Logic Minimizer 121

Wai-Kai Chen

Information Theoretic Approach to Logic Functions Minimization Denis V. Popel,2000-06-18

Information theory methods are of wide use in contemporary logic design, but their proper application to Computer Aided Design (CAD) is rather impossible without strong theoretical and practical justification. Our research is focused on logic function minimization which is an essential component of any system for digital circuit design. The well-known information theory methods to minimize logic functions should be improved and developed towards new problems appeared while increasing the number of CAD applications. We report new results on logic functions minimization by information theory standpoint. We have developed an information theoretic model of recursive decomposition of logic functions. Based on this model, a novel technique for efficient Decision Tree design of various types (AND/OR, Reed-Muller, Kronecker Decision Trees, etc.) is presented. We develop the algorithms that employ information theoretic measures to minimization of the logic functions represented by Decision Trees. We investigate the effect of information theory appliance to minimization of multiple-valued, incompletely specified functions, and to symmetry detection as well. We give the extended experimental study to validate the approach. The presented results can be treated as a significant step towards better understanding of the behavior of digital circuits from the information theory point of view. This achievement creates the prospect of solving the

wide circle of logic design problems, including low-power and high-testable circuits synthesis.

  <u>Introduction to Logic Circuits & Logic Design with Verilog</u> Brock J. LaMeres,2017-04-17 This textbook for courses in Digital Systems Design introduces students to the fundamental hardware used in modern computers. Coverage includes both the classical approach to digital system design (i.e., pen and paper) in addition to the modern hardware description language (HDL) design approach (computer-based). Using this textbook enables readers to design digital systems using the modern HDL approach, but they have a broad foundation of knowledge of the underlying hardware and theory of their designs. This book is designed to match the way the material is actually taught in the classroom. Topics are presented in a manner which builds foundational knowledge before moving onto advanced topics. The author has designed the presentation with learning Goals and assessment at its core. Each section addresses a specific learning outcome that the student should be able to "do" after its completion. The concept checks and exercise problems provide a rich set of assessment tools to measure student performance on each outcome.

  <u>The Logic Design of Transistor Digital Computers</u> Gerald A. Maley,John Earle,1963

  <u>Introduction to Logic Design</u> Sajjan G. Shiva,2018-10-03 The second edition of this text provides an introduction to the analysis and design of digital circuits at a logic, instead of electronics, level. It covers a range of topics, from number system theory to asynchronous logic

design. A solution manual is available to instructors only. Requests must be made on official school stationery.

  DIGITAL LOGIC DESIGN Sonali Singh,2018-06-01 Description:The book is an attempt to make Digital Logic Design easy and simple to understand. The book covers various features of Logic Design using lots of examples and relevant diagrams. The complete text is reviewed for its correctness. This book is an outcome of sincere effort and hard work to bring concepts of Digital Logic Design close to the audience of this book.The salient features of the book:--Easy explanation of Digital System and Binary Numbers with lots of solved examples-Detailed covering of Boolean Algebra and Gate-Level Minimization with proper examples and diagrammatic -representation.-Detailed analysis of different Combinational Logic Circuits-Complete Synchronous sequential Logic understanding-Deep understanding of Memory and Programmable Logic-Detailed analysis of different Asynchronous Sequential LogicTable Of Contents:Unit 1 : Digital System and Binary Numbers;Part 1: Digital System and Binary NumbersPart 2 : Boolean Algebra and Gate Level MinimizationUnit 2 : Combinational LogicUnit 3: Sequential CircuitsUnit 4 : Memory, Programmable Logic and DesignUnit 5 : Asynchronous Sequential Logic

  Embedded Systems Design using the MSP430FR2355 LaunchPadTM Brock J. LaMeres,2020-06-19 This textbook for courses in Embedded Systems introduces students to necessary concepts, through a hands-on approach. LEARN BY EXAMPLE — This book is designed to teach the material the way it is

learned, through example. Every concept is supported by numerous programming examples that provide the reader with a step-by-step explanation for how and why the computer is doing what it is doing. LEARN BY DOING — This book targets the Texas Instruments MSP430 microcontroller. This platform is a widely popular, low-cost embedded system that is used to illustrate each concept in the book. The book is designed for a reader that is at their computer with an MSP430FR2355 LaunchPadTM Development Kit plugged in so that each example can be coded and run as they learn. LEARN BOTH ASSEMBLY AND C — The book teaches the basic operation of an embedded computer using assembly language so that the computer operation can be explored at a low-level. Once more complicated systems are introduced (i.e., timers, analog-to-digital converters, and serial interfaces), the book moves into the C programming language. Moving to C allows the learner to abstract the operation of the lower-level hardware and focus on understanding how to "make things work". BASED ON SOUND PEDAGOGY - This book is designed with learning outcomes and assessment at its core. Each section addresses a specific learning outcome that the student should be able to "do" after its completion. The concept checks and exercise problems provide a rich set of assessment tools to measure student performance on each outcome.

  Logic Minimization Algorithms for VLSI Synthesis Robert K. Brayton,Gary D. Hachtel,C. McMullen,Alberto Sangiovanni-Vincentelli,1984-08-31 The roots of the project

which culminates with the writing of this book can be traced to the work on logic synthesis started in 1979 at the IBM Watson Research Center and at University of California, Berkeley. During the preliminary phases of these projects, the impor tance of logic minimization for the synthesis of area and performance effective circuits clearly emerged. In 1980, Richard Newton stirred our interest by pointing out new heuristic algorithms for two-level logic minimization and the potential for improving upon existing approaches. In the summer of 1981, the authors organized and participated in a seminar on logic manipulation at IBM Research. One of the goals of the seminar was to study the literature on logic minimization and to look at heuristic algorithms from a fundamental and comparative point of view. The fruits of this investigation were surprisingly abundant: it was apparent from an initial implementation of recursive logic minimiza tion (ESPRESSO-I) that, if we merged our new results into a two-level minimization program, an important step forward in automatic logic synthesis could result. ESPRESSO-II was born and an APL implemen tation was created in the summer of 1982. The results of preliminary tests on a fairly large set of industrial examples were good enough to justify the publication of our algorithms. It is hoped that the strength and speed of our minimizer warrant its Italian name, which denotes both express delivery and a specially-brewed black coffee.

Synthesis of Finite State Machines Tiziano Villa,Timothy Kam,Robert K. Brayton,Alberto L. Sangiovanni-Vincentelli,2012-12-06 Synthesis of

Finite State Machines: Logic Optimization is the second in a set of two monographs devoted to the synthesis of Finite State Machines (FSMs). The first volume, Synthesis of Finite State Machines: Functional Optimization, addresses functional optimization, whereas this one addresses logic optimization. The result of functional optimization is a symbolic description of an FSM which represents a sequential function chosen from a collection of permissible candidates. Logic optimization is the body of techniques for converting a symbolic description of an FSM into a hardware implementation. The mapping of a given symbolic representation into a two-valued logic implementation is called state encoding (or state assignment) and it impacts heavily area, speed, testability and power consumption of the realized circuit. The first part of the book introduces the relevant background, presents results previously scattered in the literature on the computational complexity of encoding problems, and surveys in depth old and new approaches to encoding in logic synthesis. The second part of the book presents two main results about symbolic minimization; a new procedure to find minimal two-level symbolic covers, under face, dominance and disjunctive constraints, and a unified frame to check encodability of encoding constraints and find codes of minimum length that satisfy them. The third part of the book introduces generalized prime implicants (GPIs), which are the counterpart, in symbolic minimization of two-level logic, to prime implicants in two-valued two-level minimization. GPIs enable the design of an exact

procedure for two-level symbolic minimization, based on a covering step which is complicated by the need to guarantee encodability of the final cover. A new efficient algorithm to verify encodability of a selected cover is presented. If a cover is not encodable, it is shown how to augment it minimally until an encodable superset of GPIs is determined. To handle encodability the authors have extended the frame to satisfy encoding constraints presented in the second part. The covering problems generated in the minimization of GPIs tend to be very large. Recently large covering problems have been attacked successfully by representing the covering table with binary decision diagrams (BDD). In the fourth part of the book the authors introduce such techniques and extend them to the case of the implicit minimization of GPIs, where the encodability and augmentation steps are also performed implicitly. Synthesis of Finite State Machines: Logic Optimization will be of interest to researchers and professional engineers who work in the area of computer-aided design of integrated circuits.

 Logic Minimization Algorithms for VLSI Synthesis Robert K. Brayton,Gary D. Hachtel,C. McMullen,Alberto L. Sangiovanni-Vincentelli,2012-12-06 The roots of the project which culminates with the writing of this book can be traced to the work on logic synthesis started in 1979 at the IBM Watson Research Center and at University of California, Berkeley. During the preliminary phases of these projects, the impor tance of logic minimization for the synthesis of

area and performance effective circuits clearly emerged. In 1980, Richard Newton stirred our interest by pointing out new heuristic algorithms for two-level logic minimization and the potential for improving upon existing approaches. In the summer of 1981, the authors organized and participated in a seminar on logic manipulation at IBM Research. One of the goals of the seminar was to study the literature on logic minimization and to look at heuristic algorithms from a fundamental and comparative point of view. The fruits of this investigation were surprisingly abundant: it was apparent from an initial implementation of recursive logic minimiza tion (ESPRESSO-I) that, if we merged our new results into a two-level minimization program, an important step forward in automatic logic synthesis could result. ESPRESSO-II was born and an APL implemen tation was created in the summer of 1982. The results of preliminary tests on a fairly large set of industrial examples were good enough to justify the publication of our algorithms. It is hoped that the strength and speed of our minimizer warrant its Italian name, which denotes both express delivery and a specially-brewed black coffee.

   Logic Synthesis and Verification Soha Hassoun,Tsutomu Sasao,2012-12-06 Research and development of logic synthesis and verification have matured considerably over the past two decades. Many commercial products are available, and they have been critical in harnessing advances in fabrication technology to produce today's plethora of electronic components. While this maturity is assuring, the advances in fabrication

continue to seemingly present unwieldy challenges. Logic Synthesis and Verification provides a state-of-the-art view of logic synthesis and verification. It consists of fifteen chapters, each focusing on a distinct aspect. Each chapter presents key developments, outlines future challenges, and lists essential references. Two unique features of this book are technical strength and comprehensiveness. The book chapters are written by twenty-eight recognized leaders in the field and reviewed by equally qualified experts. The topics collectively span the field. Logic Synthesis and Verification fills a current gap in the existing CAD literature. Each chapter contains essential information to study a topic at a great depth, and to understand further developments in the field. The book is intended for seniors, graduate students, researchers, and developers of related Computer-Aided Design (CAD) tools. From the foreword: The commercial success of logic synthesis and verification is due in large part to the ideas of many of the authors of this book. Their innovative work contributed to design automation tools that permanently changed the course of electronic design. by Aart J. de Geus, Chairman and CEO, Synopsys, Inc.

   Computational Intelligence and Sustainable Systems H. Anandakumar,R. Arulmurugan,Chow Chee Onn,2018-12-14 This book features research related to computational intelligence and energy and thermal aware management of computing resources. The authors publish original and timely research in current areas of power, energy, temperature, and environmental engineering as and advances in

computational intelligence that are benefiting the fields. Topics include signal processing architectures, algorithms, and applications; biomedical informatics and computation; artificial intelligence and machine learning; green technologies in information; and more. The book includes contributions from a wide range of researchers, academicians, and industry professionals. The book is made up both of extended papers presented at the International Conference on Intelligent Computing and Sustainable System (ICICSS 2018), September 20-21, 2018, and other accepted papers on R&D and original research work related to the practice and theory of technologies to enable and support Intelligent Computing applications.

  Digital Logic Techniques John Stonham,2017-11-22 The third edition of Digital Logic Techniques provides a clear and comprehensive treatment of the representation of data, operations on data, combinational logic design, sequential logic, computer architecture, and practical digital circuits. A wealth of exercises and worked examples in each chapter give students valuable experience in applying the concepts and techniques discussed.Beginning with an objective comparison between analogue and digital representation of data, the author presents the Boolean algebra framework for digital electronics, develops combinational logic design from first principles, and presents cellular logic as an alternative structure more relevant than canonical forms to VLSI implementation. He then addresses sequential logic design and develops a strategy for designing

finite state machines, giving students a solid foundation for more advanced studies in automata theory.The second half of the book focuses on the digital system as an entity. Here the author examines the implementation of logic systems in programmable hardware, outlines the specification of a system, explores arithmetic processors, and elucidates fault diagnosis. The final chapter examines the electrical properties of logic components, compares the different logic families, and highlights the problems that can arise in constructing practical hardware systems.

   Computer-aided Logic Design Robert M. McDermott,1985

   State Highway 121 from Interstate Highway 30 to FM 1187 in Tarrant County ,2004

   "*The Sons of Pigs and Apes*" Neil J. Kressel,2012-08-01 From the 1950s through the 1990s, antisemitism everywhere seemed to be on the wane. But as Neil Kressel documents in this startling book, the Muslim world has resurrected in recent decades almost every diatribe that more than two millennia of European hostility produced against the Jews, and it has introduced many homegrown and novel modes of attack. Though it is impossible to determine precisely how many of the world's 1.2 billion Muslims hold anti-Jewish beliefs, Kressel finds that much bigotry comes from the highest levels of religious and political leadership. Compounding the problem, as Kressel demonstrates, many in the West refuse to recognize this issue. The growing epidemic of hate has been largely ignored, misunderstood, or downplayed, Kressel reveals, because of apathy, ignorance,

confusion, bigotry, ideology, purported pragmatism, and misguided multiculturalism. Those who value human rights ignore antisemitism at their own risk, he cautions, noting that no antisemitic regime or movement has ever been otherwise reasonable or progressive. Kressel argues convincingly that Muslim antisemitism provides an acid test of the seriousness of Western liberalism. If the West fails to stem this growing tide, as now seems likely, future affairs will not go well for the true proponents of democracy. Kressel moves beyond sounding the alarm to explore the diverse religious, political, social, and psychological forces that have created and nurtured the new hostility to Jews in the Muslim world; he concludes with a bold and clear plan for what must be done to confront this hostility.

  EBOOK: Fundamentals of Digital Logic Stephen Brown,Zvonko Vranesic,2008-07-16 Fundamentals of Digital Logic with VHDL Design teaches the basic design techniques for logic circuits. The text ptovides a clear and easily understandable discussion of logic circuit design without the use of unnecessary formalism. It emphasizes the synthesis of circuits and explains how circuits are implemented in real chips. Fundamental concepts are illustrated by using small examples, which are easy to understand. Then, a modular approach is used to show how larger circuits are designed. VHDL is a complex language so it is introduced gradually in the book. Each VHDL feature is presented as it becomes pertinent for the circuits being discussed. While it includes a

discussion of VHDL, the book provides thorough coverage of the fundamental concepts of logic circuit design, independent of the use of VHDL and CAD tools. A CD-ROM containing all of the VHDL design examples used in the book, as well Altera's Quartus II CAD software, is included free with every text.

   Introduction to Logic Circuit Theory Igor Aleksander,1970

   <u>Set-Theoretic Methods for the Social Sciences</u> Carsten Q. Schneider,Claudius Wagemann,2012-08-30 Qualitative Comparative Analysis (QCA) and other set-theoretic methods distinguish themselves from other approaches to the study of social phenomena by using sets and the search for set relations. In virtually all social science fields, statements about social phenomena can be framed in terms of set relations, and using set-theoretic methods to investigate these statements is therefore highly valuable. This book guides readers through the basic principles of set theory and then on to the applied practices of QCA. It provides a thorough understanding of basic and advanced issues in set-theoretic methods together with tricks of the trade, software handling and exercises. Most arguments are introduced using examples from existing research. The use of QCA is increasing rapidly and the application of set-theory is both fruitful and still widely misunderstood in current empirical comparative social research. This book provides the comprehensive guide to these methods for researchers across the social sciences.

   The VLSI Handbook Wai-Kai Chen,2018-10-03 For the new millenium, Wai-Kai Chen introduced a

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monumental reference for the design, analysis, and prediction of VLSI circuits: The VLSI Handbook. Still a valuable tool for dealing with the most dynamic field in engineering, this second edition includes 13 sections comprising nearly 100 chapters focused on the key concepts, models, and equations. Written by a stellar international panel of expert contributors, this handbook is a reliable, comprehensive resource for real answers to practical problems. It emphasizes fundamental theory underlying professional applications and also reflects key areas of industrial and research focus. WHAT'S IN THE SECOND EDITION? Sections on... Low-power electronics and design VLSI signal processing Chapters on... CMOS fabrication Content-addressable memory Compound semiconductor RF circuits High-speed circuit design principles SiGe HBT technology Bipolar junction transistor amplifiers Performance modeling and analysis using SystemC Design languages, expanded from two chapters to twelve Testing of digital systems Structured for convenient navigation and loaded with practical solutions, The VLSI Handbook, Second Edition remains the first choice for answers to the problems and challenges faced daily in engineering practice.

  Electronic Design Automation Laung-Terng Wang,Yao-Wen Chang,Kwang-Ting (Tim) Cheng,2009-03-11 This book provides broad and comprehensive coverage of the entire EDA flow. EDA/VLSI practitioners and researchers in need of fluency in an adjacent field will find this an invaluable reference to the basic EDA concepts, principles, data structures, algorithms, and

architectures for the design, verification, and test of VLSI circuits. Anyone who needs to learn the concepts, principles, data structures, algorithms, and architectures of the EDA flow will benefit from this book. Covers complete spectrum of the EDA flow, from ESL design modeling to logic/test synthesis, verification, physical design, and test - helps EDA newcomers to get up-and-running quickly Includes comprehensive coverage of EDA concepts, principles, data structures, algorithms, and architectures - helps all readers improve their VLSI design competence Contains latest advancements not yet available in other books, including Test compression, ESL design modeling, large-scale floorplanning, placement, routing, synthesis of clock and power/ground networks - helps readers to design/develop testable chips or products Includes industry best-practices wherever appropriate in most chapters - helps readers avoid costly mistakes

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