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Measures of Complexity **Software Complexity Kolmogorov Complexity and Computational Complexity What Is a Complex System? Complexity Measures of Boolean Functions and Their Applications Object-oriented Metrics Measures of Complexity Measures of Complexity and Chaos** Measures of Complexity **Measuring Office Complexity Measuring Grammatical Complexity** Complexity in Society: From Indicators Construction to their Synthesis **Communication Complexity and Parallel Computing Statistical Complexity Meaning and Measures: Interpreting and Evaluating Complexity Metrics** *Evaluating Software Complexity Measures Complexity Measures for Systems Design* **Evaluating Software Complexity Measures Kolmogorov Complexity and Computational Complexity** Complexity Measures for programming languages *On the Structure of Complexity Measures* **Complexity Measures for Language Recognition by Canonic Systems A Unified Complexity Theory** Evaluating Software Complexity Measures *Complexity Measures for System Architecture Models complexity measures for programming language* **Introduction to Complexity and Complex Systems** Complexity and Chaos - State-of-the-Art ; Formulations and Measures of Complexity A Random Walk in Physics **The Atlas of Economic Complexity** Diversity and Complexity *Lower Bounds in Communication Complexity* **Syntactic Measures of Complexity Factor Analysis of Complexity Measures Computational Complexity Complexity Measurement of Cyber Physical Systems Definition and Measurement of Complexity I the Context of Safety Assurance** Computational Complexity *10 Step KPI System* **Complexity and the Arrow of Time**

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A canonic system C is a specification of a recursively enumerable set, such as a set of strings over a finite alphabet. From this description C, it is possible to generate a system C sub m, called a proof measure function, which is an indication of the complexity of the language defined. For certain simple but important classes of canonic systems, algebraic bounds on these functions can be derived from the structure of the system. Another transformation on C produces a system C sup (-1) which characterizes the recognition of strings generated by C.A relationship exists between the measure functions of C and C sup (-1), thus relating the complexity of the recognition procedure to that of the language description. (Author). Excerpt from Evaluating Software Complexity Measures: January 1985 Finally, a program consists of a program statement, followed by a program body, followed by an output statement. We will frequently call this program body a program, provided no confusion results. Since our language consists of entirely familiar locutions. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works. The understanding of electron density as the carrier of all the information of a multielectronic system is implicit in the theorems of density functional theory. Information theoretical based measures giving a quantitative understanding of statistical complexity of such systems is shaping up as a new area of research in chemical physics. This book is the first monograph of its kind covering the aspects of complexity measure in atoms and molecules. The boundaries between simple and complicated, and complicated and complex system designations are fuzzy and debatable, even using quantitative measures of complexity. However, if you are a biomedical engineer, a biologist, physiologist, economist, politician, stock market speculator, or politician, you have encountered complex systems. Furthermore, your success depends on your ability to successfully interact with and manage a variety of complex systems. In order not to be blindsided by unexpected results, we need a systematic, comprehensive way of analyzing, modeling, and simulating complex systems to predict non-anticipated outcomes. In its engaging first chapters, the book introduces complex systems, Campbell's Law, and the Law of Unintended Consequences, and mathematics necessary for conversations in complex systems. Subsequent chapters illustrate concepts via commonly studied biological mechanisms. The final chapters focus on higher-level complexity problems, and introduce complexity in economic systems. Designed as a reference for biologists and biological engineers, Introduction to Complexity and Complex Systems lends itself to use in a classroom course to introduce advanced students studying biomedical engineering, biophysics, or physiology to complex systems. Engaging and illustrative, this book aids scientists and decision makers in managing biological complexity and complex systems. Complexity is a puzzling and important concept in contemporary research in many disciplines. This book addresses the problem of defining complexity by carefully analysing in what sense complexity means measure in such areas as the theory of dynamical systems, condensed matter physics, ecology, immunology and the theory of neural networks. The information content of complexity is studied and similarities and differences in the various concepts of complexity are highlighted, sometimes provocatively. The book could open the way to finding a paradigm of complexity, and should become a standard reference for a wide audience of researchers in the physical and biological sciences. This book is a comprehensive guide to the measurement and evaluation of software complexity, providing readers with valuable insights and practical tools for analyzing and optimizing their software development projects. With in-depth explanations and examples, as well as a focus on real-world applications, this book is an essential resource for anyone working in software development. This work has been selected by scholars as being culturally important, and is part of the knowledge base of civilization as we know it. This work is in the "public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. We appreciate your support of the preservation process, and thank you for being an important part of keeping this knowledge alive and relevant. New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students. Since Warren Weaver presented his article 'Science and Complexity' in 1948, the term Complexity has been appearing with increasing frequency in scientific and even not strictly scientific fields. However, the review of many Complexity conceptualization and measurement proposals, shows considerably different approaches, both in the way complexity is measured as in the use of the term 'complexity' itself to designate seemingly different issues. And it is necessary to answer the following question: Is there a perspective that allows us to reconcile and explain this variety of approaches? The hypothesis that we defend in this book is that there is such perspective. We use the term com-plex referring to apparently different 'objects' but with a common quality; the presence of restrictions in their information [organizational or logical rules] produces the emergence of meanings not implicit in their parts; the properties of the object as 'entity' are not the sum or superposition of the individual properties of each of its parts. We prove that object's Complexity must be reviewed from four issues [Organization, Emergence, Meaning and Logic] which present recursiveness and interdependency relationships, though from some perspectives the ideas and Emergence and Organization will be more important, while from other perspectives the ideas of Meaning and Logic will be. This perspective that we have designated as comple[x]us [because it essentially refers to the term's etymology] constitutes a framework that help us understand the use of the term Complexity in contexts -or referring to objects- that may be very different: systems, information sources, tasks and even 'ways of thinking'. To reach it, it will be necessary to review various fields of knowledge including Systems Theory, Communication Theory, Algorithmic Information Theory, different approaches to measure complexity, and some epistemology issues including Complex Thinking and Transdisciplinarity. Based on the above review, we propose an Axioms System, four complexity measures, and some general rules that allow us to undertake the formulation of Complexity from different perspectives and even assess phenomena that have underlying hierarchical structures. And in conclusion, we recap and justify why partial approaches to complexity cannot explain all its current conceptualizations, we review the implications of the proposed perspective and indicate some reasons why understanding Complexity is especially important. It will therefore be a non-linear approach to complexity -as surely should be expected from any approach to the science of nonlinearity- which objective is not only to formalize the issues that allow measuring Complexity, but also to give some 'curves' that provide us with meaningful perspectives or' views' to achieve a global comprehension of Complexity. Abstract: Research on language complexity has been abundant and manifold in the past two decades. Within typology, it has to a very large extent been motivated by the question of whether all languages are equally complex, and if not, which language-external factors affect the distribution of complexity across languages. To address this and other questions, a plethora of different metrics and approaches has been put forward to measure the complexity of languages and language varieties. Against this backdrop we address three major gaps in the literature by discussing statistical, theoretical, and methodological problems related to the interpretation of complexity measures. First, we explore core statistical concepts to assess the meaningfulness of measured differences and distributions in complexity based on two case studies. In other words, we assess whether observed measurements are neither random nor negligible. Second, we discuss the common mismatch between measures and their intended meaning, namely, the fact that absolute complexity measures are often used to address hypotheses on relative complexity. Third, in the absence of a gold standard for complexity metrics, we suggest that existing measures be evaluated by drawing on cognitive methods and relating them to real-world cognitive phenomena. We conclude by highlighting the theoretical and methodological implications for future complexity research This thesis lays the necessary groundwork for measuring the complexity of systems architecture models. We propose a set of complexity measures, which are usable with models defined using the Object-Process Model (OPM). In order to do this, we introduce a new concept of interface complexity multiplier for compensating the hidden information at interfaces. We also define a set of complexity metrics for system architecture models. We also develop models for three different systems for mobile entertainment. The purpose of these models is to show how OPM is suitable for modeling such systems and also to provide some comparative material for complexity measurements. We use the new metrics to determine the complexity of the models of mobile entertainment systems. The thesis also contains a rigorous definition of complexity and a survey of existing complexity measurement methods. This volume serves as a general introduction to the state of the art of quantitatively characterizing chaotic and turbulent behavior. It is the outgrowth of an international workshop on "Quantitative Measures of Dynamical Complexity and Chaos" held at Bryn Mawr College, June 22-24, 1989. The workshop was co-sponsored by the Naval Air Development Center in Warminster, PA and by the NATO Scientific Affairs Programme through its special program on Chaos and Complexity. Meetings on this subject have occurred regularly since the NATO workshop held in June 1983 at Haverford College only two kilometers distant from the site of this latest in the series. At that first meeting, organized by J. Gollub and H. Swinney, quantitative tests for nonlinear dynamics and chaotic behavior were debated and promoted [1). In the six years since, the methods for dimension, entropy and Lyapunov exponent calculations have been applied in many disciplines and the procedures have been refined. Since then it has been necessary to demonstrate quantitatively that a signal is chaotic rather than it being acceptable to observe that "it looks chaotic". Other related meetings have included the Pecos River Ranch meeting in September 1985 of G. Mayer Kress [2) and the reflective and forward looking gathering near Jerusalem organized by M. Shapiro and I. Procaccia in December 1986 [3). This meeting was proof that interest in measuring chaotic and turbulent signals is widespread. The central focus of computational complexity theory is to measure the "hardness" of computing different functions. Towards this end, several measures of complexity for Boolean functions have been studied over the past few decades. Examples of important complexity measures include sensitivity, block sensitivity, certificate complexity, decision tree complexity and degree. Studying the relationships between these different measures has been an active area of research. In the first part of this dissertation, we prove several results towards tightening the relationships between some of these measures - particularly, the sensitivity and block sensitivity. Specifically, we prove better (cubic and sometimes quadratic) upper bounds on block sensitivity in terms of sensitivity for certain classes of transitive functions. We also prove tight lower bounds on the block sensitivity for the classes we consider. In the other direction, we give various new constructions of families of Boolean functions that exhibit quadratic separation between sensitivity and block sensitivity. Our constructions have several novel aspects. For example, we give the first direct constructions of families of Boolean functions that have both 0-block sensitivity and 1-block sensitivity quadratically larger than sensitivity. In the next part of this dissertation, we introduce a new complexity measure of Boolean functions we call diameter, that captures the relationship between certificate complexity and several other measures of Boolean functions. We argue that estimating diameter may help to get improved bounds on certificate complexity in terms of sensitivity, and other measures. Further, we prove tight bounds on the sensitivity and block sensitivity of transitive functions with constant diameter. We also prove some implications for the log-rank conjecture in communication complexity for XOR functions with bounded diameter. In the last part of this dissertation, we study applications of the relationship between some of these measures to machine learning. Specifically we contribute towards two problems concerning decision trees as a machine learning model. First, we focus on the problem of modifying a given decision tree classifier to optimize a specific evaluation measure (the recall of the classifier) under some constraints. Finally, we present some algorithms for decision trees for regression problems in the context of transfer learning There is a widespread assumption that the universe in general, and life in particular, is 'getting more complex with time'. This book brings together a wide range of experts in science, philosophy and theology and unveils their joint effort in exploring this idea. They confront essential problems behind the theory of complexity and the role of life within it: what is complexity? When does it increase, and why? Is the universe evolving towards states of ever greater complexity and diversity? If so, what is the source of this universal enrichment? This book addresses those difficult questions, and offers a unique cross-disciplinary perspective on some of the most profound issues at the heart of science and philosophy. Readers will gain insights in complexity that reach deep into key areas of physics, biology, complexity science, philosophy and religion. This book brings together historical notes, reviews of research developments, fresh ideas on how to make VC (Vapnik–Chervonenkis) guarantees tighter, and new technical contributions in the areas of machine learning, statistical inference, classification, algorithmic statistics, and pattern recognition. The contributors are leading scientists in domains such as statistics, mathematics, and theoretical computer science, and the book will be of interest to researchers and graduate students in these domains. Modern automotive and aerospace products are large cyber-physical system involving both software and hardware, composed of mechanical, electrical and electronic components. The increasing complexity of such systems is a major concern as it impacts development time and effort, as well as, initial and operational costs. Towards the goal of measuring complexity, the first step is to determine factors that contribute to it and metrics to qualify it. These complexity components can be further use to (a) estimate the cost of cyber-physical system, (b) develop methods that can reduce the cost of cyber-physical system and (c) make decision such as selecting one design from a set of possible solutions or variants. To determine the contributions to complexity we conducted survey at an aerospace company. We found out three types of contribution to the complexity of the system: Artifact complexity, Design process complexity and Manufacturing complexity. In all three domains, we found three types of metrics: size complexity, numeric complexity (degree of coupling) and technological complexity (solvability). We propose a formal representation for all three domains as graphs, but with different interpretations of entity (node) and relation (link) corresponding to the above three aspects. Complexities of these components are measured using algorithms defined in graph theory. Two experiments were conducted to check the meaningfulness and feasibility of the complexity metrics. First experiment was mechanical transmission and the scope of this experiment was component level. All the design stages, from concept to manufacturing, were considered in this experiment. The second experiment was conducted on hybrid powertrains. The scope of this experiment was assembly level and only artifact complexity is considered because of the limited resources. Finally the calibration of these complexity measures was conducted at an aerospace company but the results cannot be included in this thesis. Airborne system complexity has been increasing rapidly with the advent of newer technologies. There are multiple interpretations of complexity, and it is difficult to measure system complexity in a meaningful way. The goal of this research effort was to define an appropriate type of complexity and to come up with a measure to estimate the complexity of avionics systems. This measure would help the FAA predict when systems are too complex so that it can assure their safety for use on certified aircraft. Although the literature did not provide succinct definitions of the term complexity from which to select a small number of definitions, the readings did provide a rich canvas of concepts and approaches that serve as a solid foundation from which to select or define candidate measures and to identify impacts on flight safety. In fact, the word "complexity" implicitly suggests that some causes create some effects; without elucidation of which causes and which effects, the word is being used in a casual manner and is not adding facts to the discussion. After a detailed review of the literature, a taxonomy of complexity was developed, and this taxonomy is used to determine the impacts and measurement of system complexity. A measure of complexity was developed using a number of ways that an avionics system error (fault) could propagate from one element to another. Because each potential propagation requires another sub-argument in the safety case, the number of such arguments should be linear with certification effort. Therefore, the ability to show that the system is safe, through the assurance process, should depend on whether a system has small enough complexity (number of ways for errors to propagate). The results of this research include a formula for calculating the error-propagation complexity from a system design, the results of using that formula for small and medium systems, and steps for using the formula. The formula was tested on small system (stepper motor), a redesigned stepper motor systems, a medium complex system (wheel braking system), and a larger system (SAAB-EH-100). To get a better feeling of the complexity measure, an attempt was made to convert the measure into an estimate of assurance safety review effort. The review effort is a good surrogate measure to compare systems of different complexities and to determine whether or not a system is too complex to assure safety. It estimated the review time for the small cases and extrapolated up to larger cases, assuming a spread of small, medium, and large designs included within a typical avionics system. Many of the numbers used are not tested and validated in terms of relationships and assumptions. Therefore, the proposed boundary of systems "too complex to assure safety" should be treated with caution. This volume discusses the many recent significant developments, and identifies important problems, in the field of social indicators. In the last ten years the methodology of multivariate analysis and synthetic indicators construction significantly developed. In particular, starting from the classical theory of composite indicators many interesting approaches have been developed to overcome the weaknesses of composites. This volume focuses on these recent developments in synthesizing indicators, and more generally, in quantifying complex phenomena. The communication complexity of a function f(x, y) measures the number of bits that two players, one who knows x and the other who knows y, must exchange to determine the value f(x, y). Communication complexity is a fundamental measure of complexity of functions. Lower bounds on this measure lead to lower bounds on many other measures of computational complexity. This monograph surveys lower bounds in the field of communication complexity. Our focus is on lower bounds that work by first representing the communication complexity measure in Euclidean space. That is to say, the first step in these lower bound techniques is to find a geometric complexity measure, such as rank or trace norm, that serves as a lower bound to the underlying communication complexity measure. Lower bounds on this geometric complexity measure are then found using algebraic and geometric tools. Object-oriented (OO) metrics are an integral part of object technology -- at the research level and in commercial software development projects. This book offers theoretical and empirical tips and facts for creating an OO complexity metrics (measurement) program, based on a review of existing research from the last several years. KEY TOPICS: Covers moving through object-oriented concepts as they related to managing the project lifecycle; the framework in which metrics exist; structural complexity metrics for traditional systems; OO product metrics; and current industrial applications. MARKET: For software developers, programmers, and managers. An quot;officequot; can be described in terms of at least four different (but related) sets of descriptors:the physical, the social, the organizational, and the work-related. This paper focuses on work-relatedaspects of offices, and presents two measures of complexity in office work. The first measure,operational complexity, gauges the average difficulty, in terms of the cognitive resources required, toperform a quot;chunkquot; of office work. Independent of this, sequential complexity measures the potentialnumber of task sequences which could be used to accomplish a given chunk of work. Sequentialcomplexity increases as does the number of quot;special cases,quot; quot;special cases of special cases,quot; etc. forwhich the chunk of office work need be performed. In other words, it focuses on the complexity ofinterrelationships between individual office tasks, while operational complexity is concerned with thecomplexity of the individual tasks themselves. We then combine these measures into a an aggregatemeasure of overall complexity, combined complexity. The application of these measures isillustrated, using descriptions of order entry processes, for two hypothetical firms, employing job shopand assembly-line technologies, respectively. While these three measures hardly comprise anexhaustive catalogue of complexity in the quot;officequot; (or even in office work), we believe they provide auseful basis for both practical application and further theoretical extension. This book provides an introduction to the role of diversity in complex adaptive systems. A complex system--such as an economy or a tropical ecosystem--consists of interacting adaptive entities that produce dynamic patterns and structures. Diversity plays a different role in a complex system than it does in an equilibrium system, where it often merely produces variation around the mean for performance measures. In complex adaptive systems, diversity makes fundamental contributions to system performance. Scott Page gives a concise primer on how diversity happens, how it is maintained, and how it affects complex systems. He explains how diversity underpins system level robustness, allowing for multiple responses to external shocks and internal adaptations; how it provides the seeds for large events by creating outliers that fuel tipping points; and how it drives novelty and innovation. Page looks at the different kinds of diversity--variations within and across types, and distinct community compositions and interaction structures--and covers the evolution of diversity within complex systems and the factors that determine the amount of maintained diversity within a system. Provides a concise and accessible introduction Shows how diversity underpins robustness and fuels tipping points Covers all types of diversity The essential primer on diversity in complex adaptive systems A theory of complexity is developed for algorithms implemented in typical programming languages. The complexity of a program may be interpreted in many ways; a method for measuring a specific type of complexity is a complexity measure -- some function of the amount of a particular resource used by a program in processing an input. After the complexity of the basic program elements is determined, program complexity is analyzed with respect to single inputs and then with respect to finite sets of legitimate halting inputs. A program equation is developed to aid in the complexity analysis. Using this equation, an input set is partitioned into classes of constant complexity. Several equivalence relations are defined, relating different programs by their complexity. Complexity is also discussed in terms of concatenation and functional equivalence of program. (Author). The mathematical theory of computation has given rise to two important ap proaches to the informal notion of "complexity": Kolmogorov complexity, usu ally a complexity measure for a single object such as a string, a sequence etc., measures the amount of information necessary to describe the object. Compu tational complexity, usually a complexity measure for a set of objects, measures the compuational resources necessary to recognize or produce elements of the set. The relation between these two complexity measures has been considered for more than two decades, and may interesting and deep observations have been obtained. In March 1990, the Symposium on Theory and Application of Minimal Length Encoding was held at Stanford University as a part of the AAAI 1990 Spring Symposium Series. Some sessions of the symposium were dedicated to Kolmogorov complexity and its relations to the computational complexity the ory, and excellent expository talks were given there. Feeling that, due to the importance of the material, some way should be found to share these talks with researchers in the computer science community, I asked the speakers of those sessions to write survey papers based on their talks in the symposium. In response, five speakers from the sessions contributed the papers which appear in this book. The communication complexity of two-party protocols is an only 15 years old complexity measure, but it is already considered to be one of the fundamen tal complexity measures of recent complexity theory. Similarly to Kolmogorov complexity in the theory of sequential computations, communication complex ity is used as a method for the study of the complexity of concrete computing problems in parallel information processing. Especially, it is applied to prove lower bounds that say what computer resources (time, hardware, memory size) are necessary to compute the given task. Besides the estimation of the compu tational difficulty of computing problems the proved lower bounds are useful for proving the optimality of algorithms that are already designed. In some cases the knowledge about the communication complexity of a given problem may be even helpful in searching for efficient algorithms to this problem. The study of communication complexity becomes a well-defined indepen dent area of complexity theory. In addition to a strong relation to several funda mental complexity measures (and so to several fundamental problems of com plexity theory) communication complexity has contributed to the study and to the understanding of the nature of determinism, nondeterminism, and random ness in algorithmics. There already exists a non-trivial mathematical machinery to handle the communication complexity of concrete computing problems, which gives a hope that the approach based on communication complexity will be in strumental in the study of several central open problems of recent complexity theory. A clear, concise introduction to the quickly growing field of complexity science that explains its conceptual and mathematical foundations What is a complex system? Although "complexity science" is used to understand phenomena as diverse as the behavior of honeybees, the economic markets, the human brain, and the climate, there is no agreement about its foundations. In this introduction for students, academics, and general readers, philosopher of science James Ladyman and physicist Karoline Wiesner develop an account of complexity that brings the different concepts and mathematical measures applied to complex systems into a single framework. They introduce the different features of complex systems, discuss different conceptions of complexity, and develop their own account. They explain why complexity science is so important in today's world. This book offers an informal, easy-to-understand account of topics in modern physics and mathematics. The focus is, in particular, on statistical mechanics, soft matter, probability, chaos, complexity, and models, as well as their interplay. The book features 28 key entries and it is carefully structured so as to allow readers to pursue different paths that reflect their interests and priorities, thereby avoiding an excessively systematic presentation that might stifle interest. While the majority of the entries concern specific topics and arguments, some relate to important protagonists of science, highlighting and explaining their contributions. Advanced mathematics is avoided, and formulas are introduced in only a few cases. The book is a user-friendly tool that nevertheless avoids scientific compromise. It is of interest to all who seek a better grasp of the world that surrounds us and of the ideas that have changed our perceptions. Maps capture data expressing the economic complexity of countries from Albania to Zimbabwe, offering current economic measures and as well as a guide to achieving prosperity Why do some countries grow and others do not? The authors of The Atlas of Economic Complexity offer readers an explanation based on "Economic Complexity," a measure of a society's productive knowledge. Prosperous societies are those that have the knowledge to make a larger variety of more complex products. The Atlas of Economic Complexity attempts to measure the amount of productive knowledge countries hold and how they can move to accumulate more of it by making more complex products. Through the graphical representation of the "Product Space," the authors are able to identify each country's "adjacent possible," or potential new products, making it easier to find paths to economic diversification and growth. In addition, they argue that a country's economic complexity and its position in the product space are better predictors of economic growth than many other well-known development indicators, including measures of competitiveness, governance, finance, and schooling. Using innovative visualizations, the book locates each country in the product space, provides complexity and growth potential rankings for 128 countries, and offers individual country pages with detailed information about a country's current capabilities and its diversification options. The maps and visualizations included in the Atlas can be used to find more viable paths to greater productive knowledge and prosperity. There are many ways to measure the complexity of a given object, but there are two measures of particular importance in the theory of computing: One is Kolmogorov complexity, which measures the amount of information necessary to describe an object. Another is computational complexity, which measures the computational resources necessary to recognize (or produce) an object. The relation between these two complexity measures has been studied since the 1960s. More recently, the more generalized notion of resource bounded Kolmogorov complexity and its relation to computational complexity have received much attention. Now many interesting and deep observations on this topic have been established. This book consists of four survey papers concerning these recent studies on resource bounded Kolmogorov complexity and computational complexity. It also contains one paper surveying several types of Kolmogorov complexity measures. The papers are based on invited talks given at the AAAI Spring Symposium on Minimal-Length Encoding in 1990. The book is the only collection of survey papers on this subject and provides fundamental information for researchers in the field. Complexity is a puzzling and important concept in contemporary research in many disciplines. This book addresses the problem of defining complexity by carefully analysing in what sense complexity means measure in such areas as the theory of dynamical systems, condensed matter physics, ecology, immunology and the theory of neural networks. The information content of complexity is studied and similarities and differences in the various concepts of complexity are highlighted, sometimes provocatively. The book could open the way to finding a paradigm of complexity, and should become a standard reference for a wide audience of researchers in the physical and biological sciences. This book examines the question of whether languages can differ in grammatical complexity and, if so, how relative complexity differences might be measured. Chapters approach the question from the point of view of formal grammatical theory, psycholinguistics, and neurolinguistics, and take phonology, morphology, syntax, and semantics into account. Finding winning KPIs is not about picking some smart-sounding candidates from the long list of options. The best performance metrics are those that are born in the discussion and are tailor-made for your organization. This book is for those business professionals who are looking beyond standard performance metrics; this book will guide you step-by-step to develop the most effective KPIs. Different formulations and measures that may be used for evaluating the complexity of systems are gathered in this Technical Note. They might be useful for describing aspects of military complex systems. They were extracted from documents issued from the scientific literature related to Complexity Theory, chaos and complex systems.