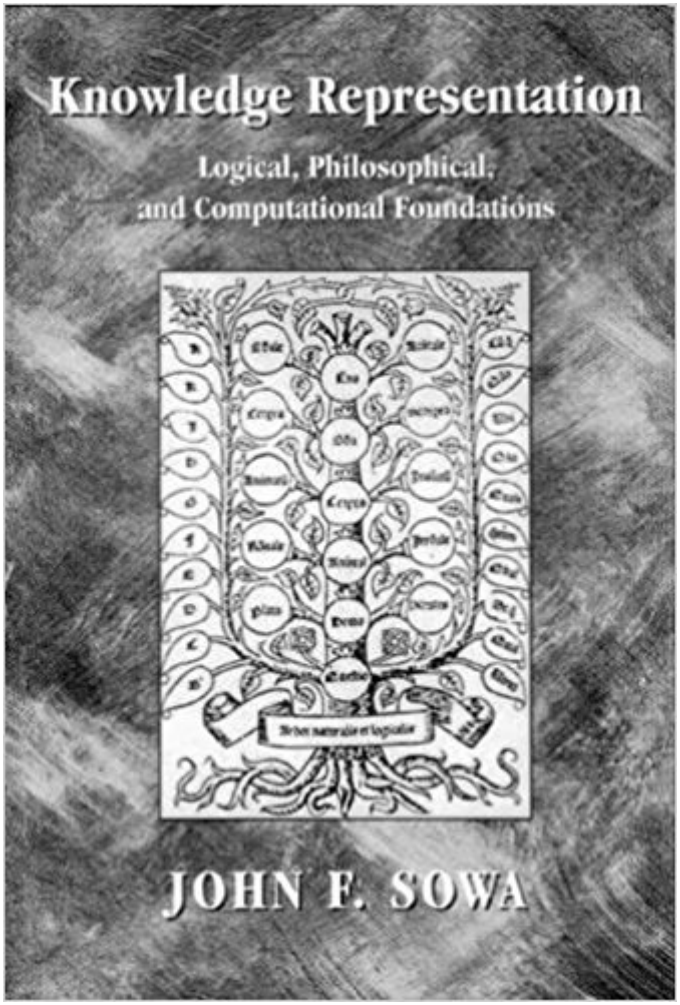
Knowledge Representation: Logical, Philosophical, And Computational Foundations



Synopsis

John Sowa integrates logic, philosophy, linguistics, and computer science into this study of knowledge and its various models and implementations. His definitive new book shows how techniques of artificial intelligence, database design, and object-oriented programming help make knowledge explicit in a form that computer systems can use. The first three chapters are devoted to logic, ontology, and computable models of reality. Remaining chapters apply theories to the analysis of problems stated in ordinary language, and their translation to computable form. The text is self-contained, with each new idea defined when first mentioned; all formalism is developed in the body of the text or summarized in an appendix. Knowledge Representation is appropriate for advanced undergraduate and graduate students in computer science, as well as philosophy and linguistics students with some background in artificial intelligence or programming.

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Customer Reviews

1. Logic. 2. Ontology. 3. Knowledge Representation. 4. Processes. 5. Purposes, Contexts, And Agents. 6. Knowledge Soup. 7. Knowledge Acquisition And Sharing. Appendixes: Appendix A: Summary Of Notations Appendix B: Sample Ontology. Appendix C: Extended Example. Answers To Selected Exercises. Bibliography. Name Index. Subject Index. Special Symbols.

John Sowa is a Fellow of the American Association for Artificial Intelligence. He earned a bachelor’s degree in Mathematics from MIT, a master’s degree in Applied Mathematics from Harvard, and a

doctorate in Computer Science from the Vrije Universiteit Brussel. He has published and edited several books and dozens of articles on artificial intelligence and related topics.

There is real conceptual meat in this book, it is obviously the fruit of decades of thinking on this vey hard topic.My only qualm is that it may be a little outdated by now. As far as I know there are better solutions to the Frames problem than the one outlined in the book.But as a place to start it is about as good as any for the time being, roughly on par with Russel and Norvigthough more detailed on some aspects.Here is the table of contents, which I OCR'd.Preface XICHAPTER ONELogic1.1 Historical Background1.2 Representing Knowledge in Logic1.3 Varieties of Logic1.4 Names, Types, and Measures1.5 Unity Amidst DiversityCHAPTER TWOOntology2.1 Ontological Categories2.2 Philosophical Background2.3 Top-Level Categories2.4 Describing Physical Entities2.5 Defining Abstractions2.6 Sets, Collections, Types, and CategoriesCHAPTER THREEKnowledge Representations3.1 Knowledge Engineering3.2 Representing Structure in Frames3.3 Rules and Data3.4 Object-Oriented Systems3.5 Natural Language Semantics3.6 Levels of RepresentationCHAPTER FOURProcesses4.1 Times, Events, and Situations4.2 Classification of Processes4.3 Procedures, Processes, and Histories4.4 Concurrent Processes4.5 Computation4.6 Constraint Satisfaction4.7 ChangeCHAPTER FIVEPurposes, Contexts, and Agents5.1 Purpose5.2 Syntax of Contexts5.3 Semantics of Contexts5.4 First-Order Reasoning in Contexts 5.6 Encapsulating Objects in Contexts 5.7 AgentsCHAPTER SIXKnowledge Soup6.1 Vagueness, Uncertainty, Randomness, and Ignorance6.2 Limitations of Logic6.3 Fuzzy Logic6.4 Nonmonotonic Logic6.5 Theories, Models, and the World6.6 SemioticsCHAPTER SEVENKnowledge Acquisition and Sharing7.1 Sharing Ontologies7.2 Conceptual Schema7.3 Accommodating Multiple Paradigms7.4 Relating Different Knowledge Representations7.5 Language Patterns7.6 Tools for Knowledge AcquisitionAPPENDIX ASummary of NotationsA.1 Predicate CalculusA.2 Conceptual GraphsAPPENDIX BB.1 Principles of OntologyB.2 Top-Level CategoriesB.3 Role and Relation TypesB.4 Thematic RolesB.5 Placement of the Thematic RolesAPPENDIX CExtended ExampleC.1 Hotel Reservation SystemC.2 Library DatabaseC.3 ACE VocabularyC.4 Translating ACE to LogicAnswers to Selected ExercisesBibliographyName IndexSubject IndexSpecial Symbols

In this book, John Sowa conveys diverse and effective insights within the field of knowledge representation (KR). The frameworks he employs are deeply grounded philosphically. (Sowa's previous work on conceptual structures reactivated and extended the innovative work of Charles Sanders Peirce, which integrates logic and graph theory.) The work reviewed here surveys a wide

range of KR issues from basic ontology to agency and processes. Chapter 6, Knowledge Soup, is widely recognized for framing and addressing some of the more demanding, and largely unresolved, challenges in the field.Throughout the book, issues are explored in a coherent, readable way. Of course, KR implies the use of relevant formalisms, and readers with some background in AI research will be better prepared to absorb the book's insights. However, for students and scholars looking for an integrated overview, Sowa makes a unique contribution.

I thought the first three chapters did an excellent job of covering advances in knowledge representation. However chapter four is marred by an attempt to present what appears to be virtually every syntax used relating to processes. Somewhere in this gulf of complexity I think he has some basic concepts, but they are hard to reach. It's equivalent to reading a book on algorithms in which the author presents the algorithms in C, Cobol, Fortran, Basic, SAS, etc. Why not just present the concepts within the context of a MINIMUM of syntax? Still the book is worth reading and has good appendixes.

Popular Lectures on Logic, and Logic, Philosophy & Psychoanalysis Integrative Approaches to Psychology and Christianity, 3rd edition: An Introduction to Worldview Issues, Philosophical Foundations, and Models of Integraiton Integrative Approaches to Psychology and Christianity, Third Edition: An Introduction to Worldview Issues, Philosophical Foundations, and Models of Integraiton Historical and Philosophical Foundations of Education: A Biographical Introduction (5th Edition) Historical and Philosophical Foundations of Education: A Biographical Introduction (4th Edition) Defending the Axioms: On the Philosophical Foundations of Set Theory