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Book Announcements

I.R. Goodman, H.T. Nguyen and E.A. Walker, Conditional Inference and Logic for Intelligent Systems: A Theory of Measure-Free Conditioning (1991) 288 pages

Chapter 1: *A survey of Previous Work on Conditional Events.* Implicative Boolean algebras and Lewis' triviality result. Division of events. Three-valued logic. Coset form of conditional events. Logical operations among conditional events. Notes. *Chapter* 2: *Derivation of Conditional Events.* Generalities. Conditioning operators. Conditional events. *Chapter* 3: *Logical Operations on Conditional Events.* The extension problem. Conditional logical operations. An order relation and related concepts. Connections with three-valued logic. Comparison of various systems of logical operators. Connection with qualitative probability. *Chapter* 4: *Algebraic Structure of Conditional Events.* Basic algebraic properties. An abstraction of the space of conditional events. Semi-simple MV-algebras. *Chapter* 5: *Conditional Events and Probability.* Uncertainty measures on conditionals. Conditional probability evaluations. Random conditional objects. Qualitative conditional independence. *Chapter* 6: *Conditional Probability Logic.* Essentials of probability logic. Syntax and basic properties. Truth conditional semantics. Additional properties of CPL. *Chapter* 7: *Fuzzy Conditionals.* Generalities on fuzziness. Fuzzy logics. Syntax representation of fuzzy sets. Fuzzy conditionals. Probability qualification. Iterated fuzzy conditionals. *Chapter* 8: *Iterated Conditioning and Miscellaneous Issues.* Iterated conditioning. Non-monotonic logics on conditionals. Operations on cosets of regular rings. Miscellaneous issues and open problems.

J.C.M. Baeten and W.P. Weijland, Process Algebra (Cambridge University Press, Cambridge, 1990) 248 pages

Chapter 1: *Preliminaries.* Introduction. Terms and equations. Algebras. Term rewriting systems. *Chapter* 2: *Basic Process Algebra.* The basic system. Deadlock and termination. Recursion. Projection and bounded non-determinism. The term model. Projective limit model. Process graphs. Regular processes. Stack. *Chapter* 3: *Concurrent Processes.* Interleaving. Some theorems on PA. Merge and termination. Models. Bag. Renaming. *Chapter* 4: *Communication.* Communication function. ACP. Some theorems on ACP. Termination. Models. Examples. Alternating Bit Protocol (specification). Queue. *Chapter* 5: *Abstraction.* Abstraction and silent step. ACP^{τ}. Termination. Models. Recursion. Divergence and fairness. Alternating Bit Protocol (verification). Observation equivalence. *Chapter* 6: *Features.* Priorities and interrupts. Alphabets and conditional axioms. Localization, traces and restriction. State operator. Asynchronous communication. Asymmetric communication. Process creation. Synchronous cooperation. Signals and observation. *Chapter* 7: *Semantics.* Bisimulation and trace semantics. Failure and ready semantics. Failure trace and ready trace semantics. *Chapter* 8: *Sources and Related Work.* Historical remarks. CCS. CSP.

Elsevier Science Publishers B.V.

Uwe Schoning, Logic for Computer Scientists (Birkhauser, Boston, 1989) 166 pages

Chapter 1: *Propositional Logic.* Foundations. Equivalence and normal forms. Horn formulas. The compactness theorem. Resolution. *Chapter* 2: *Predicate Logic.* Foundations. Normal forms. Undecidability. Herbrand's theory. Resolution. Refinements of resolution. *Chapter* 3: *Logic Programming.* Answer generation. Horn clause programs. Evaluation strategies. PROLOG.

Armen H. Zemanian, Infinite Electrical Networks (Cambridge University Press, Cambridge, 1991) 308 pages

Chapter 1: *Introduction.* Notations and terminology. Countable graphs. 0-graphs. Electrical networks. Kirchhoff's laws. Curiouser and curiouser. Electrical analogs for some differential equations. The transient behavior of linear RLC networks. *Chapter* 2: *Infinite-Power Regimes.* An example. The chainlike structure. Halin's result for locally finite graphs. An extension to countably infinite graphs. Limbs. Current regimes satisfying Kirchhoff's current law. Joints and chords. The equations for a limb analysis. Chord dominance. Limb analysis, summarized. Nonlinear networks. A contraction mapping result. A more general fixed point theorem. *Chapter* 3: *Finite-Power Regimes: The Linear Case.* Flanders' theorems. Connections at infinity: 1-graphs. Existence and uniqueness. The validity of Kirchhoff's laws. A dual analysis. Transferring pure sources. Networks with pure sources. Thomson's least power principle. The concavity of driving-point resistances. Nondisconnectable 0-tips. Effectively shorted 0-tips. *Chapter* 4: *Finite-Power Regimes: The Nonlinear Case.* Regular networks. The fundamental operator. The modular sequence space l_M. The space $l_M^{\#}$. The space c_M. Some uniform-variation conditions. Current regimes in l_M. A minimization principle. *Chapter* 5: *Transfinite Electrical Networks.* p-graphs. ω-graphs. Graphs of still higher ranks. (k, q)-paths and terminal behavior. k-networks. *Chapter* 6: *Cascades.* Linear uniform cascades. Nonlinear uniform cascades. Backward mappings of the axes. Trajectories near the origin. Characteristic immittances for nonlinear uniform cascades. Nonlinear uniform lattice cascades. Nonuniform cascades: infinity imperceptible. Nonuniform cascades: infinity perceptible. Input-output mappings. ω^p-cascades. Loaded cascades. *Chapter* 7: *Grids.* Laurent operators and the Fourier-series transformation. n-dimensional rectangular grids. A nodal analysis for uniform grids. One-dimensional nonuniformity. Solving grounded semi-infinite grids: infinity imperceptible. Solving ungrounded semi-infinite grids: infinity imperceptible. Semi-infinite grids: infinity perceptible. Forward and backward mappings. Solving semi-infinite grids: infinity perceptible. Transfinite grids. Grids with two-dimensionally transfinite nonuniformities. *Chapter* 8: *Applications.* Surface operators. Domain contractions. Random walks. Operator networks.

Allan Ramsay, Formal Methods in Artificial Intelligence (Cambridge University Press, Cambridge, 1988) 279 pages

Chapter 1: *Logic: Proofs and Models.* Representation plus entailment. Alternative views. *Chapter* 2: *Propositional Calculus.* Propositional calculus (Hilbert system). Propositional calculus (Gentzen system). Propositional calculus (tableau system). *Chapter* 3: *Predicate Calculus.* Predicate calculus. Problems with classical logic. *Chapter* 4: *Theorem Proving.* Unification. Theorem proving by backward chaining. Theorem proving by resolution. Connection method theorem proving. Prospects for automatic theorem proving. *Chapter* 5: *Modal Logic.* Formal details of possible worlds semantics. Axioms for modal logic. Theorem proving techniques for modal logic. Reasoning about knowledge. Combining knowledge and action. Belief structures. *Chapter* 6: *Temporal Reasoning.* Modal logics of time. Reification of temporal logic. The situation calculus. Points or intervals? Review of temporal logics. *Chapter* 7: *Non-Monotonic*

Reasoning. Monotonic and non-monotonic inference. Uses of non-monotonic rules. Formal properties of assumption based reasoning. Truth maintenance. Non-monotonic reasoning: theory and implementation. *Chapter* 8: *Properties.* λ-calculus. Montague Semantics. Theorem proving in λ-calculus. *Chapter* 9: *Alternative views.* Constructive logic. Fuzzy logic.

Subrata Dasgupta, Design Theory and Computer Science (Cambridge University Press, Cambridge, 1991) 428 pages

PART I: THE ARCHITECTONICS OF DESIGN. *Chapter* 1: *The Inadequacy of Definitions. Chapter* 2: *Design as the Initiation of Change.* Demarcating engineering from science. The matter of values. *Chapter* 3: *The Nature of Design Problems.* Empirical requirements. Conceptual requirements. The impreciseness of design problems. Bounded rationality and the incompleteness of design problems. *Chapter* 4: *The Form of Design Solutions.* Designs as blueprints. Designs as user guides. Designs as media for criticism and change. *Chapter* 5: *The Evolutionary Structure of Design Processes.* The satisficing nature of design decisions. The intractability of design optimization problems. Design as an evolutionary process. Empirical evidence of evolution in design. Ontogenic and phylogenic design evolution. Empirical evidence of evolution in phylogenic design. PART II: DESIGN PARADIGMS. *Chapter* 6: *The Concept of a Design Paradigm.* Introduction. Kuhnian paradigms. Defining the design paradigm concept. Design paradigms in computer science. *Chapter* 7: *The Analysis-Synthesis-Evaluation Paradigm.* Characteristics. Some instances of ASE-based design methods. Inductivism as the logical foundation for ASE. Limitations of the ASE paradigm. Remarks on requirements engineering. The use of conceptual models. *Chapter* 8: *The Formal Design Paradigm.* Designs as formal entities. The formal approach in programming. Hoare logic. The formal development of programs. The FD paradigm in computer architecture. The formal design of microprograms. The formal design of hardware structures. Limits to the universality of formal design. On the distinction between proofs of design correctness and mathematical proofs. *Chapter* 9: *The Theory of Plausible Designs.* Introduction. Constraints. The plausibility of a constraint. Plausibility states. The nature of evidence in TPD. Plausibility statements. The logic of plausibility states. The structure of plausibility-driven design. Justification constraints. Exercises in plausibility-driven design. Discussion, contrasts and comparisons. *Chapter* 10: *Design and Artificial Intelligence.* The automation of design. General structure of the AI design paradigm. Representing knowledge using production rules. Thought experiments in rule-based design. Weak methods revisited. Multiple goal resolution. The notion of style as a knowledge type. The TPD paradigm revisited. *Chapter* 11: *Algorithms for Design.* Introduction. Compiling as an algorithmic style. Knowledge representation in the algorithmic paradigm. Algorithmic translation. Algorithmic transformation. The issue of 'real' optimization. PART III: DESIGN AND SCIENCE. *Chapter* 12: *Design as Scientific Discovery.* Introduction. A reference model of science. Two examples of scientific discoveries from physics. The DSD model. Two thought experiments. On the richness of designs-as-theories.

I.R. Goodman, M.M. Gupta, H.T. Nguyen and G.S. Rogers, eds., Conditional Logic in Expert Systems (Elsevier Science Publishers, Amsterdam, 1991) 344 pages

Chapter 1: *Algebraic and Probabilistic Bases for Fuzzy Sets and the Development of Fuzzy Conditioning* (I.R. Goodman). *Chapter* 2: *Deduction and Inference Using Conditional Logic and Probability* (P.G. Calabrese). *Chapter* 3: *A Simple Look at Conditional Events* (E.A. Walker). *Chapter* 4: *Conditioning, Non-Monotonic Logic, and Non-Standard Uncertainty Models* (D. Dubois and H. Prade). *Chapter* 5: *Conditioning Operators in a Logic of Conditionals* (H.T. Nguyen and G.S. Rogers). *Chapter* 6: *Combination of Evidence with Conditional Objects and its Application to Cognitive Modeling* (M. Spies).

Chapter 7: *Connectives (and, or, not) and T-Operators in Fuzzy Reasoning* (M.M. Gupta and J. Qi). *Chapter* 8: *Implication and Modus Ponens in Fuzzy Logic* (P. Smets). *Chapter* 9: *Belief Function Computations* (H.M. Thoma). *Chapter* 10: *A Random Set Formalism for Evidential Reasoning* (K. Hestir, H.T. Nguyen and G.S. Rogers).

Ellery Eells, Probabilistic Causality (Cambridge University Press, Cambridge, 1991) 413 pages

Chapter 1: *Populations and Probability*. Populations. Probability. *Chapter* 2: *Spurious Correlation and Probability Increase*. Spurious correlation. Causal background contexts. Context unanimity. Interactive forks. *Chapter* 3: *Causal Interaction and Probability Increase*. Causal interaction and contexts. Disjunctive causal factors. *Chapter* 4: *Causal Intermediaries and Transitivity*. Causal intermediaries and contexts. Causal subsequents and contexts. Transitivity, intermediaries, and subsequents. On unanimity of intermediaries. *Chapter* 5: *Temporal Priority, Asymmetry, and some Comparisons*. The problem of temporal priority. The temporal requirement. Comparisons. *Chapter* 6: *Token-Level Probabilistic Causation*. Token causation and probability change. Token causation and probability trajectories. The causal background context and separate causes. The causal background context and interaction. Degrees of token causal significance. Comparisons, and explanation of particular events.