1. Record Nr. UNINA9910782274603321

Autore	Das Subrata Kumar
Titolo	Foundations of decision-making agents [[electronic resource]] : logic, probability and modality / / Subrata Das
Pubbl/distr/stampa	Singapore ; ; Hackensack, NJ, : World Scientific [London], : Imperial College Press, c2008
ISBN	1-281-93816-5 9786611938161 981-277-984-1
Descrizione fisica	1 online resource (385 p.)
Disciplina	006.33
Soggetti	Intelligent agents (Computer software) Artificial intelligence - Computer programs
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references (p. 347-353) and index.
Nota di contenuto	ch. 1. Modeling agent epistemic states: an informal overview. 1.1. Models of agent epistemic states. 1.2. Propositional epistemic model. 1.3. Probabilistic epistemic model. 1.4. Possible world epistemic model. 1.5. Comparisons of models. 1.6. P3 model for decision-making agents -- ch. 2. Mathematical preliminaries. 2.1. Usage of symbols. 2.2. Sets, relations, and functions. 2.3. Graphs and trees. 2.4. Probability. 2.5. Algorithmic complexity -- ch. 3. Classical logics for the propositional epistemic model. 3.1. Propositional logic. 3.2. First-order logic. 3.3. Theorem proving procedure. 3.4. Resolution theorem proving. 3.5. Refutation procedure. 3.6. Complexity analysis -- ch. 4. Logic programming. 4.1. The concept. 4.2. Program clauses and goals. 4.3. Program semantics. 4.4. Definite programs. 4.5. Normal programs. 4.6. Prolog. 4.7. Prolog systems. 4.8. Complexity analysis -- ch. 5. Logical rules for making decisions. 5.1. Evolution of rules. 5.2. Bayesian probability theory for handling uncertainty. 5.3. Dempster-Shafer theory for handling uncertainty. 5.4. Measuring consensus. 5.5. Combining sources of varying confidence. 5.6. Advantages and disadvantages of rule-based systems -- ch. 6. Bayesian belief networks. 6.1. Bayesian belief networks. 6.2. Conditional independence

in belief networks. 6.3. Evidence, belief, and likelihood. 6.4. Prior probabilities in networks without evidence. 6.5. Belief revision. 6.6. Evidence propagation in polytrees. 6.7. Evidence propagation in directed acyclic graphs. 6.8. Complexity of inference algorithms. 6.9. Acquisition of probabilities. 6.10. Advantages and disadvantages of belief networks. 6.11. Belief network tools -- ch. 7. Influence diagrams for making decisions. 7.1. Expected utility theory and decision trees. 7.2. Influence diagrams. 7.3. Inferencing in influence diagrams. 7.4. Compilation of influence diagrams. 7.5. Inferencing in strong junction tress -- ch. 8. Modal logics for the possible world epistemic model. 8.1. Historical development of modal logics. 8.2. Systems of modal logic. 8.3. Deductions in modal systems. 8.4. Modality. 8.5. Decidability and matrix method. 8.6. Relationships among modal systems. 8.7. Possible world semantics. 8.8. Soundness and completeness results. 8.9. Complexity and decidability of modal systems. 8.10. Modal first-order logics. 8.11. Resolution in modal first-order logics. 8.12. Modal epistemic logics. 8.13. Logic of agents beliefs (LAB) -- ch. 9. Symbolic argumentation for decision-making. 9.1. Toulmin's model of argumentation. 9.2. Domino decision-making model for P3. 9.3. Knowledge representation syntax of P3. 9.4. Formalization of P3 via LAB. 9.5. Aggregation via Dempster-Shafer theory. 9.6. Aggregation via Bayesian belief networks.

Sommario/riassunto

This self-contained book provides three fundamental and generic approaches (logical, probabilistic, and modal) to representing and reasoning with agent epistemic states, specifically in the context of decision making. Each of these approaches can be applied to the construction of intelligent software agents for making decisions, thereby creating computational foundations for decision-making agents. In addition, the book introduces a formal integration of the three approaches into a single unified approach that combines the advantages of all the approaches. Finally, the symbolic argumentation approach to decision making developed in this book, combining logic and probability, offers several advantages over the traditional approach to decision making which is based on simple rule-based expert systems or expected utility theory.