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Once Upon an Algorithm The Master Algorithm A Human Algorithm Algorithmic Thinking The Ethical Algorithm Algorithms - A Short Review The YouTube Formula Algorithms Review We Are Data Summary of Leadership by Algorithm – [Review Keypoints and Take-aways] Algorithms to Live By What Algorithms Want Algorithms and the End of Politics A REVIEW OF ALGORITHMS FOR OPTIMIZATION. Weapons of Math Destruction Opinion Analysis for Online Reviews The Algorithm Design Manual Algorithms of Oppression Automate This Once Upon an Algorithm Advances in Differential Evolution Point-in-Polyhedron Foundations of Machine Learning, second edition Automating Inequality The Everyday Life of an Algorithm Foundations of Algorithms Foundations of Algorithms Ada's Algorithm Sensemaking The Advent of the Algorithm Mathematics for Algorithm and Systems Analysis Evolutionary Data Clustering: Algorithms and Applications A Guide to Algorithm Design An Elementary Approach To Design And Analysis Of Algorithms The Everyday Life of an Algorithm Techniques for Designing and Analyzing Algorithms A Review of Point Cloud Registration Algorithms for Mobile Robotics Algorithms Unplugged Review of MEKA, an Algorithm for Generating Keys More Than Mom

This open access book begins with an algorithm—a set of IF...THEN rules used in the development of a new, ethical, video surveillance architecture for transport hubs. Readers are invited to follow the algorithm over three years, charting its everyday life. Questions of ethics, transparency, accountability and market value must be grasped by the algorithm in a series of ever more demanding forms of experimentation. Here the algorithm must prove its ability to get a grip on everyday life if it is to become an ordinary feature of the settings where it is being put to work. Through investigating the everyday life of the algorithm, the book opens a conversation with existing social science research that tends to focus on the power and opacity of algorithms. In this book we have unique access to the algorithm's design, development and testing, but can also bear witness to its fragility and dependency on others. This newly expanded and updated second edition of the best-selling classic continues to take the "mystery" out of designing algorithms, and analyzing their efficacy and efficiency. Expanding on the first edition, the book now serves as the primary textbook of choice for algorithm design courses while maintaining its status as the premier practical reference guide to algorithms for programmers, researchers, and students. The reader-friendly Algorithm Design Manual provides straightforward access to combinatorial algorithms technology, stressing design over analysis. The first part, Techniques, provides accessible instruction on methods for designing and analyzing computer algorithms. The second part, Resources, is intended for browsing and reference, and comprises the catalog of algorithmic resources, implementations and an extensive bibliography. NEW to the second edition: • Doubles the tutorial material and exercises over the first edition • Provides full online support for lecturers, and a completely updated and improved website component with lecture slides, audio and video • Contains a unique catalog identifying the 75 algorithmic problems that arise most often in practice, leading the reader down the right path to solve them • Includes several NEW "war stories" relating experiences from real-world applications • Provides up-to-date links leading to the very best algorithm implementations available in C, C++, and Java "Algorithms are everywhere, organizing the near-limitless data that exists in our world. Drawing on our every search, like, click, and purchase, algorithms determine the news we get, the ads we see, the information accessible to us, and even who our friends are. These complex configurations not only form knowledge and social relationships in the digital and physical world but also determine who we are and who we can be. Algorithms use our data to assign our gender, race, sexuality, and citizenship status. In this era of ubiquitous surveillance, contemporary data collection entails more than gathering information about us. Entities like Google, Facebook, and the NSA also decide what that information means, constructing our worlds and the identities we inhabit in the process. We have little control over who we algorithmically are. Through a series of entertaining and engaging examples, John Cheney-Lippold draws on the social constructions of identity to advance a new understanding of our algorithmic identities. We Are Data will educate and inspire readers who want to wrest back some freedom in our increasingly surveilled and algorithmically constructed world."--Page 4 of cover A thought-provoking and wide-ranging exploration of machine learning and the race to build computer intelligences as flexible as our own In the world's top research labs and universities, the race is on to invent the ultimate learning algorithm: one capable of discovering any knowledge from data, and doing anything we want, before we even ask. In The Master Algorithm, Pedro Domingos lifts the veil to give us a peek inside the learning machines that power Google, Amazon, and your smartphone. He assembles a blueprint for the future universal learner--the Master Algorithm--and discusses what it will mean for business, science, and society. If data-ism is today's philosophy, this book is its bible. 'Algorithms to Live By' looks at the simple, precise algorithms that computers use to solve the complex 'human' problems that we face, and discovers what they can tell us about the nature and origin of the mind. This book provides a comprehensive introduction on opinion analysis for online reviews. It offers the newest research on opinion mining, including theories, algorithms and datasets. A new feature presentation method is highlighted for sentiment classification. Then, a three-phase framework for sentiment classification is proposed, where a set of sentiment classifiers are selected automatically to make predictions. Such predictions are integrated via ensemble learning. Finally, to solve the problem of combination explosion encountered, a greedy algorithm is devised to select the base classifiers. Contents:IntroductionRelated WorksPreliminariesTerm's Sentiment-Based Review Opinion AnalysisMultiple Classifier System for Opinion AnalysisOptimization of Base Classifier SelectionOpinion Spam DetectionConclusions Readership: Researchers, academics, professionals and graduate students in databases, artificial intelligence and pattern recognition. Based on his work at some of the world's largest companies, including Ford, Adidas, and Chanel, Christian Madsbjerg's Sensemaking is a provocative stand against the tyranny of big data and scientism, and an urgent, overdue defense of human intelligence. Humans have become subservient to algorithms. Every day brings a new Moneyball fix--a math whiz who will crack open an industry with clean fact-based analysis rather than human intuition and experience. As a result, we have stopped thinking. Machines do it for us. Christian Madsbjerg argues that our fixation with data often masks stunning deficiencies, and the risks for humankind are enormous. Blind devotion to number crunching imperils our businesses, our educations, our governments, and our life savings. Too many companies have lost touch with the humanity of their customers, while marginalizing workers with liberal arts-based skills. Contrary to popular thinking, Madsbjerg shows how many of today's biggest success stories stem not from "quant" thinking but from deep, nuanced engagement with culture, language, and history. He calls his method sensemaking. In this landmark book, Madsbjerg lays out five principles for how business leaders, entrepreneurs, and individuals can use it to solve their thorniest problems. He profiles companies using sensemaking to connect with new customers, and takes readers inside the work process of sensemaking "connoisseurs" like investor George Soros, architect Bjarke Ingels, and others. Both practical and philosophical, Sensemaking is a powerful rejoinder to corporate groupthink and an indispensable resource for leaders and innovators who want to stand out from the pack. Deals with the topic of geometric registration in robotics. It provides a historical perspective of the registration problem and shows that the various solutions available can be organized and differentiated in a framework according to a few elements. It also reviews a few applications of this framework in mobile robotics. A new edition of a graduate-level machine learning textbook that focuses on the analysis and theory of algorithms. This book is a

general introduction to machine learning that can serve as a textbook for graduate students and a reference for researchers. It covers fundamental modern topics in machine learning while providing the theoretical basis and conceptual tools needed for the discussion and justification of algorithms. It also describes several key aspects of the application of these algorithms. The authors aim to present novel theoretical tools and concepts while giving concise proofs even for relatively advanced topics. Foundations of Machine Learning is unique in its focus on the analysis and theory of algorithms. The first four chapters lay the theoretical foundation for what follows; subsequent chapters are mostly self-contained. Topics covered include the Probably Approximately Correct (PAC) learning framework; generalization bounds based on Rademacher complexity and VC-dimension; Support Vector Machines (SVMs); kernel methods; boosting; on-line learning; multi-class classification; ranking; regression; algorithmic stability; dimensionality reduction; learning automata and languages; and reinforcement learning. Each chapter ends with a set of exercises. Appendixes provide additional material including concise probability review. This second edition offers three new chapters, on model selection, maximum entropy models, and conditional entropy models. New material in the appendixes includes a major section on Fenchel duality, expanded coverage of concentration inequalities, and an entirely new entry on information theory. More than half of the exercises are new to this edition. The purpose of this paper is to present several of the 'better' algorithms for finding the 'best' state of some system. In so far as it is possible, these algorithms will be compared and their relative merits and demerits will be described. A small attempt is made at proving convergence of each algorithm and no attempt is made to prove rates of convergence. A bibliography with comments is included for reference. (Author). As the US contends with issues of populism and de-democratization, this timely study considers the impacts of digital technologies on the country's politics and society. Timcke provides a Marxist analysis of the rise of digital media, social networks and technology giants like Amazon, Apple, Facebook and Microsoft. He looks at the impact of these new platforms and technologies on their users who have made them among the most valuable firms in the world. Offering bold new thinking across data politics and digital and economic sociology, this is a powerful demonstration of how algorithms have come to shape everyday life and political legitimacy in the US and beyond. Differential evolution is arguably one of the hottest topics in today's computational intelligence research. This book seeks to present a comprehensive study of the state of the art in this technology and also directions for future research. The fourteen chapters of this book have been written by leading experts in the area. The first seven chapters focus on algorithm design, while the last seven describe real-world applications. Chapter 1 introduces the basic differential evolution (DE) algorithm and presents a broad overview of the field. Chapter 2 presents a new, rotationally invariant DE algorithm. The role of self-adaptive control parameters in DE is investigated in Chapter 3. Chapters 4 and 5 address constrained optimization; the former develops suitable stopping conditions for the DE run, and the latter presents an improved DE algorithm for problems with very small feasible regions. A novel DE algorithm, based on the concept of "opposite" points, is the topic of Chapter 6. Chapter 7 provides a survey of multi-objective differential evolution algorithms. A review of the major application areas of differential evolution is presented in Chapter 8. Chapter 9 discusses the application of differential evolution in two important areas of applied electromagnetics. Chapters 10 and 11 focus on applications of hybrid DE algorithms to problems in power system optimization. Chapter 12 applies the DE algorithm to computer chess. The use of DE to solve a problem in bioprocess engineering is discussed in Chapter 13. Chapter 14 describes the application of hybrid differential evolution to a problem in control engineering. A groundbreaking narrative on the urgency of ethically designed AI and a guidebook to reimagining life in the era of intelligent technology. The Age of Intelligent Machines is upon us, and we are at a reflection point. The proliferation of fast-moving technologies, including forms of artificial intelligence akin to a new species, will cause us to confront profound questions about ourselves. The era of human intellectual superiority is ending, and we need to plan for this monumental shift. A Human Algorithm: How Artificial Intelligence Is Redefining Who We Are examines the immense impact intelligent technology will have on humanity. These machines, while challenging our personal beliefs and our socioeconomic world order, also have the potential to transform our health and well-being, alleviate poverty and suffering, and reveal the mysteries of intelligence and consciousness. International human rights attorney Flynn Coleman deftly argues that it is critical that we instill values, ethics, and morals into our robots, algorithms, and other forms of AI. Equally important, we need to develop and implement laws, policies, and oversight mechanisms to protect us from tech's insidious threats. To realize AI's transcendent potential, Coleman advocates for inviting a diverse group of voices to participate in designing our intelligent machines and using our moral imagination to ensure that human rights, empathy, and equity are core principles of emerging technologies. Ultimately, A Human Algorithm is a clarion call for building a more humane future and moving conscientiously into a new frontier of our own design. "[Coleman] argues that the algorithms of machine learning—if they are instilled with human ethics and values—could bring about a new era of enlightenment." —San Francisco Chronicle The summary of Leadership by Algorithm – Who Leads and Who Follows in the AI Era? presented here include a short review of the book at the start followed by quick overview of main points and a list of important take-aways at the end of the summary. The Summary of The book "Leadership by Algorithm" investigates the opportunities and difficulties that artificial intelligence presents to businesses operating in the twenty-first century. This book explores the various ways artificial intelligence (AI) is going to change the structure of businesses, including how to deal with disgruntled employees and the gradual rise of soft skills. Leadership by Algorithm summary includes the key points and important takeaways from the book Leadership by Algorithm by David De Cremer. Disclaimer: 1. This summary is meant to preview and not to substitute the original book. 2. We recommend, for in-depth study purchase the excellent original book. 3. In this summary key points are rewritten and recreated and no part/text is directly taken or copied from original book. 4. If original author/publisher wants us to remove this summary, please contact us at support@mocktime.com. The Wall Street Journal bestseller! Comes with free online companion course Learn the secrets to getting dramatic results on YouTube Derral Eves has generated over 60 billion views on YouTube and helped 24 channels grow to one million subscribers from zero. In The YouTube Formula: How Anyone Can Unlock the Algorithm to Drive Views, Build an Audience, and Grow Revenue, the owner of the largest YouTube how-to channel provides the secrets to getting the results that every YouTube creator and strategist wants. Eves will reveal what readers can't get anywhere else: the inner workings of the YouTube algorithm that's responsible for determining success on the platform, and how creators can use it to their advantage. Full of actionable advice and concrete strategies, this book teaches readers how to: Launch a channel Create life-changing content Drive rapid view and subscriber growth Build a brand and increase engagement Improve searchability Monetize content and audience Replete with case studies and information from successful YouTube creators, The YouTube Formula is perfect for any creator, entrepreneur, social media strategist, and brand manager who hopes to see real commercial results from their work on the platform. How Hansel and Gretel, Sherlock Holmes, the movie Groundhog Day, Harry Potter, and other familiar stories illustrate the concepts of computing. Picture a computer scientist, staring at a screen and clicking away frantically on a keyboard, hacking into a system, or perhaps developing an app. Now delete that picture. In Once Upon an Algorithm, Martin Erwig explains computation as something that takes place beyond electronic computers, and computer science as the study of systematic problem solving. Erwig points out that many daily activities involve problem solving. Getting up in the morning, for example: You get up, take a shower, get dressed, eat breakfast. This simple daily routine solves a recurring problem through a series of well-defined steps. In computer science, such a routine is called an algorithm. Erwig illustrates a series of concepts in computing with examples from daily life and familiar stories. Hansel and Gretel, for example, execute an algorithm to get home from the forest. The movie Groundhog Day illustrates the problem of unsolvability; Sherlock Holmes manipulates data structures when solving a crime; the magic in Harry Potter's world is understood through types and abstraction; and Indiana Jones demonstrates the complexity of searching. Along the way, Erwig also discusses representations and different ways to organize data; "intractable" problems; language, syntax, and ambiguity; control structures, loops, and the halting problem; different forms of recursion; and rules for finding errors in algorithms. This engaging book explains computation accessibly and shows its relevance to daily life. Something to think about next time we execute the algorithm of getting up in the morning. Foundations of Algorithms, Fifth Edition offers a well-balanced presentation of algorithm design, complexity analysis of algorithms, and computational complexity. Ideal for any computer science students with a background in college algebra and discrete structures, the text

presents mathematical concepts using standard English and simple notation to maximize accessibility and user-friendliness. Concrete examples, appendices reviewing essential mathematical concepts, and a student-focused approach reinforce theoretical explanations and promote learning and retention. C++ and Java pseudocode help students better understand complex algorithms. A chapter on numerical algorithms includes a review of basic number theory, Euclid's Algorithm for finding the greatest common divisor, a review of modular arithmetic, an algorithm for solving modular linear equations, an algorithm for computing modular powers, and the new polynomial-time algorithm for determining whether a number is prime. The revised and updated Fifth Edition features an all-new chapter on genetic algorithms and genetic programming, including approximate solutions to the traveling salesperson problem, an algorithm for an artificial ant that navigates along a trail of food, and an application to financial trading. With fully updated exercises and examples throughout and improved instructor resources including complete solutions, an Instructor's Manual and PowerPoint lecture outlines, Foundations of Algorithms is an essential text for undergraduate and graduate courses in the design and analysis of algorithms. Key features include:

- The only text of its kind with a chapter on genetic algorithms
- Use of C++ and Java pseudocode to help students better understand complex algorithms
- No calculus background required
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"[Ada Lovelace], like Steve Jobs, stands at the intersection of arts and technology."—Walter Isaacson, author of *The Innovators*

Over 150 years after her death, a widely-used scientific computer program was named "Ada," after Ada Lovelace, the only legitimate daughter of the eighteenth century's version of a rock star, Lord Byron. Why? Because, after computer pioneers such as Alan Turing began to rediscover her, it slowly became apparent that she had been a key but overlooked figure in the invention of the computer. In *Ada Lovelace*, James Essinger makes the case that the computer age could have started two centuries ago if Lovelace's contemporaries had recognized her research and fully grasped its implications. It's a remarkable tale, starting with the outrageous behavior of her father, which made Ada instantly famous upon birth. Ada would go on to overcome numerous obstacles to obtain a level of education typically forbidden to women of her day. She would eventually join forces with Charles Babbage, generally credited with inventing the computer, although as Essinger makes clear, Babbage couldn't have done it without Lovelace. Indeed, Lovelace wrote what is today considered the world's first computer program—despite opposition that the principles of science were "beyond the strength of a woman's physical power of application." Based on ten years of research and filled with fascinating characters and observations of the period, not to mention numerous illustrations, Essinger tells Ada's fascinating story in unprecedented detail to absorbing and inspiring effect.

Acknowledgments -- Introduction: the power of algorithms -- A society, searching -- Searching for Black girls -- Searching for people and communities -- Searching for protections from search engines -- The future of knowledge in the public -- The future of information culture -- Conclusion: algorithms of oppression -- Epilogue -- Notes -- Bibliography -- Index -- About the author

Techniques for Designing and Analyzing Algorithms

Design and analysis of algorithms can be a difficult subject for students due to its sometimes-abstract nature and its use of a wide variety of mathematical tools. Here the author, an experienced and successful textbook writer, makes the subject as straightforward as possible in an up-to-date textbook incorporating various new developments appropriate for an introductory course. This text presents the main techniques of algorithm design, namely, divide-and-conquer algorithms, greedy algorithms, dynamic programming algorithms, and backtracking. Graph algorithms are studied in detail, and a careful treatment of the theory of NP-completeness is presented. In addition, the text includes useful introductory material on mathematical background including order notation, algorithm analysis and reductions, and basic data structures. This will serve as a useful review and reference for students who have covered this material in a previous course. Features

- The first three chapters provide a mathematical review, basic algorithm analysis, and data structures
- Detailed pseudocode descriptions of the algorithms along with illustrative algorithms are included
- Proofs of correctness of algorithms are included when appropriate

The book presents a suitable amount of mathematical rigor

After reading and understanding the material in this book, students will be able to apply the basic design principles to various real-world problems that they may encounter in their future professional careers. The rousing story of the last gasp of human agency and how today's best and brightest minds are endeavoring to put an end to it. It used to be that to diagnose an illness, interpret legal documents, analyze foreign policy, or write a newspaper article you needed a human being with specific skills—and maybe an advanced degree or two. These days, high-level tasks are increasingly being handled by algorithms that can do precise work not only with speed but also with nuance. These "bots" started with human programming and logic, but now their reach extends beyond what their creators ever expected. In this fascinating, frightening book, Christopher Steiner tells the story of how algorithms took over—and shows why the "bot revolution" is about to spill into every aspect of our lives, often silently, without our knowledge. The May 2010 "Flash Crash" exposed Wall Street's reliance on trading bots to the tune of a 998-point market drop and \$1 trillion in vanished market value. But that was just the beginning. In *Automate This*, we meet bots that are driving cars, penning haiku, and writing music mistaken for Bach's. They listen in on our customer service calls and figure out what Iran would do in the event of a nuclear standoff. There are algorithms that can pick out the most cohesive crew of astronauts for a space mission or identify the next Jeremy Lin. Some can even ingest statistics from baseball games and spit out pitch-perfect sports journalism indistinguishable from that produced by humans. The interaction of man and machine can make our lives easier. But what will the world look like when algorithms control our hospitals, our roads, our culture, and our national security? What happens to businesses when we automate judgment and eliminate human instinct? And what role will be left for doctors, lawyers, writers, truck drivers, and many others? Who knows—maybe there's a bot learning to do your job this minute. Presenting a complementary perspective to standard books on algorithms, *A Guide to Algorithm Design: Paradigms, Methods, and Complexity Analysis* provides a roadmap for readers to determine the difficulty of an algorithmic problem by finding an optimal solution or proving complexity results. It gives a practical treatment of algorithmic complexity and guides readers in solving algorithmic problems. Divided into three parts, the book offers a comprehensive set of problems with solutions as well as in-depth case studies that demonstrate how to assess the complexity of a new problem. Part I helps readers understand the main design principles and design efficient algorithms. Part II covers polynomial reductions from NP-complete problems and approaches that go beyond NP-completeness. Part III supplies readers with tools and techniques to evaluate problem complexity, including how to determine which instances are polynomial and which are NP-hard. Drawing on the authors' classroom-tested material, this text takes readers step by step through the concepts and methods for analyzing algorithmic complexity. Through many problems and detailed examples, readers can investigate polynomial-time algorithms and NP-completeness and beyond. A hands-on, problem-based introduction to building algorithms and data structures to solve problems with a computer. *Algorithmic Thinking* will teach you how to solve challenging programming problems and design your own algorithms. Daniel Zingaro, a master teacher, draws his examples from world-class programming competitions like USACO and IOI. You'll learn how to classify problems, choose data structures, and identify appropriate algorithms. You'll also learn how your choice of data structure, whether a hash table, heap, or tree, can affect runtime and speed up your algorithms; and how to adopt powerful strategies like recursion, dynamic programming, and binary search to solve challenging problems. Line-by-line breakdowns of the code will teach you how to use algorithms and data structures like:

- The breadth-first search algorithm to find the optimal way to play a board game or find the best way to translate a book
- Dijkstra's algorithm to determine how many mice can exit a maze or the number of fastest routes between two locations
- The union-find data structure to answer questions about connections in a social network or determine who are friends or enemies
- The heap data structure to determine the amount of money given away in a promotion
- The hash-table data structure to determine whether snowflakes are unique or identify compound words in a dictionary

NOTE: Each problem in this book is available on a programming-judge website. You'll find the site's URL and problem ID in the description. What's better than a free correctness check? Standing in my truth released me from feelings of doubt, fear and worry. More than mom, is aguide to extend this sense of liberation to you. The lessons in partnership, creating boundaries, finding purpose, and weathering storms offer a more authentic approach to life. I understand that being around good people, doesn't necessarily make us better moms. However, accepting the challenge to do the inner-work is a promising next step toward growth. We can

unapologetically make tough decisions, knowing that we're never truly alone. Someone like me has a similar story, and guess what. I'm willing to share the lesson! Hopefully, my honest perspective encourages you to embrace life without compromising the more significant details. Ultimately, creating space for the success you truly desire. We only have one life, make a personal investments that counts. SHAKIRA A. WRIGHT is a wife, mother, author, business owner, and inspiration to families seeking strategies for change. The integrity of her wisdom is demonstrated in their lived experiences. 'The book under review is an interesting elaboration that fills the gaps in libraries for concisely written and student-friendly books about essentials in computer science ... I recommend this book for anyone who would like to study algorithms, learn a lot about computer science or simply would like to deepen their knowledge ... The book is written in very simple English and can be understood even by those with limited knowledge of the English language. It should be emphasized that, despite the fact that the book consists of many examples, mathematical formulas and theorems, it is very hard to find any mistakes, errors or typos.'

zbMATHIn computer science, an algorithm is an unambiguous specification of how to solve a class of problems. Algorithms can perform calculation, data processing and automated reasoning tasks. As an effective method, an algorithm can be expressed within a finite amount of space and time and in a well-defined formal language for calculating a function. Starting from an initial state and initial input (perhaps empty), the instructions describe a computation that, when executed, proceeds through a finite number of well-defined successive states, eventually producing 'output' and terminating at a final ending state. The transition from one state to the next is not necessarily deterministic; some algorithms, known as randomized algorithms, incorporate random input. This book introduces a set of concepts in solving problems computationally such as Growth of Functions; Backtracking; Divide and Conquer; Greedy Algorithms; Dynamic Programming; Elementary Graph Algorithms; Minimal Spanning Tree; Single-Source Shortest Paths; All Pairs Shortest Paths; Flow Networks; Polynomial Multiplication, to ways of solving NP-Complete Problems, supported with comprehensive, and detailed problems and solutions, making it an ideal resource to those studying computer science, computer engineering and information technology. Discrete mathematics is fundamental to computer science, and this up-to-date text assists undergraduates in mastering the ideas and mathematical language to address problems that arise in the field's many applications. It consists of 4 units of study: counting and listing, functions, decision trees and recursion, and basic concepts of graph theory. This article deals with the field of algorithms overview with emphasis on Dijkstra algorithm and Euclidean algorithm

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Algorithms specify the way computers process information and how they execute tasks. Many recent technological innovations and achievements rely on algorithmic ideas – they facilitate new applications in science, medicine, production, logistics, traffic, communication and entertainment. Efficient algorithms not only enable your personal computer to execute the newest generation of games with features unimaginable only a few years ago, they are also key to several recent scientific breakthroughs – for example, the sequencing of the human genome would not have been possible without the invention of new algorithmic ideas that speed up computations by several orders of magnitude. The greatest improvements in the area of algorithms rely on beautiful ideas for tackling computational tasks more efficiently. The problems solved are not restricted to arithmetic tasks in a narrow sense but often relate to exciting questions of nonmathematical flavor, such as: How can I find the exit out of a maze? How can I partition a treasure map so that the treasure can only be found if all parts of the map are recombined? How should I plan my trip to minimize cost? Solving these challenging problems requires logical reasoning, geometric and combinatorial imagination, and, last but not least, creativity – the skills needed for the design and analysis of algorithms. In this book we present some of the most beautiful algorithmic ideas in 41 articles written in colloquial, nontechnical language. Most of the articles arose out of an initiative among German-language universities to communicate the fascination of algorithms and computer science to high-school students. The book can be understood without any prior knowledge of algorithms and computing, and it will be an enlightening and fun read for students and interested adults. How Hansel and Gretel, Sherlock Holmes, the movie Groundhog Day, Harry Potter, and other familiar stories illustrate the concepts of computing. Picture a computer scientist, staring at a screen and clicking away frantically on a keyboard, hacking into a system, or perhaps developing an app. Now delete that picture. In *Once Upon an Algorithm*, Martin Erwig explains computation as something that takes place beyond electronic computers, and computer science as the study of systematic problem solving. Erwig points out that many daily activities involve problem solving. Getting up in the morning, for example: You get up, take a shower, get dressed, eat breakfast. This simple daily routine solves a recurring problem through a series of well-defined steps. In computer science, such a routine is called an algorithm. Erwig illustrates a series of concepts in computing with examples from daily life and familiar stories. Hansel and Gretel, for example, execute an algorithm to get home from the forest. The movie *Groundhog Day* illustrates the problem of unsolvability; Sherlock Holmes manipulates data structures when solving a crime; the magic in Harry Potter's world is understood through types and abstraction; and Indiana Jones demonstrates the complexity of searching. Along the way, Erwig also discusses representations and different ways to organize data; “intractable” problems; language, syntax, and ambiguity; control structures, loops, and the halting problem; different forms of recursion; and rules for finding errors in algorithms. This engaging book explains computation accessibly and shows its relevance to daily life. Something to think about next time we execute the algorithm of getting up in the morning. The gap between theoretical ideas and messy reality, as seen in Neal Stephenson, Adam Smith, and *Star Trek*. We depend on—we believe in—algorithms to help us get a ride, choose which book to buy, execute a mathematical proof. It's as if we think of code as a magic spell, an incantation to reveal what we need to know and even what we want. Humans have always believed that certain invocations—the marriage vow, the shaman's curse—do not merely describe the world but make it. Computation casts a cultural shadow that is shaped by this long tradition of magical thinking. In this book, Ed Finn considers how the algorithm—in practical terms, “a method for solving a problem”—has its roots not only in mathematical logic but also in cybernetics, philosophy, and magical thinking. Finn argues that the algorithm deploys concepts from the idealized space of computation in a messy reality, with unpredictable and sometimes fascinating results. Drawing on sources that range from Neal Stephenson's

Snow Crash to Diderot's Encyclopédie, from Adam Smith to the Star Trek computer, Finn explores the gap between theoretical ideas and pragmatic instructions. He examines the development of intelligent assistants like Siri, the rise of algorithmic aesthetics at Netflix, Ian Bogost's satiric Facebook game Cow Clicker, and the revolutionary economics of Bitcoin. He describes Google's goal of anticipating our questions, Uber's cartoon maps and black box accounting, and what Facebook tells us about programmable value, among other things. If we want to understand the gap between abstraction and messy reality, Finn argues, we need to build a model of "algorithmic reading" and scholarship that attends to process, spearheading a new experimental humanities. This book provides an in-depth analysis of the current evolutionary clustering techniques. It discusses the most highly regarded methods for data clustering. The book provides literature reviews about single objective and multi-objective evolutionary clustering algorithms. In addition, the book provides a comprehensive review of the fitness functions and evaluation measures that are used in most of evolutionary clustering algorithms. Furthermore, it provides a conceptual analysis including definition, validation and quality measures, applications, and implementations for data clustering using classical and modern nature-inspired techniques. It features a range of proven and recent nature-inspired algorithms used to data clustering, including particle swarm optimization, ant colony optimization, grey wolf optimizer, salp swarm algorithm, multi-verse optimizer, Harris hawks optimization, beta-hill climbing optimization. The book also covers applications of evolutionary data clustering in diverse fields such as image segmentation, medical applications, and pavement infrastructure asset management. Over the course of a generation, algorithms have gone from mathematical abstractions to powerful mediators of daily life. Algorithms have made our lives more efficient, more entertaining, and, sometimes, better informed. At the same time, complex algorithms are increasingly violating the basic rights of individual citizens. Allegedly anonymized datasets routinely leak our most sensitive personal information; statistical models for everything from mortgages to college admissions reflect racial and gender bias. Meanwhile, users manipulate algorithms to "game" search engines, spam filters, online reviewing services, and navigation apps. Understanding and improving the science behind the algorithms that run our lives is rapidly becoming one of the most pressing issues of this century. Traditional fixes, such as laws, regulations and watchdog groups, have proven woefully inadequate. Reporting from the cutting edge of scientific research, *The Ethical Algorithm* offers a new approach: a set of principled solutions based on the emerging and exciting science of socially aware algorithm design. Michael Kearns and Aaron Roth explain how we can better embed human principles into machine code - without halting the advance of data-driven scientific exploration. Weaving together innovative research with stories of citizens, scientists, and activists on the front lines, *The Ethical Algorithm* offers a compelling vision for a future, one in which we can better protect humans from the unintended impacts of algorithms while continuing to inspire wondrous advances in technology. WINNER: The 2018 McGannon Center Book Prize and shortlisted for the Goddard Riverside Stephan Russo Book Prize for Social Justice The New York Times Book Review: "Riveting." Naomi Klein: "This book is downright scary." Ethan Zuckerman, MIT: "Should be required reading." Dorothy Roberts, author of *Killing the Black Body*: "A must-read." Astra Taylor, author of *The People's Platform*: "The single most important book about technology you will read this year." Cory Doctorow: "Indispensable." A powerful investigative look at data-based discrimination—and how technology affects civil and human rights and economic equity The State of Indiana denies one million applications for healthcare, foodstamps and cash benefits in three years—because a new computer system interprets any mistake as “failure to cooperate.” In Los Angeles, an algorithm calculates the comparative vulnerability of tens of thousands of homeless people in order to prioritize them for an inadequate pool of housing resources. In Pittsburgh, a child welfare agency uses a statistical model to try to predict which children might be future victims of abuse or neglect. Since the dawn of the digital age, decision-making in finance, employment, politics, health and human services has undergone revolutionary change. Today, automated systems—rather than humans—control which neighborhoods get policed, which families attain needed resources, and who is investigated for fraud. While we all live under this new regime of data, the most invasive and punitive systems are aimed at the poor. In *Automating Inequality*, Virginia Eubanks systematically investigates the impacts of data mining, policy algorithms, and predictive risk models on poor and working-class people in America. The book is full of heart-wrenching and eye-opening stories, from a woman in Indiana whose benefits are literally cut off as she lays dying to a family in Pennsylvania in daily fear of losing their daughter because they fit a certain statistical profile. The U.S. has always used its most cutting-edge science and technology to contain, investigate, discipline and punish the destitute. Like the county poorhouse and scientific charity before them, digital tracking and automated decision-making hide poverty from the middle-class public and give the nation the ethical distance it needs to make inhumane choices: which families get food and which starve, who has housing and who remains homeless, and which families are broken up by the state. In the process, they weaken democracy and betray our most cherished national values. This deeply researched and passionate book could not be more timely. An exploration of the discovery and far reaching effects of the algorithm especially as it relates to the computerized world. "A former Wall Street quantitative analyst sounds an alarm on mathematical modeling, a pervasive new force in society that threatens to undermine democracy and widen inequality,"--NoveList.

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