An Early History of Recursive Functions and Computability

from Gödel to Turing

ROD ADAMS

An Early History Of Recursive Functions And Computability From Godel To Turing

Yuk Hui

An Early History Of Recursive Functions And Computability From Godel To Turing:

An Early History of Recursive Functions and Computability Rod Adams, 2011 Traces the development of recursive functions from their origins in the late nineteenth century to the mid 1930s with particular emphasis on the work and influence of Kurt G del History and Philosophy of Computing Fabio Gadducci, Mirko Tavosanis, 2016-10-05 This volume constitutes the refereed post conference proceedings of the Third International Conference on the History and Philosophy of Computing held in Pisa Italy in October 2015 The 18 full papers included in this volume were carefully reviewed and selected from the 30 papers presented at the conference They cover topics ranging from the world history of computing to the role of The Foundations of Computability Theory Borut Robič, 2020-11-13 This book computing in the humanities and the arts offers an original and informative view of the development of fundamental concepts of computability theory. The treatment is put into historical context emphasizing the motivation for ideas as well as their logical and formal development In Part I the author introduces computability theory with chapters on the foundational crisis of mathematics in the early twentieth century and formalism In Part II he explains classical computability theory with chapters on the quest for formalization the Turing Machine and early successes such as defining incomputable problems c e computably enumerable sets and developing methods for proving incomputability In Part III he explains relative computability with chapters on computation with external help degrees of unsolvability the Turing hierarchy of unsolvability the class of degrees of unsolvability c e degrees and the priority method and the arithmetical hierarchy Finally in the new Part IV the author revisits the computability Church Turing thesis in greater detail He offers a systematic and detailed account of its origins evolution and meaning he describes more powerful modern versions of the thesis and he discusses recent speculative proposals for new computing paradigms such as hypercomputing This is a gentle introduction from the origins of computability theory up to current research and it will be of value as a textbook and guide for advanced undergraduate and graduate students and researchers in the domains of computability theory and theoretical computer science This new edition is completely revised with almost one hundred pages of new material In particular the author applied more up to date more consistent terminology and he addressed some notational redundancies and minor errors He developed a glossary relating to computability theory expanded the bibliographic references with new entries and added the new part described above and other new sections Computability B. Jack Copeland, Carl J. Posy, Oron Shagrir, 2015-01-30 Computer scientists mathematicians and philosophers discuss the conceptual foundations of the notion of computability as well as recent theoretical developments In the 1930s a series of seminal works published by Alan Turing Kurt G del Alonzo Church and others established the theoretical basis for computability This work advancing precise characterizations of effective algorithmic computability was the culmination of intensive investigations into the foundations of mathematics In the decades since the theory of computability has moved to the center of discussions in philosophy computer science and cognitive science In this volume distinguished computer

scientists mathematicians logicians and philosophers consider the conceptual foundations of computability in light of our modern understanding Some chapters focus on the pioneering work by Turing G del and Church including the Church Turing thesis and G del s response to Church s and Turing s proposals Other chapters cover more recent technical developments including computability over the reals G del s influence on mathematical logic and on recursion theory and the impact of work by Turing and Emil Post on our theoretical understanding of online and interactive computing and others relate computability and complexity to issues in the philosophy of mind the philosophy of science and the philosophy of mathematics Contributors Scott Aaronson Dorit Aharonov B Jack Copeland Martin Davis Solomon Feferman Saul Kripke Carl J Posy Hilary Putnam Oron Shagrir Stewart Shapiro Wilfried Sieg Robert I Soare Umesh V Vazirani Physical Computation Oron Shagrir, 2022 Computing systems are ubiquitous in contemporary life Even the brain is thought to be a computing system of sorts But what does it mean to say that a given organ or system computes What is it about laptops smartphones and nervous systems that they are deemed to compute and why does it seldom occur to us to describe stomachs hurricanes rocks or chairs that way These questions are key to laying the conceptual foundations of computational sciences including computer science and engineering and the cognitive and neural sciences Oron Shagrir here provides an extended argument for the semantic view of computation which states that semantic properties are involved in the nature of computing systems The first part of the book provides general background Although different in scope these chapters have a common theme namely that the linkage between the mathematical theory of computability and the notion of physical computation is weak The second part of the book reviews existing non semantic accounts of physical computation Shagrir analyze three influential accounts in greater depth and argues that none of these accounts is satisfactory but each of them highlights certain key features of physical computation that he eventually adopts in his own semantic account of physical computation a view that rests on a phenomenon known as simultaneous implementation or indeterminacy of computation Shagrir completes the characterization of his account of computation and highlights the distinctive feature of computational explanations

Software as Hermeneutics Luca M. Possati,2022-06-24 This book claims that continental philosophy gives us a new understanding of digital technology and software in particular its main thesis being that software is like a text so it involves a hermeneutic process A hermeneutic understanding of software allows us to explain those aspects of software that escape a strictly technical definition such as the relationship with the user the human being and the social and cultural transformations that software produces The starting point of the book is the fracture between living experience and the code In the first chapter the author argues that the code is the origin of the digital experience while remaining hidden invisible The second chapter explores how the software can be seen as a text in Ricoeur's sense Before being an algorithm code or problem solving software is an act of interpretation The third chapter connects software to the history of writing following Kittler's suggestions The fourth chapter unifies the two parts of the book the historical and the theoretical from a Kantian

perspective The central thesis is that software is a form of reflective judgment namely digital reflective judgement The Oxford Handbook of Philosophy of Science Paul Humphreys, Anjan Chakravartty, Margaret Morrison, Andrea Woody, 2016 This Handbook combines coverage of traditional areas in the philosophy of science such as causation explanation and theory structure with chapters on new areas such as philosophy of astronomy data complexity theory and emergence The articles are accessible to scientifically educated non philosophers as well as to philosophers Milestones in Analog and Digital Computing Herbert Bruderer, 2021-01-04 This Third Edition is the first English language edition of the award winning Meilensteine der Rechentechnik illustrated in full color throughout in two volumes The Third Edition is devoted to both analog and digital computing devices as well as the world's most magnificient historical automatons and select scientific instruments employed in astronomy surveying time measurement etc It also features detailed instructions for analog and digital mechanical calculating machines and instruments and is the only such historical book with comprehensive technical glossaries of terms not found in print or in online dictionaries The book also includes a very extensive bibliography based on the literature of numerous countries around the world Meticulously researched the author conducted a worldwide survey of science technology and art museums with their main holdings of analog and digital calculating and computing machines and devices historical automatons and selected scientific instruments in order to describe a broad range of masterful technical achievements Also covering the history of mathematics and computer science this work documents the cultural heritage of On the Foundations of Computing Giuseppe Primiero, 2020 On The Foundations of Computing is a technology as well technical historical and conceptual investigation in the three main methodological approaches to the computational sciences mathematical engineering and experimental The first part of the volume explores the background behind the formal understanding of computing originating at the end of the XIX century and it invesitagtes the formal origins and conceptual development of the notions of computation algorithm and program The second part of the volume overviews the construction of physical devices to perform automated tasks and it considers associated technical and conceptual issues We start from the design and construction of the first generation of computing machines explore their evolution and progress in engineering for both hardware and software and investigate their theoretical and conceptual problems The third part of the volume analyses the methods and principles of experimental sciences founded on computational methods We study the use of machines to perform scientific tasks with particular reference to computer models and simulations Each part aims at defining a notion of computational validity according to the corresponding methodological approach On the Existence of Digital Objects Yuk Hui, 2016-02-29 Digital objects in their simplest form are data They are also a new kind of industrial object that pervades every aspect of our life today as online videos images text files e mails blog posts Facebook events Yet despite their ubiquity the nature of digital objects remains unclear On the Existence of Digital Objects conducts a philosophical examination of digital objects and their organizing schema by creating a dialogue between Martin Heidegger and Gilbert

Simondon which Yuk Hui contextualizes within the history of computing How can digital objects be understood according to individualization and individuation Hui pursues this question through the history of ontology and the study of markup languages and Web ontologies he investigates the existential structure of digital objects within their systems and milieux With this relational approach toward digital objects and technical systems the book addresses alienation described by Simondon as the consequence of mistakenly viewing technics in opposition to culture Interdisciplinary in philosophical and technical insights with close readings of Husserl Heidegger and Simondon as well as the history of computing and the Web Hui s work develops an original productive way of thinking about the data and metadata that increasingly define our world

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