

Decision Procedures An Algorithmic Point Of View 1st Edition

An expanded and updated edition of a comprehensive presentation of the theory and practice of model checking, a technology that automates the analysis of complex systems. Model checking is a verification technology that provides an algorithmic means of determining whether an abstract model—representing, for example, a hardware or software design—satisfies a formal specification expressed as a temporal logic formula. If the specification is not satisfied, the method identifies a counterexample execution that shows the source of the problem. Today, many major hardware and software companies use model checking in practice, for verification of VLSI circuits, communication protocols, software device drivers, real-time embedded systems, and security algorithms. This book offers a comprehensive presentation of the theory and practice of model checking, covering the foundations of the key algorithms in depth. The field of model checking has grown dramatically since the publication of the first edition in 1999, and this second edition reflects the advances in the field. Reorganized, expanded, and updated, the new edition retains the focus on the foundations of temporal logic model while offering new chapters that cover topics that did not exist in 1999: propositional satisfiability, SAT-based model checking, counterexample-guided abstraction refinement, and software model checking. The book serves as an introduction to the field suitable for classroom use and as an essential guide for researchers.

This book offers a comprehensive treatment of the classical decision problem of mathematical logic and of the role of the classical decision problem in modern computer science. The text presents a revealing analysis of the natural order of decidable and undecidable cases and includes a number of simple proofs and exercises.

An extensive and authoritative introduction to property testing, the study of super-fast algorithms for the structural analysis of large quantities of data in order to determine global properties. This book can be used both as a reference book and a textbook, and includes numerous exercises.

This book constitutes the refereed proceedings of the 16th International Conference on Automated Deduction, CADE-16, held in Trento, Italy in July 1999 as part of FLoC'99. The 21 revised full papers presented were carefully reviewed and selected from a total of 83 submissions. Also included are 15 system descriptions and two invited full papers. The book addresses all current issues in automated deduction and theorem proving, ranging from logical foundations to deduction systems design and evaluation

Algorithms

Mining of Massive Datasets

Model Checking, second edition

Proving Theorems for Complex Dynamics

Practical Examples in Apache Spark and Neo4j

Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community detection. Learn how graph analytics vary from conventional statistical analysis Understand how classic graph algorithms work, and how they are applied Get guidance on which algorithms to use for different types of questions Explore algorithm examples with working code and sample datasets from Spark and Neo4j See how connected feature extraction can increase machine learning accuracy and precision Walk through creating an ML workflow for link prediction combining Neo4j and Spark

Computer science and economics have engaged in a lively interaction over the past fifteen years, resulting in the new field of algorithmic game theory. Many problems that are central to modern computer science, ranging from resource allocation in large networks to online advertising, involve interactions between multiple self-interested parties. Economics and game theory offer a host of useful models and definitions to reason about such problems. The flow of ideas also travels in the other direction, and concepts from computer science are increasingly important in economics. This book grew out of the author's Stanford University course on algorithmic game theory, and aims to give students and other newcomers a quick and accessible introduction to many of the most important concepts in the field. The book also includes case studies on online advertising, wireless spectrum auctions, kidney exchange, and network management.

Artificial Intelligence is here, today. How can society make the best use of it? Until recently, "artificial intelligence" sounded like something out of science fiction. But the technology of artificial intelligence, AI,

is becoming increasingly common, from self-driving cars to e-commerce algorithms that seem to know what you want to buy before you do. Throughout the economy and many aspects of daily life, artificial intelligence has become the transformative technology of our time. Despite its current and potential benefits, AI is little understood by the larger public and widely feared. The rapid growth of artificial intelligence has given rise to concerns that hidden technology will create a dystopian world of increased income inequality, a total lack of privacy, and perhaps a broad threat to humanity itself. In their compelling and readable book, two experts at Brookings discuss both the opportunities and risks posed by artificial intelligence--and how near-term policy decisions could determine whether the technology leads to utopia or dystopia. Drawing on in-depth studies of major uses of AI, the authors detail how the technology actually works. They outline a policy and governance blueprint for gaining the benefits of artificial intelligence while minimizing its potential downsides. The book offers major recommendations for actions that governments, businesses, and individuals can take to promote trustworthy and responsible artificial intelligence. Their recommendations include: creation of ethical principles, strengthening government oversight, defining corporate culpability, establishment of advisory boards at federal agencies, using third-party audits to reduce biases inherent in algorithms, tightening personal privacy requirements, using insurance to mitigate exposure to AI risks, broadening decision-making about AI uses and procedures, penalizing malicious uses of new technologies, and taking pro-active steps to address how artificial intelligence affects the workforce. Turning Point is essential reading for anyone concerned about how artificial intelligence works and what can be done to ensure its benefits outweigh its harm.

A decision procedure is an algorithm that, given a decision problem, terminates with a correct yes/no answer. Here, the authors focus on theories that are expressive enough to model real problems, but are still decidable.

Specifically, the book concentrates on decision procedures for first-order theories that are commonly used in automated verification and reasoning, theorem-proving, compiler optimization and operations research. The techniques described in the book draw from fields such as graph theory and logic, and are routinely used in industry. The authors introduce the basic terminology of satisfiability modulo theories and then, in separate chapters, study decision procedures for each of the following theories: propositional logic: equalities and uninterpreted functions; linear arithmetic; bit vectors; arrays; pointer logic; and quantified formulas.

First International Conference, ITP 2010 Edinburgh, UK, July 11-14, 2010, Proceedings

The Cambridge Handbook of the Law of Algorithms

An Algorithmic Point of View

Theory and Applications

4th International Workshop and Tutorial, FMTea 2021, Virtual Event, November 21, 2021, Proceedings

A Flaw in Human Judgment

Written with graduate and advanced undergraduate students in mind, this textbook introduces computational logic from the foundations of first-order logic to state-of-the-art decision procedures for arithmetic, data structures, and combination theories. The textbook also presents a logical approach to engineering correct software. Verification exercises are given to develop the reader's facility in specifying and verifying software using logic. The treatment of verification concludes with an introduction to the static analysis of software, an important component of modern verification systems. The final chapter outlines courses of further study.

This book constitutes the refereed proceedings of the First International Conference on Interactive Theorem proving, ITP 2010, held in Edinburgh, UK, in July 2010. The 33 revised full papers presented were carefully reviewed and selected from 74 submissions. The papers are organized in topics such as counterexample generation, hybrid system verification, translations from one formalism to another, and cooperation between tools. Several verification case studies were presented, with applications to computational geometry, unification, real analysis, etc.

The problem of privacy-preserving data analysis has a long history spanning multiple disciplines. As electronic data about individuals becomes increasingly detailed, and as technology enables ever more powerful collection and curation of these data, the need increases for a robust, meaningful, and mathematically rigorous definition of privacy, together with a computationally rich class of algorithms that satisfy this definition. Differential Privacy is such a definition. The Algorithmic Foundations of Differential Privacy starts out by motivating and discussing the meaning of differential privacy, and proceeds to explore the fundamental techniques for achieving differential privacy, and the application of these techniques in creative combinations, using the query-release problem as an ongoing example. A key point is that, by rethinking the computational goal, one can often obtain far better results than would be achieved by methodically replacing each step of a non-private computation with a differentially private implementation. Despite some powerful computational results, there are still fundamental limitations. Virtually all the algorithms discussed herein maintain differential privacy against adversaries of arbitrary computational power -- certain algorithms are computationally intensive, others are efficient. Computational complexity for the adversary and the algorithm are both discussed. The monograph then turns from fundamentals to applications other than query-release, discussing differentially private methods for mechanism design and machine learning. The vast majority of the literature on differentially private algorithms considers a single, static, database that is subject to many analyses. Differential privacy in other models, including distributed databases and computations on data streams, is discussed. The Algorithmic Foundations of Differential Privacy is meant as a thorough introduction to the problems and techniques of differential privacy, and is an invaluable reference for anyone with an interest in the topic.

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Interior Point Algorithms

Discrimination and Privacy in the Information Society

Decision Procedures with Applications to Verification

The Classical Decision Problem

Logical Analysis of Hybrid Systems

Hello World

This book is a printed edition of the Special Issue " Algorithms for Scheduling Problems" that was published in Algorithms

This book describes the new generation of discrete choice methods, focusing on the many advances that are made possible by simulation. Researchers use these statistical methods to examine the choices that consumers, households, firms, and other agents make. Each of the major models is covered: logit, generalized extreme value, or GEV (including nested and cross-nested logits), probit, and mixed logit, plus a variety of specifications that build on these basics. Simulation-assisted estimation procedures are investigated and compared, including maximum simulated likelihood, method of simulated moments, and method of simulated scores. Procedures for drawing from densities are described, including variance reduction techniques such as antithetics and Halton draws. Recent advances in Bayesian procedures are explored, including the use of the Metropolis-Hastings algorithm and its variant Gibbs sampling. The second edition adds chapters on endogeneity and expectation-maximization (EM) algorithms. No other book incorporates all these fields, which have arisen in the past 25 years. The procedures are applicable in many fields, including energy, transportation, environmental studies, health, labor, and marketing.

In this book the author introduces a novel approach to securing exam systems. He provides an in-depth understanding, useful for studying the security of exams and similar systems, such as public tenders, personnel selections, project reviews, and conference management systems. After a short chapter that explains the context and objectives of the book, in Chap. 2 the author introduces terminology for exams and the foundations required to formulate their security requirements. He describes the tasks that occur during an exam, taking account of the levels of detail and abstraction of an exam specification and the threats that arise out of the different exam roles. He also presents a taxonomy that classifies exams by types and categories. Chapter 3 contains formal definitions of the authentication, privacy, and verifiability requirements for exams, a framework based on the applied pi-calculus for the specification of authentication and privacy, and a more abstract approach based on set-theory that enables the specification of verifiability. Chapter 4 describes the Huszti-Peth protocol in detail and proposes a security enhancement. In Chap. 5 the author details Remark!, a protocol for Internet-based exams, discussing its cryptographic building blocks and some security considerations. Chapter 6 focuses on WATA, a family of computer-assisted exams that employ computer assistance while keeping face-to-face testing. The chapter also introduces formal definitions of accountability requirements and details the analysis of a WATA protocol against such definitions. In Chaps. 4, 5, and 6 the author uses the cryptographic protocol verifier ProVerif for the formal analyses. Finally, the author outlines future work in Chap. 7. The book is valuable for researchers and graduate students in the areas of information security, in particular for people engaged with exams or protocols.

This book constitutes the refereed proceedings of the 4th International Workshop and Tutorial, FMTea 2021, Held as Part of the 4th World Congress on Formal Methods, FM 2021, as a virtual event in November 2021. The 8 full papers presented together with 2 short papers were carefully reviewed and selected from 12 submissions. The papers are organized in topical sections named: experiences and proposals related with online FM learning and teaching, integrating/embedding FM teaching/thinking within other computer science courses, teaching FM for industry, and innovative learning and teaching methods for FM.

Discrete Choice Methods with Simulation

Automata, Computability and Complexity

Data Mining and Profiling in Large Databases

Policymaking in the Era of Artificial Intelligence

Concrete Semantics

Theory and Analysis

Introduces machine learning and its algorithmic paradigms, explaining the principles behind automated learning approaches and the considerations underlying their usage.

*The first comprehensive review of the theory and practice of one of today's most powerful optimization techniques. The explosive growth of research into and development of interiorpoint algorithms over the past two decades has significantly improved the complexity of linear programming and yielded some of today's most sophisticated computing techniques. This book offers a comprehensive and thorough treatment of the theory, analysis, and implementation of this powerful computational tool. Interior Point Algorithms provides detailed coverage of all basic and advanced aspects of the subject. Beginning with an overview of fundamental mathematical procedures, Professor Yinyu Ye moves swiftly on to in-depth explorations of numerous computational problems and the algorithms that have been developed to solve them. An indispensable text/reference for students and researchers in applied mathematics, computer science, operations research, management science, and engineering. Interior Point Algorithms: * Derives various complexity results for linear and convex programming * Emphasizes interior point geometry and potential theory * Covers state-of-the-art results for extension, implementation, and other cutting-edge computational techniques * Explores the hottest new research topics, including nonlinear programming and nonconvex optimization.*

An introduction to decision making under uncertainty from a computational perspective, covering both theory and applications ranging from speech recognition to airborne collision avoidance. Many important problems involve decision making under uncertainty—that is, choosing actions based on often imperfect observations, with unknown outcomes. Designers of automated decision support systems must take into account the various sources of uncertainty while balancing the multiple objectives of the system. This book provides an introduction to the challenges of decision making under uncertainty from a computational perspective. It presents both the theory behind decision making models and algorithms and a collection of example applications that range from speech recognition to aircraft collision avoidance. Focusing on two methods for designing decision agents, planning and reinforcement learning, the book covers probabilistic models, introducing Bayesian networks as a graphical model that captures probabilistic relationships between variables; utility theory as a framework for understanding optimal decision making under uncertainty; Markov decision processes as a method for modeling sequential problems; model uncertainty; state uncertainty; and cooperative decision making involving multiple interacting agents. A series of applications shows how the theoretical concepts can be applied to systems for attribute-based person search, speech applications, collision avoidance, and unmanned aircraft persistent surveillance. Decision Making Under Uncertainty unifies research from different communities using consistent notation, and is accessible to students and researchers across engineering disciplines who have some prior exposure to probability theory and calculus. It can be used as a text for advanced undergraduate and graduate students in fields including computer science, aerospace and electrical engineering, and management science. It will also be a valuable professional reference for researchers in a variety of disciplines.

'One of the best books yet written on data and algorithms. . .deserves a place on the bestseller charts.' (The Times) You are accused of a crime. Who would you rather determined your fate - a human or an algorithm? An algorithm is more consistent and less prone to error of judgement. Yet a human can look you in the eye before passing sentence. Welcome to the age of the algorithm, the story of a not-too-distant future where machines rule supreme, making important decisions - in healthcare, transport, finance, security, what we watch, where we go even who we send to prison. So how much should we rely on them? What kind of future do we want? Hannah Fry takes us on a tour of the good, the bad and the downright ugly of the algorithms that surround us. In Hello World she lifts the lid on their inner workings, demonstrates their power, exposes their limitations, and examines whether they really are an improvement on the humans they are replacing. A BBC RADIO 4- BOOK OF THE WEEK SHORTLISTED FOR THE 2018 BAILLIE GIFFORD PRIZE AND 2018 ROYAL SOCIETY SCIENCE BOOK PRIZE With Isabelle/HOL

Noise

A Modern Approach

Interactive Theorem Proving

Different Rules for Different People

Algorithmic Regulation

Multiagent systems combine multiple autonomous entities, each having diverging interests or different information. This overview of the field offers a computer science perspective, but also draws on ideas from game theory, economics, operations research, logic, philosophy and linguistics. It will serve as a reference for researchers in each of these fields, and be used as a text for advanced undergraduate or graduate courses. The authors emphasize foundations to create a broad and rigorous treatment of their subject, with thorough presentations of distributed problem solving, game theory, multiagent communication and learning, social choice, mechanism design, auctions, cooperative game theory, and modal logics of knowledge and belief. For each topic, basic concepts are introduced, examples are given, proofs of key results are offered, and algorithmic considerations are examined. An appendix covers background material in probability theory, classical logic, Markov decision processes and mathematical programming.

As the power and sophistication of 'big data' and predictive analytics has continued to expand, so too has policy and public concern about the use of algorithms in contemporary life. This is hardly surprising given our increasing reliance on algorithms in daily life, touching policy sectors from healthcare, transport, finance, consumer retail, manufacturing education, and employment through to public service provision and the operation of the criminal justice system. This has prompted concerns about the need and importance of holding algorithmic power to account, yet it is far from clear that existing legal and other oversight mechanisms are up to the task. This collection of essays, edited by two leading regulatory governance scholars, offers a critical exploration of 'algorithmic regulation', understood both as a means for co-ordinating and regulating social action and decision-making, as well as the need for institutional mechanisms through which the power of algorithms and algorithmic systems might themselves be regulated. It offers a unique perspective that is likely to become a significant reference point for the ever-growing debates about the power of algorithms in daily life in the worlds of research, policy and practice. The range of contributors are drawn from a broad range of disciplinary perspectives including law, public administration, applied philosophy, data science and artificial intelligence. Taken together, they highlight the rise of algorithmic power, the potential benefits and risks associated with this power, the way in which Sheila Jasanoff's long-standing claim that 'technology is politics' has been thrown into sharp relief by the speed and scale at which algorithmic systems are proliferating, and the urgent need for wider public debate and engagement of their underlying values and value trade-offs, the way in which they affect individual and collective decision-making and action, and effective and legitimate mechanisms by and through which algorithmic power is held to account.

Part I of this book is a practical introduction to working with the Isabelle proof assistant. It teaches you how to write functional programs and inductive definitions and how to prove properties about them in Isabelle's structured proof language. Part II is an introduction to the semantics of imperative languages with an emphasis on applications like compilers and program analysers. The distinguishing feature is that all the mathematics has been formalised in Isabelle and much of it is executable. Part I focusses on the details of proofs in Isabelle; Part II can be read even without familiarity with Isabelle's proof language, all proofs are described in detail but informally. The book teaches the reader the art of precise logical reasoning and the practical use of a proof assistant as a surgical tool for formal proofs about computer science artefacts. In this sense it represents a formal approach to computer science, not just semantics. The Isabelle formalisation, including the proofs and accompanying slides, are freely available online, and the book is suitable for graduate students, advanced undergraduate students, and researchers in theoretical computer science and logic.

A comprehensive and rigorous introduction for graduate students and researchers, with applications in sequential decision-making problems.

Parameterized Algorithms

Twenty Lectures on Algorithmic Game Theory

The Algorithmic Foundations of Differential Privacy

From Theory to Algorithms

Graph Algorithms

Theory and Application

Introduction to abstract interpretation, with examples of applications to the semantics, specification, verification, and static analysis of computer programs. Formal methods are mathematically rigorous techniques for the specification, development, manipulation, and verification of safe, robust, and secure software and hardware systems. Abstract interpretation is a unifying theory of formal methods that proposes a general methodology for proving the correctness of computing systems, based on their semantics. The concepts of abstract interpretation underlie such software tools as compilers, type systems, and security protocol analyzers. This book provides an introduction to the theory and practice of abstract interpretation, offering examples of applications to semantics, specification, verification, and static analysis of programming languages with emphasis on calculational design. The book covers all necessary computer science and mathematical concepts—including most of the logic, order, linear, fixpoint, and discrete mathematics frequently used in computer science—in separate chapters before they are used in the text. Each chapter offers exercises and selected solutions. Chapter topics include syntax, parsing, trace semantics, properties and their abstraction, fixpoints and their abstractions, reachability semantics, abstract domain and abstract interpreter, specification and verification, effective fixpoint approximation, relational static analysis, and symbolic static analysis. The main applications covered include program semantics, program specification and verification, program dynamic and static analysis of numerical properties and of such symbolic properties as dataflow analysis, software model checking, pointer analysis, dependency, and typing (both for forward and backward analysis), and their combinations.

Principles of Abstract Interpretation is suitable for classroom use at the graduate level and as a reference for researchers and practitioners.

From the Nobel Prize-winning author of *Thinking, Fast and Slow* and the coauthor of *Nudge*, a revolutionary exploration of why people make bad judgments and how to make better ones—"a tour de force" (New York Times). Imagine that two doctors in the same city give different diagnoses to identical patients—or that two judges in the same courthouse give markedly different sentences to people who have committed the same crime. Suppose that different interviewers at the same firm make different decisions about indistinguishable job applicants—or that when a company is handling customer complaints, the resolution depends on who happens to answer the phone. Now imagine that the same doctor, the same judge, the same interviewer, or the same customer service agent makes different decisions depending on whether it is morning or afternoon, or Monday rather than Wednesday. These are examples of noise: variability in judgments that should be identical. In *Noise*, Daniel Kahneman, Olivier Sibony, and Cass R. Sunstein show the detrimental effects of noise in many fields, including medicine, law, economic forecasting, forensic science, bail, child protection, strategy, performance reviews, and personnel selection. Wherever there is judgment, there is noise. Yet, most of the time, individuals and organizations alike are unaware of it. They neglect noise. With a few simple remedies, people can reduce both noise and bias, and so make far better decisions. Packed with original ideas, and offering the same kinds of research-based insights that made *Thinking, Fast and Slow* and *Nudge* groundbreaking New York Times bestsellers, *Noise* explains how and why humans are so susceptible to noise in judgment—and what we can do about it.

Now in its second edition, this book focuses on practical algorithms for mining data from even the largest datasets.

This comprehensive textbook presents a clean and coherent account of most fundamental tools and techniques in Parameterized Algorithms and is a self-contained guide to the area. The book covers many of the recent developments of the field, including application of important separators, branching based on linear programming, Cut & Count to obtain faster algorithms on tree decompositions, algorithms based on representative families of matroids, and use of the Strong Exponential Time Hypothesis. A number of older results are revisited and explained in a modern and didactic way. The book provides a toolbox of algorithmic techniques. Part I is an overview of basic techniques, each chapter discussing a certain algorithmic paradigm. The material covered in this part can be used for an introductory course on fixed-parameter tractability. Part II discusses more advanced and specialized algorithmic ideas, bringing the reader to the cutting edge of current research. Part III presents complexity results and lower bounds, giving negative evidence by way of W[1]-hardness, the Exponential Time Hypothesis, and kernelization lower bounds. All the results and concepts are introduced at a level accessible to graduate students and advanced undergraduate students. Every chapter is accompanied by exercises, many with hints, while the bibliographic notes point to original publications and related work.

Algorithms for Scheduling Problems

Bandit Algorithms

Decision Making Under Uncertainty

Personalized Law

The Calculus of Computation

Automated Deduction - CADE-16

Algorithms are a fundamental building block of artificial intelligence - and, increasingly, society - but our legal institutions have largely failed to recognize or respond to this reality. The Cambridge Handbook of the Law of Algorithms, which EU, and Asian legal scholars, discusses the specific challenges algorithms pose not only to current law, but also - as algorithms replace people as decision makers - to the foundations of society itself. The work includes wide coverage of the chapters analyzing how human biases have crept into algorithmic decision-making about who receives housing or credit, the length of sentences for defendants convicted of crimes, and many other decisions that impact constitutionally protected rights. The work include the impact of algorithms on the law of free speech, intellectual property, and commercial and human rights law.

Comprehensive treatment focuses on creation of efficient data structures and algorithms and selection or design of data structure best suited to specific problems. This edition uses Java as the programming language.

The theoretical underpinnings of computing form a standard part of almost every computer science curriculum. But the classic treatment of this material isolates it from the myriad ways in which the theory influences the design of modern computers. The goal of this book is to change that. The book is organized into a core set of chapters (that cover the standard material suggested by the title), followed by a set of appendix chapters that highlight application areas including programming verification, networks, security, natural language processing, artificial intelligence, game playing, and computational biology. The core material includes discussions of finite state machines, Markov models, hidden Markov models (HMMs), regular grammars, pushdown automata, Chomsky and Greibach normal forms, context-free parsing, pumping theorems for regular and context-free languages, closure theorems and decision procedures for regular and context-free languages, Turing decidability and undecidability, the Church-Turing thesis, reduction proofs, Post Correspondence problem, tiling problems, the undecidability of first-order logic, asymptotic dominance, time and space complexity, the Cook-Levin theorem, NP-completeness, time and space hierarchy theorems, randomized algorithms and heuristic search. Throughout the discussion of these topics there are pointers into the application chapters. So, for example, the chapter that describes reduction proofs of undecidability, which shows a reduction proof of the undecidability of the safety of a simple protection framework.

Decision ProceduresAn Algorithmic Point of ViewSpringer

Understanding Machine Learning

Algorithmic, Game-Theoretic, and Logical Foundations

Multiagent Systems

Decision Procedures

Data Structures and Algorithm Analysis in Java, Third Edition

How to Be Human in the Age of the Machine

We live in a world of one-size-fits-all law. People are different, but the laws that govern them are uniform. "Personalized Law"---rules that vary person by person---will change that. Here is a vision of a brave new world, where each person is bound by their own personally-tailored law. "Reasonable person" standards would be replaced by a multitude of personalized commands, each individual with their own "reasonable you" rule. Skilled doctors would be held to higher standards of care, the most vulnerable consumers and employees would receive stronger protections, age restrictions for driving or for the consumption of alcohol would vary according the recklessness risk that each person poses, and borrowers would be entitled to personalized loan disclosures tailored to their unique needs and delivered in a format fitting their mental capacity. The data and algorithms to administer personalized law are at our doorstep, and embryos of this regime are sprouting. Should we welcome this transformation of the law? Does personalized law harbor a utopic promise, or would it produce alienation, demoralization, and discrimination? This book is the first to explore personalized law, offering a vision of law and robotics that delegates to machines those tasks humans are least able to perform well. It inquires how personalized law can be designed to deliver precision and justice and what pitfalls the regime would have to prudently avoid. In this book, Omri Ben-Shahar and Ariel Porat not only present this concept in a clear, easily accessible way, but they offer specific examples of how personalized law may be implemented across a variety of real-life applications.

Vast amounts of data are nowadays collected, stored and processed, in an effort to assist in making a variety of administrative and governmental decisions. These innovative steps considerably improve the speed, effectiveness and quality of decisions. Analyses are increasingly performed by data mining and profiling technologies that statistically and automatically determine patterns and trends.

However, when such practices lead to unwanted or unjustified selections, they may result in unacceptable forms of discrimination. Processing vast amounts of data may lead to situations in which data controllers know many of the characteristics, behaviors and whereabouts of people. In some cases, analysts might know more about individuals than these individuals know about themselves. Judging people by their digital identities sheds a different light on our views of privacy and data protection. This book discusses discrimination and privacy issues related to data mining and profiling practices. It provides technological and regulatory solutions, to problems which arise in these innovative contexts. The book explains that common measures for mitigating privacy and discrimination, such as access controls and anonymity, fail to properly resolve privacy and discrimination concerns. Therefore, new solutions, focusing on technology design, transparency and accountability are called for and set forth.

One-stop reference, self-contained, with theoretical topics presented in conjunction with implementations for which code is supplied.

Hybrid systems are models for complex physical systems and have become a widely used concept for understanding their behavior. Many applications are safety-critical, including car, railway, and air traffic control, robotics, physical-chemical process control, and biomedical devices. Hybrid systems analysis studies how we can build computerized controllers for physical systems which are guaranteed to meet their design goals. The author gives a unique, logic-based perspective on hybrid systems analysis. It is the first book that leverages the power of logic for hybrid systems. The author develops a coherent logical approach for systematic hybrid systems analysis, covering its theory, practice, and applications. It is further shown how the developed verification techniques can be used to study air traffic and railway control systems. This book is intended for researchers, postgraduates, and professionals who are interested in hybrid systems analysis, cyberphysical or embedded systems design, logic and theorem proving, or transportation and automation.

Principles of Abstract Interpretation

Introduction to Property Testing

Handbook of Practical Logic and Automated Reasoning

Formal Methods Teaching

Modelling and Verification of Secure Exams

16th International Conference on Automated Deduction, Trento, Italy, July 7-10, 1999, Proceedings