring. computer-aided VLSI design. game playing. automatic programming. medical reasoning. diagnosis in various domains. and speech recogOltlOn. to name a few. are all currently experimenting with knowledge-based approaches. The problem of knowledge representation breaks down into several subsidiary problems including what knowledge to represent in a particular application. how to extract or create that knowledge. how to represent the knowledge efficiently and effectively. how to implement the knowledge representation scheme chosen. how to modify the knowledge in the face of a changing world. how to reason with the knowledge. and how tc use the knowledge appropriately in the creation of the application solution. This volume contains an elaboration of many of these basic issues from a variety of perspectives.

Knowledge Representation Morgan Kaufmann Pub

This book explores the building of expert systems using logic for knowledge representation and meta-level inference for control. It presents research done by members of the expert systems group of the Department of Artificial Intelligence in Edinburgh, often in collaboration with others, based on two hypotheses: that logic is a suitable knowledge representation language, and that an explicit representation of the control regime of the theorem prover has many advantages. The editors introduce these hypotheses and present the arguments in their favor They then describe Socrates' a tool for the construction of expert systems that is based on these assumptions. They devote the remaining chapters to the solution of problems that arise from the restrictions imposed by Socrates's representation language and from the system's inefficiency. The chapters dealing with the representation problem present a reified approach to temporal logic that makes it possible to use nonstandard logics without extending the system, and describe a general proof method for arbitrary modal logics. Those dealing with the efficiency problem discuss the technique of partial evaluation and its limitations, as well as another possible solution known as assertion-time inference. Peter Jackson is a Senior Scientist in the Department of Applied Mathematics and Computer Sciences at the McDonnell Douglas Research Laboratory in St. Louis. Han Reichgelt is a Lecturer in Department of Psychology at the University of Nottingham. Frank van Harmelen is a Research Fellow in the Mathematical Reasoning Group at the University of Edinburgh.

Foundations of Knowledge Representation and Reasoning Cambridge University Press

Growing interest in symbolic representation and reasoning has pushed this backstageactivity into the spotlight as a clearly identifiable and technically rich subfield in artificialintelligence. This collection of extended versions of 12 papers from the First InternationalConference on Principles of Knowledge Representation and Reasoning provides a snapshot of the bestcurrent work in AI on formal methods and principles of representation and reasoning. The topicsrange from temporal reasoning to default reasoning to representations for natural language.Ronald J.Brachman is Head of the Artificial Intelligence Principles Research Department at AT&T BellLaboratories. Hector J. Levesque and Raymond Reiter are Professors of Computer Science at theUniversity of Toronto.Contents: Introduction. Nonmonotonic Reasoning in the Framework of SituationCalculus. The Computational Complexity of Abduction. Temporal Constraint Networks. Impediments toUniversal Preference-Based Default Theories. Embedding Decision-Analytic Control in a LearningArchitecture. The Substitutional Framework for Sorted Deduction: Fundamental Results on HybridReasoning. Existence Assumptions in Knowledge Representation. Hard Problems for Simple DefaultLogics. The Effect of Knowledge on Belief: Conditioning, Specificity and the Lottery Paradox inDefault Reasoning. Three-Valued Nonmonotonic Formalisms and Semantics of Logic Programs. On theApplicability of Nonmonotonic Logic to Formal Reasoning in Continuous Time. Principles ofMetareasoning.

Knowledge Representation and Reasoning Under Uncertainty Springer Science & Business Media

Knowledge representation is fundamental to the study of mind. All theories of psychological processing are rooted in assumptions about how information is stored. These assumptions, in turn, influence the explanatory power of theories. This book fills a gap in the existing literature by providing an overview of types of knowledge representation techniques and their use in cognitive models. Organized around types of representations, this book begins with a discussion of the foundations of knowledge representation, then presents discussions of different ways that knowledge representation has been used. Both symbolic and connectionist approaches to representation are discussed and a set of recommendations about the way representations should be used is presented. This work can be used as the basis for a course on knowledge representation or can be read independently. It will be useful to students of psychology as well as people in related disciplines--computer science, philosophy, anthropology, and linguistics--who want an introduction to techniques for knowledge representation.

Approaches to Knowledge Representation Springer Nature

Knowledge Representation and Relation Nets introduces a fresh approach to knowledge representation that can be used to organize study material in a convenient, teachable and learnable form. The method extends and formalizes concept mapping by developing knowledge representation as a structure of concepts and the relationships among them. Such a formal description of analogy results in a controlled method of modeling `new' knowledge in terms of `existing' knowledge in teaching and learning situations, and its applications result in a consistent and well-organized approach to problem solving. Additionally, strategies for the presentation of study material to learners arise naturally in this representation. While the theory of relation nets is dealt with in detail in part of this book, the reader need not master the formal mathematics in order to apply the theory to this method of knowledge representation. To assist the reader, each chapter starts with a brief summary, and the main ideas are illustrated by examples. The reader is also given an intuitive view of the formal notions used in the applications by means of diagrams, informal descriptions, and simple sets of construction rules. Knowledge Representation and Relation Nets is an excellent source for teachers, courseware designers and researchers in knowledge representation, cognitive science, theories of learning, the psychology of education, and structural modeling.

Principles of Knowledge Representation and Reasoning MIT Press

The proceedings of the Second International Conference on [title] held in Cambridge, Massachusetts, April 1991, comprise 55 papers on topics including the logical specifications of reasoning behaviors and representation formalisms, comparative analysis of competing algorithms and formalisms, and ana

Encyclopedia of Systems Biology John Wiley & Sons

This major work on knowledge representation is based on the writings of Charles S. Peirce, a logician, scientist, and philosopher of the first rank at the beginning of the 20th century. This book follows Peirce's practical guidelines and universal categories in a structured approach to knowledge representation that captures differences in events, entities, relations, attributes, types, and concepts. Besides the ability to capture meaning and context, the Peircean approach is also well-suited to machine learning and knowledge-based artificial intelligence. Peirce is a founder of pragmatism, the uniquely American philosophy. Knowledge representation is shorthand for how to represent human symbolic information and knowledge to computers to solve complex questions. KR applications range from semantic technologies and knowledge management and machine learning to information integration, data interoperability, and natural language understanding. Knowledge representation is an essential foundation for knowledge-based AI. This book is structured into five parts. The first and last parts are bookends that first set the context and background and conclude with practical applications. The three main parts that are the meat of the approach first address the terminologies and grammar of knowledge representation, then building blocks for KR systems, and then design, build, test, and best practices in putting a system together. Throughout, the book refers to and leverages the open source KBpedia knowledge graph and its public knowledge bases, including Wikipedia and Wikidata. KBpedia is a ready baseline for users to bridge from and expand for their own domain needs and applications. It is built from the ground up to reflect Peircean principles. This book is one of timeless, practical guidelines for how to think about KR and to design knowledge management (KM) systems. The book is grounded bedrock for enterprise information and knowledge managers who are contemplating a new knowledge initiative. This book is an essential addition to theory and practice for KR and semantic technology and AI researchers and practitioners, who will benefit from Peirce's profound understanding of meaning and context.

Knowledge Representation and Relation Nets Elsevier

This book provides a de?nition and study of a knowledge representation and r- soning formalism stemming from conceptual graphs, while focusing on the com- tational properties of this formalism. Knowledge can be symbolically represented in many ways. The knowledge representation and reasoning formalism presented here is a graph formalism – knowledge is represented by labeled graphs, in the graph theory sense, and r- soning mechanisms are based on graph operations, with graph homomorphism at the core. This formalism can thus be considered as related to semantic networks. Since their conception, semantic networks have faded out several times, but have always returned to the limelight. They faded mainly due to a lack of formal semantics and the limited reasoning tools proposed. They have, however, always rebounded - cause labeled graphs, schemas and drawings provide an intuitive and easily und- standable support to represent knowledge. This formalism has the visual qualities of any graphic model, and it is logically founded. This is a key feature because logics has been the foundation for knowledge representation and reasoning for millennia. The authors also focus substantially on computational facets of the presented formalism as they are interested in knowledge representation and reasoning formalisms upon which knowledge-based systems can be built to solve real problems. Since object structures are graphs, naturally graph homomorphism is the key underlying notion and, from a computational viewpoint, this moors calculus to combinatorics and to computer science domains in which the algorithmicqualitiesofgraphshavelongbeenstudied,asindatabasesandconstraint networks.

Dynamic Knowledge Representation in Scientific Domains Elsevier

Drawing from a wide range of disciplines, this book integrates logic, philosophy, linguistics and computer science into this important new book. Written by a leading researcher in knowledge representation, this definitive work is designed for researchers in computer science with knowledge of artificial intelligence as a prerequisite.

The Knowledge Frontier Springer

This volume is a presentation of all methods of legal knowledge representation from the point of view of jurisprudence as well as computer science. A new method of automatic analysis of legal texts is presented in four case studies. Law is seen as an information system with legally formalised information processes. The achieved coverage of legal knowledge in information retrieval systems has to be followed by the next step: conceptual indexing and automatic analysis of texts. Existing approaches of automatic knowledge representations do not have a proper link to the legal language in information systems. The concept-based model for semi-automatic analysis of legal texts provides this necessary connection. The knowledge base of descriptors, context-sensitive rules and meta-rules formalises properly all important passages in the text corpora for automatic analysis. Statistics and self-organising maps give assistance in knowledge acquisition. The result of the analysis is organised with automatically generated hypertext links. Four case studies show the huge potential but also some drawbacks of this approach.

Handbook of Knowledge Representation Morgan Kaufmann Pub

This is an analysis of the philosophical assumptions and implications of current artificial intelligence (AI) representation schemes, particularly those dealing with the underlying cognitive processes of language. The work attacks the traditional, logic-based view of language and knowledge representation and argues that cognitive mechanisms provide a better model for structuring knowledge that that of first-order logic. The author explains her dynamic type hierarchy theory, a new approach to metaphor, language and knowledge representation.

Knowledge Representation Elsevier

Machine learning has become a rapidly growing field of Artificial Intelligence. Since the First International Workshop on Machine Learning in 1980, the number of scientists working in the field has been increasing steadily. This situation allows for specialization within the field. There are two types of specialization: on subfields or, orthogonal to them, on special subjects of interest. This book follows the thematic orientation. It contains research papers, each of which throws light upon the relation between knowledge representation, knowledge acquisition and machine learning from a different angle. Building up appropriate representations is considered to be the main concern of knowledge acquisition for knowledge-based systems throughout the book. Here machine learning is presented as a tool for building up such representations. But machine learning itself also states new representational problems. This book gives an easy-to-understand insight into a new field with its problems and the solutions it offers. Thus it will be

of good use to both experts and newcomers to the subject.

Natural Language Processing and Knowledge Representation Morgan Kaufmann Pub

Cognitive Science is a single-source undergraduate text that broadly surveys the theories and empirical results of cognitive science within a consistent computational perspective. In addition to covering the individual contributions of psychology, philosophy, linguistics, and artificial intelligence to cognitive science, the book has been revised to introduce the connectionist approach as well as the classical symbolic approach and adds a new chapter on cognitively related advances in neuroscience. Cognitive science is a rapidly evolving field that is characterized by considerable contention among different views and approaches. Cognitive Science presents these in a relatively neutral manner. It covers many new orientations theories and findings, embedding them in an integrated computational perspective and establishing a sense of continuity and contrast with more traditional work in cognitive science. The text assumes no prerequisite knowledge, introducing all topics in a uniform, accessible style. Many topics, such as natural language processing and vision, however, are developed in considerable depth, which allows the book to be used with more advanced undergraduates or even in beginning graduate settings. A Bradford Book

Building Large Knowledge-based Systems MIT Press

In Artificial Intelligence, it is often said that the representation of knowledge is the key to the design of robust intelligent systems. In one form or another the principles of Knowledge Representation are fundamental to work in natural language processing, computer vision, knowledge-based expert systems, and other areas. The papers reprinted in this volume have been collected to allow the reader with a general technical background in AI to explore the subtleties of this key subarea. These seminal articles, spanning a quarter-century of research, cover the most important ideas and developments in the representation field. The editors introduce each paper, discuss its relevance and context, and provide an extensive bibliography of other work. "Readings in Knowledge Representation" is intended to serve as a complete sourcebook for the study of this crucial subject.

Knowledge Representation and Organization in Machine Learning Morgan Kaufmann

The main approach to understanding and creating knowledge engineering concepts is static knowledge. Currently, there is a need to approach knowledge through a dynamic lens and address changing relations on an elaborated syntactic and semantic basis. Dynamic Knowledge Representation in Scientific Domains provides emerging research on the internal and external changes in knowledge within various subject areas and their visual representations. While highlighting topics such as behavior diagrams, distribution analysis, and qualitative modeling, this publication explores the structural development and assessment of knowledge models. This book is an important resource for academicians, researchers, students, and practitioners seeking current research on information visualization in order to foster research and collaboration.

Principles of Semantic Networks IGI Global

Systems biology refers to the quantitative analysis of the dynamic interactions among several components of a biological system and aims to understand the behavior of the system as a whole. Systems biology involves the development and application of systems theory concepts for the study of complex biological systems through iteration over mathematical modeling, computational simulation and biological experimentation. Systems biology could be viewed as a tool to increase our understanding of biological systems, to develop more directed experiments, and to allow accurate predictions. The Encyclopedia of Systems Biology is conceived as a comprehensive reference work covering all aspects of systems biology, in particular the investigation of living matter involving a tight coupling of biological experimentation, mathematical modeling and computational analysis and simulation. The main goal of the Encyclopedia is to provide a complete reference of established knowledge in systems biology – a ‘one-stop shop’ for someone seeking information on key concepts of systems biology. As a result, the Encyclopedia comprises a broad range of topics relevant in the context of systems biology. The audience targeted by the Encyclopedia includes researchers, developers, teachers, students and practitioners who are interested or working in the field of systems biology. Keeping in mind the varying needs of the potential readership, we have structured and presented the content in a way that is accessible to readers from wide range of backgrounds. In contrast to encyclopedic online resources, which often rely on the general public to author their content, a key consideration in the development of the Encyclopedia of Systems Biology was to have subject matter experts define the concepts and subjects of systems biology.