

<<计算复杂性>>

图书基本信息

书名：<<计算复杂性>>

13位ISBN编号：9787115224002

10位ISBN编号：7115224005

出版时间：2010-4

出版时间：人民邮电出版社

作者：Oded Goldreich

页数：603

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

<<计算复杂性>>

前言

The quest for efficiency is ancient and universal, as time and other resources are always in shortage. Thus, the question of which tasks can be performed efficiently is central to the human experience. A key step toward the systematic study of the aforementioned question is a rigorous definition of the notion of a task and of procedures for solving tasks. These definitions were provided by computability theory, which emerged in the 1930s. This theory focuses on computational tasks, and considers automated procedures (i.e., computing devices and algorithms) that may solve such tasks. In focusing attention on computational tasks and algorithms, computability theory has set the stage for the study of the computational resources (like time) that are required by such algorithms. When this study focuses on the resources that are necessary for any algorithm that solves a particular task (or a task of a particular type) , the study becomes part of the theory of Computational Complexity (also known as Complexity Theory) .¹ Complexity Theory is a central field of the theoretical foundations of computer science. It is concerned with the study of the intrinsic complexity of computational tasks. That is, a typical complexity theoretic study refers to the computational resources required to solve a computational task (or a class of such tasks) , rather than referring to a specific algorithm or an algorithmic schema. Actually, research in Complexity Theory tends to start with and focus on the computational resources themselves, and addresses the effect of limiting these resources on the class of tasks that can be solved. Thus, Computational Complexity is the general study of what can be achieved within limited time (and/or other limited natural computational resources) .

<<计算复杂性>>

内容概要

复杂性理论是计算机科学的理论基础的核心。

本书是著名计算机科学家Oded Goldreich的力作，书中对计算任务固有复杂性研究进行了概念性介绍，全面分析了复杂性理论的现代主题。

本书涉及复杂性理论的很多子领域（如难度放大、伪随机性及概率证明系统等），涵盖了NP完整性、空间复杂性、随机性和计数、伪随机数生成器等内容，还在附录里面介绍了现代密码学基础等。

本书内容严谨，可读性强，适合作为高年级本科生、研究生的教材。

同时，书中展示了复杂性理论的很多子领域，也适合领域专家参考。

<<计算复杂性>>

作者简介

Oded Goldreich 以色列魏茨曼科学研究所 (Weizmann Institute of Science) 计算机科学教授, Meyer W. Weisgal 讲席教授。

他是SIAM Journal on Computing、Journal of Cryptology和Computational Complexity杂志的特约编辑。

<<计算复杂性>>

书籍目录

1	Introduction and Preliminaries	1	1.1	Introduction	1	1.1.1	A Brief Overview of Complexity Theory	2	1.1.2	Characteristics of Complexity Theory	6	1.1.3	Contents of This Book	8	1.1.4	Approach and Style of This Book	12	1.1.5	Standard Notations and Other Conventions	16	1.2	Computational Tasks and Models	17	1.2.1	Representation	18	1.2.2	Computational Tasks	18	1.2.3	Uniform Models (Algorithms)	20	1.2.4	Non-uniform Models (Circuits and Advice)	36	1.2.5	Complexity Classes	42	Chapter Notes	432	P, NP, and NP-Completeness	44	2.1	The P Versus NP Question	46	2.1.1	The Search Version: Finding Versus Checking	47	2.1.2	The Decision Version: Proving Versus Verifying	50	2.1.3	Equivalence of the Two Formulations	54	2.1.4	Two Technical Comments Regarding NP	55	2.1.5	The Traditional Definition of NP	55	2.1.6	In Support of P Different from NP	57	2.1.7	Philosophical Meditations	58	2.2	Polynomial-Time Reductions	58	2.2.1	The General Notion of a Reduction	59	2.2.2	Reducing Optimization Problems to Search Problems	61	2.2.3	Self-Reducibility of Search Problems	63	2.2.4	Digest and General Perspective	67	2.3	NP-Completeness	67	2.3.1	Definitions	68	2.3.2	The Existence of NP-Complete Problems	69	2.3.3	Some Natural NP-Complete Problems	71	2.3.4	NP Sets That Are Neither in P nor NP-Complete	81	2.3.5	Reflections on Complete Problems	85	2.4	Three Relatively Advanced Topics	87	2.4.1	Promise Problems	87	2.4.2	Optimal Search Algorithms for NP	92	2.4.3	The Class coNP and Its Intersection with NP	94	Chapter Notes	97	Exercises	993	Variations on P and NP	108	3.1	Non-uniform Polynomial Time (P/poly)	108	3.1.1	Boolean Circuits	109	3.1.2	Machines That Take Advice	111	3.2	The Polynomial-Time Hierarchy (PH)	113	3.2.1	Alternation of Quantifiers	114	3.2.2	Non-deterministic Oracle Machines	117	3.2.3	The P/poly Versus NP Question and PH	119	Chapter Notes	121	Exercises	1224	More Resources, More Power	127	4.1	Non-uniform Complexity Hierarchies	128	4.2	Time Hierarchies and Gaps	129	4.2.1	Time Hierarchies	129	4.2.2	Time Gaps and Speedup	136	4.3	Space Hierarchies and Gaps	139	Chapter Notes	139	Exercises	1405	Space Complexity	143	5.1	General Preliminaries and Issues	144	5.1.1	Important Conventions	144	5.1.2	On the Minimal Amount of Useful Computation Space	145	5.1.3	Time Versus Space	146	5.1.4	Circuit Evaluation	153	5.2	Logarithmic Space	153	5.2.1	The Class L	154	5.2.2	Log-Space Reductions	154	5.2.3	Log-Space Uniformity and Stronger Notions	155	5.2.4	Undirected Connectivity	155	5.3	Non-deterministic Space Complexity	162	5.3.1	Two Models	162	5.3.2	NL and Directed Connectivity	164	5.3.3	A Retrospective Discussion	171	5.4	PSPACE and Games	172	Chapter Notes	175	Exercises	1756	Randomness and Counting	1847	The Bright Side of Hardness	2418	Pseudorandom Generators	2849	Probabilistic Proof Systems	34910	Relaxing the Requirements	416	Epilogue	461	Appendix A: Glossary of Complexity Classes	463	Appendix B: On the Quest for Lower Bounds	469	Appendix C: On the Foundations of Modern Cryptography	482	Appendix D: Probabilistic Preliminaries and Advanced Topics in Randomization	523	Appendix E: Explicit Constructions	545	Appendix F: Some Omitted Proofs	566	Appendix G: Some Computational Problems	583	Bibliography	589	Index	60
---	--------------------------------	---	-----	--------------	---	-------	---------------------------------------	---	-------	--------------------------------------	---	-------	-----------------------	---	-------	---------------------------------	----	-------	--	----	-----	--------------------------------	----	-------	----------------	----	-------	---------------------	----	-------	-----------------------------	----	-------	--	----	-------	--------------------	----	---------------	-----	----------------------------	----	-----	--------------------------	----	-------	---	----	-------	--	----	-------	-------------------------------------	----	-------	-------------------------------------	----	-------	----------------------------------	----	-------	-----------------------------------	----	-------	---------------------------	----	-----	----------------------------	----	-------	-----------------------------------	----	-------	---	----	-------	--------------------------------------	----	-------	--------------------------------	----	-----	-----------------	----	-------	-------------	----	-------	---------------------------------------	----	-------	-----------------------------------	----	-------	---	----	-------	----------------------------------	----	-----	----------------------------------	----	-------	------------------	----	-------	----------------------------------	----	-------	---	----	---------------	----	-----------	-----	------------------------	-----	-----	--------------------------------------	-----	-------	------------------	-----	-------	---------------------------	-----	-----	------------------------------------	-----	-------	----------------------------	-----	-------	-----------------------------------	-----	-------	--------------------------------------	-----	---------------	-----	-----------	------	----------------------------	-----	-----	------------------------------------	-----	-----	---------------------------	-----	-------	------------------	-----	-------	-----------------------	-----	-----	----------------------------	-----	---------------	-----	-----------	------	------------------	-----	-----	----------------------------------	-----	-------	-----------------------	-----	-------	---	-----	-------	-------------------	-----	-------	--------------------	-----	-----	-------------------	-----	-------	-------------	-----	-------	----------------------	-----	-------	---	-----	-------	-------------------------	-----	-----	------------------------------------	-----	-------	------------	-----	-------	------------------------------	-----	-------	----------------------------	-----	-----	------------------	-----	---------------	-----	-----------	------	-------------------------	------	-----------------------------	------	-------------------------	------	-----------------------------	-------	---------------------------	-----	----------	-----	--	-----	---	-----	---	-----	--	-----	------------------------------------	-----	---------------------------------	-----	---	-----	--------------	-----	-------	----

<<计算复杂性>>

章节摘录

插图：A key step toward the systematic study of the aforementioned question is a rigorous definition of the notion of a task and of procedures for solving tasks. These definitions were provided by computability theory, which emerged in the 1930s. This theory focuses on computational tasks, and considers automated procedures (i.e., computing devices and algorithms) that may solve such tasks. In focusing attention on computational tasks and algorithms, computability theory has set the stage for the study of the computational resources (like time) that are required by such algorithms. When this study focuses on the resources that are necessary for any algorithm that solves a particular task (or a task of a particular type) , the study becomes part of the theory of Computational Complexity (also known as Complexity Theory) .¹ Complexity Theory is a central field of the theoretical foundations of computer science. It is concerned with the study of the intrinsic complexity of computational tasks. That is, a typical complexity theoretic study refers to the computational resources required to solve a computational task (or a class of such tasks) , rather than referring to a specific algorithm or an algorithmic schema. Actually, research in Complexity Theory tends to start with and focus on the computational resources themselves, and addresses the effect of limiting these resources on the class of tasks that can be solved. Thus, Computational Complexity is the general study of what can be achieved within limited time (and/or other limited natural computational resources) .

<<计算复杂性>>

媒体关注与评论

“这是一本非常值得关注的书……Goldreich的观点让我耳目一新……本书特别注重概念性问题，是研究人员及专家不可或缺的参考文献。

”——M. Bona，佛罗里达大学

<<计算复杂性>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>