## Contents

Pr	eface		v
1.	Intr	oduction	1
	1.1	How Do We Know What Information Is?	2
	1.2	Information in Society	24
	1.3	Information in Nature	33
	1.4	Technological Aspects of Information	38
	1.5	Structure of the Book	45
2.	Gen	eral Theory of Information	52
	2.1	Signs, Symbols and the World	56
	2.2	What Information Is: Information Ontology	92
	2.3	How to Measure Information: Information Axiology	129
	2.4	Types and Properties of Information: Information Typology	144
	2.5	Information, Data, and Knowledge	181
	2.6	Emotions and Information	220
3.	Statistical Information Theory		255
	3.1	Information and Communication	256
	3.2	Information and Entropy	268
	3.3	Quantum Information	278
	3.4	Information and Problem Solving	285
	3.5	Axiomatization of Information Measurement	289
	3.6	Information in Physics	294
4.	Semantic Information Theory		
	4.1	Three Dimensions of Information	303
	4.2	Logical Approach of Bar-Hillel and Carnap, Hintikka, and	
		others: Logic in Information	315
	4.3	Knowledge-base Approach of Mackay, Shreider, Brooks,	
		Mizzaro, and others: Knowledge from Information	330

5.	Algorithmic Information Theory	. 361	
	5.1 Information, Algorithms, and Complexity	. 363	
	5.2 Algorithmic Information Theory based on Recursive		
	Algorithms: Recursive Approach	. 374	
	5.3 Algorithmic Information Theory based on Inductive		
	Algorithms: Inductive Approach	. 385	
	5.4 Conditional Information Size as a Relative Information		
	Measure: Relativistic Approach	. 394	
	5.5 Dual Complexity and Information Measures: Axiomatic		
	Approach in Algorithmic Information Theory	. 397	
	reprotein in rugertannie information Theory		
6.	Pragmatic Information Theory	. 412	
	6.1 Economic Approach of Marschak: Cost of Information	. 413	
	6.2 Mission-Oriented Approach: Value, Cost, and Ouality of		
	Information	. 420	
	6.3 Transformational Approach of Mazur: Impetus of		
	Information	. 455	
7.	Dynamics of Information	. 462	
	7.1 Information Flow in the Approach of Dretske, Barwise and		
	Seligman: Information Process	. 464	
	7.2 Operator Approach of Chechkin: Information Action	. 482	
	7.3 Information Algebra and Geometry	. 495	
	7.3.1 Interpreted Information Algebra	. 496	
	7.3.2 Abstract Information Algebra	. 538	
	7.3.3 Information Geometry	. 544	
8.	Conclusion	550	
Ar	opendix: Mathematical Foundations of Information Theory	561	
1	Appendix A: Set Theoretical Foundations	562	
	Appendix B: Elements of the Theory of Algorithms	572	
	Appendix C: Elements of Logic	578	
	Appendix D: Elements of Algebra and Category Theory	586	
	Appendix F: Elements of Probability Theory	500	
	Appendix E: Numbers and Numerical Functions	592	
	Appendix C: Topological Matric and Normal Spaces	. 590	
	Appendix O. Topological, metric and normed spaces	390	
Bibliography			
Subject Index			