

ARTIFICIAL COGNITIVE SYSTEMS

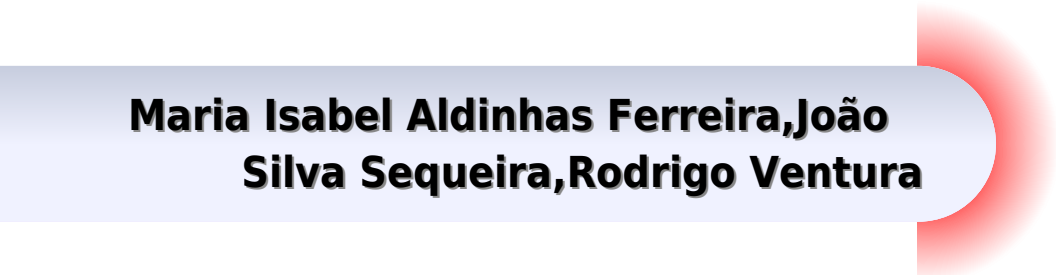
A PRIMER



DAVID VERNON

Artificial Cognitive Systems A Primer

**Maria Isabel Aldinhas Ferreira, João
Silva Sequeira, Rodrigo Ventura**



Artificial Cognitive Systems A Primer:

Artificial Cognitive Systems David Vernon, 2014-10-17 A concise introduction to a complex field bringing together recent work in cognitive science and cognitive robotics to offer a solid grounding on key issues This book offers a concise and accessible introduction to the emerging field of artificial cognitive systems Cognition both natural and artificial is about anticipating the need for action and developing the capacity to predict the outcome of those actions Drawing on artificial intelligence developmental psychology and cognitive neuroscience the field of artificial cognitive systems has as its ultimate goal the creation of computer based systems that can interact with humans and serve society in a variety of ways This primer brings together recent work in cognitive science and cognitive robotics to offer readers a solid grounding on key issues The book first develops a working definition of cognitive systems broad enough to encompass multiple views of the subject and deep enough to help in the formulation of theories and models It surveys the cognitivist emergent and hybrid paradigms of cognitive science and discusses cognitive architectures derived from them It then turns to the key issues with chapters devoted to autonomy embodiment learning and development memory and prospection knowledge and representation and social cognition Ideas are introduced in an intuitive natural order with an emphasis on the relationships among ideas and building to an overview of the field The main text is straightforward and succinct sidenotes drill deeper on specific topics and provide contextual links to further reading

Artificial Cognitive Systems David Vernon, 2024-08-20 A concise introduction to a complex field bringing together recent work in cognitive science and cognitive robotics to offer a solid grounding on key issues This book offers a concise and accessible introduction to the emerging field of artificial cognitive systems Cognition both natural and artificial is about anticipating the need for action and developing the capacity to predict the outcome of those actions Drawing on artificial intelligence developmental psychology and cognitive neuroscience the field of artificial cognitive systems has as its ultimate goal the creation of computer based systems that can interact with humans and serve society in a variety of ways This primer brings together recent work in cognitive science and cognitive robotics to offer readers a solid grounding on key issues The book first develops a working definition of cognitive systems broad enough to encompass multiple views of the subject and deep enough to help in the formulation of theories and models It surveys the cognitivist emergent and hybrid paradigms of cognitive science and discusses cognitive architectures derived from them It then turns to the key issues with chapters devoted to autonomy embodiment learning and development memory and prospection knowledge and representation and social cognition Ideas are introduced in an intuitive natural order with an emphasis on the relationships among ideas and building to an overview of the field The main text is straightforward and succinct sidenotes drill deeper on specific topics and provide contextual links to further reading

Artificial Cognition Architectures James Crowder, John N. Carbone, Shelli Friess, 2013-08-13 The goal of this book is to establish the foundation principles theory and concepts that are the backbone of real autonomous Artificial Intelligence Presented here are some

basic human intelligence concepts framed for Artificial Intelligence systems These include concepts like Metacognition and Metamemory along with architectural constructs for Artificial Intelligence versions of human brain functions like the prefrontal cortex Also presented are possible hardware and software architectures that lend themselves to learning reasoning and self evolution

Cognitive Robotics Angelo Cangelosi, Minoru Asada, 2022-05-17 The current state of the art in cognitive robotics covering the challenges of building AI powered intelligent robots inspired by natural cognitive systems A novel approach to building AI powered intelligent robots takes inspiration from the way natural cognitive systems in humans animals and biological systems develop intelligence by exploiting the full power of interactions between body and brain the physical and social environment in which they live and phylogenetic developmental and learning dynamics This volume reports on the current state of the art in cognitive robotics offering the first comprehensive coverage of building robots inspired by natural cognitive systems Contributors first provide a systematic definition of cognitive robotics and a history of developments in the field They describe in detail five main approaches developmental neuro evolutionary swarm and soft robotics They go on to consider methodologies and concepts treating topics that include commonly used cognitive robotics platforms and robot simulators biomimetic skin as an example of a hardware based approach machine learning methods and cognitive architecture Finally they cover the behavioral and cognitive capabilities of a variety of models experiments and applications looking at issues that range from intrinsic motivation and perception to robot consciousness Cognitive Robotics is aimed at an interdisciplinary audience balancing technical details and examples for the computational reader with theoretical and experimental findings for the empirical scientist

Advancing Developmental Science Anthony S. Dick, Ulrich Müller, 2017-07-06 Advancing Developmental Science reviews the state of the science in theoretical methodological and topical research with a unique focus on the scholarship that developed within a process relational framework

Cognitive Architectures Maria Isabel Aldinhas Ferreira, João Silva Sequeira, Rodrigo Ventura, 2018-09-03 This book provides an integrated framework for natural and artificial cognition by highlighting the fundamental role played by the cognitive architecture in the dialectics with the surrounding environment and consequently in the definition of a particular meaningful world This book is also about embodied and non embodied artificial systems cognitive architectures that are human constructs meant to be able to populate the human world capable of identifying different life contexts and replicating human patterns of behavior capable of acting according to human values and conventions systems that perform tasks in a human like way By identifying the essential phenomena at the core of all forms of cognition the book addresses the topic of design of artificial cognitive architectures in the domains of robotics and artificial life Moving from mere bio inspired design methodology it aims to open a pathway to semiotically determined design

Cognitive Computing for Machine Thinking Makarand R. Velankar, Parikshit N. Mahalle, Gitanjali R. Shinde, 2024-03-16 This book presents cognitive modeling along with the new paradigm machine thinking to enhance existing AI power and address its current limitations This book

provides overview of natural and artificial intelligence along with the computing models used currently The need of advancing the current models is presented with suitable examples The business case studies presented in different domains provide possible use of augmented intelligence with the proposed machine thinking paradigm This book is targeted at academicians researchers students professionals who belong to disciplines which involves intelligent computing and modelling human thinking It provides possible multidisciplinary research directions including social psychology artificial intelligence HCI cognition for applications in various domains

Natural and Artificial Computation for Biomedicine and Neuroscience José Manuel Ferrández Vicente, José Ramón Álvarez-Sánchez, Félix de la Paz López, Javier Toledo Moreo, Hojjat Adeli, 2017-06-10 The two volumes LNCS 10337 and 10338 constitute the proceedings of the International Work Conference on the Interplay Between Natural and Artificial Computation IWINAC 2017 held in Corunna Spain in June 2017 The total of 102 full papers was carefully reviewed and selected from 194 submissions during two rounds of reviewing and improvement The papers are organized in two volumes one on natural and artificial computation for biomedicine and neuroscience addressing topics such as theoretical neural computation models natural computing in bioinformatics physiological computing in affective smart environments emotions as well as signal processing and machine learning applied to biomedical and neuroscience applications The second volume deals with biomedical applications based on natural and artificial computing and addresses topics such as biomedical applications mobile brain computer interaction human robot interaction deep learning machine learning applied to big data analysis computational intelligence in data coding and transmission and applications

Intelligent Human Systems Integration Waldemar Karwowski, Tareq Ahram, 2017-12-30 This book reports on research on innovative human systems integration and human machine interaction with an emphasis on artificial intelligence and automation as well as computational modeling and simulation It covers a wide range of applications in the area of design construction and operation of products systems and services including lifecycle development and human technology interaction The book describes advanced methodologies and tools for evaluating and improving interface usability new models as well as case studies and best practices in virtual augmented and mixed reality systems with a special focus on dynamic environments It also discusses different factors concerning the human hardware and artificial intelligence software Based on the proceedings of the 1st International Conference on Intelligent Human Systems Integration IHSI 2018 held on January 7 9 2018 in Dubai United Arab Emirates the book also examines the forces that are currently shaping the nature of computing and cognitive systems such as the need for decreasing hardware costs the importance of infusing intelligence and automation and the related trend toward hardware miniaturization and power reduction the necessity for a better assimilation of computation in the environment and the social concerns regarding access to computers and systems for people with special needs It offers a timely survey and a practice oriented reference guide to policy and decision makers human factors engineers systems developers and users alike

Perspective on Design Daniel Raposo, João Neves, José

Silva,2019-11-23 This book presents the outcomes of recent endeavors that are expected to foster significant advances in the areas of communication design fashion design interior design and product design as well as overlapping areas The fourteen chapters highlight carefully selected contributions presented during the 6th EIMAD conference held on February 22 23 2018 at the School of Applied Arts Campus da Talagueira in Castelo Branco Portugal They report on outstanding advances that offer new theoretical perspectives and practical research directions in design and which are aimed at fostering communication in a global digital world while also addressing key individual and societal needs *Handbook of Research on*

IT Applications for Strategic Competitive Advantage and Decision Making Idemudia, Efosa Carroll,2020-06-05 To date a plethora of companies and organizations are investing vast amounts of money on the latest technologies Information technology can be used to improve market share profits sales competitive advantage and customer employee satisfaction Unfortunately the individuals meant to use these technologies are not well equipped on how to effectively and efficiently use these tools for competitive advantage and decision making The Handbook of Research on IT Applications for Strategic Competitive Advantage and Decision Making is a collection of innovative research relevant to the methodologies theoretical frameworks and latest empirical research findings in information technology applications strategic competitive advantage and decision making While highlighting topics including agility knowledge management and business intelligence this book is ideally designed for information technology professionals academics researchers managers executives and government officials interested in using information technology for strategic competitive advantage and better decision making **The**

Computational Evolution of Cognitive Architectures Iuliia Kotseruba,John K. Tsotsos,2025-06-23 What is the human mind and how does it work These questions have occupied humanity since antiquity but have only recently received rigorous scientific investigation Cognitive architectures are complex software programs whose goal is to approach human like behavior on a wide variety of tasks This is accomplished by employing human like or at least human plausible mechanisms within an integrated framework that is claimed representative of human cognitive perceptual and movement capabilities By examining how close their behavior is to human they help us understand how the human mind and brain work They contribute to our understanding as computational models that can be tested and whose details in turn provide insights on new aspects of the human brain and mind This field of cognitive architectures emerged at the intersection of artificial intelligence and cognitive science and in less than fifty years has spawned hundreds of projects In The Computational Evolution of Cognitive Architectures the authors trace the evolution of cognitive architectures their abilities and future prospects from their early logic based beginnings to their recent melding of classic methodologies with deep learning concepts Analyzing over 3000 publications on more than eighty cognitive architectures and hundreds more surveys research papers and opinion pieces spanning philosophy cognitive science computer science and robotics the authors aggregate their findings into broad themes such as common components of the architectures their organization interaction and relation to

human cognitive abilities They discuss both theoretical elements of cognitive architectures and their performance before finally considering the future of cognitive architectures and their challenges

Biomimetic and Biohybrid Systems

Vasiliki Vouloutsis, Anna Mura, Falk Tauber, Thomas Speck, Tony J. Prescott, Paul F. M. J. Verschure, 2020-12-22 This book constitutes the proceedings of the 12th International Conference on Biomimetic and Biohybrid Systems Living Machines 2020 held in Freiburg Germany in July 2020 Due to COVID 19 pandemic the conference was held virtually The 32 full and 7 short papers presented in this volume were carefully reviewed and selected from 45 submissions They deal with research on novel life like technologies inspired by the scientific investigation of biological systems biomimetics and research that seeks to interface biological and artificial systems to create biohybrid systems

Data Science in Practice Alan Said, Vicenç

Torra, 2018-09-19 This book approaches big data artificial intelligence machine learning and business intelligence through the lens of Data Science We have grown accustomed to seeing these terms mentioned time and time again in the mainstream media However our understanding of what they actually mean often remains limited This book provides a general overview of the terms and approaches used broadly in data science and provides detailed information on the underlying theories models and application scenarios Divided into three main parts it addresses what data science is how and where it is used and how it can be implemented using modern open source software The book offers an essential guide to modern data science for all students practitioners developers and managers seeking a deeper understanding of how various aspects of data science work and of how they can be employed to gain a competitive advantage

Re-Enacting Sensorimotor Experience for Cognition

Guido Schillaci, Verena V. Hafner, Bruno Lara, 2017-03-29 Mastering the sensorimotor capabilities of our body is a skill that we acquire and refine over time starting at the prenatal stages of development This learning process is linked to brain development and is shaped by the rich set of multimodal information experienced while exploring and interacting with the environment Evidence coming from neuroscience suggests the brain forms and maintains body representations as the main strategy to this mastering Although it is still not clear how this knowledge is represented in our brain it is reasonable to think that such internal models of the body undergo a continuous process of adaptation They need to match growing corporal dimensions during development as well as temporary changes in the characteristics of the body such as the transient morphological alterations produced by the usage of tools In the robotics community there is an increasing interest in reproducing similar mechanisms in artificial agents mainly motivated by the aim of producing autonomous adaptive systems that can deal with complexity and uncertainty in human environments Although promising results have been achieved in the context of sensorimotor learning and autonomous generation of body representations it is still not clear how such low level representations can be scaled up to more complex motor skills and how they can enable the development of cognitive capabilities Recent findings from behavioural and brain studies suggests that processes of mental simulations of action perception loops are likely to be executed in our brain and are dependent on internal motor representations The capability to

simulate sensorimotor experience might represent a key mechanism behind the implementation of further cognitive skills such as self detection self other distinction and imitation Empirical investigation on the functioning of similar processes in the brain and on their implementation in artificial agents is fragmented This e book comprises a collection of manuscripts published by Frontiers in Robotics and Artificial Intelligence under the section Humanoid Robotics on the research topic re enactment of sensorimotor experience for cognition in artificial agents This compendium aims at condensing the latest theoretical review and experimental studies that address new paradigms for learning and integrating multimodal sensorimotor information in artificial agents re use of the sensorimotor experience for cognitive development and further construction of more complex strategies and behaviours using these concepts The authors would like to thank M A Dylan Andrade for his art work for the cover

Advanced Information Systems Engineering Paolo Giorgini, Barbara Weber, 2019-05-28 This book constitutes the refereed proceedings of the 31st International Conference on Advanced Information Systems Engineering CAiSE 2019 held in Rome Italy in June 2019 The 41 full papers presented in this volume were carefully reviewed and selected from 206 submissions The book also contains one invited talk in full paper length The papers were organized in topical sections named information system engineering requirements and modeling data modeling and analysis business process modeling and engineering information system security and learning and mining in information systems Abstracts on the CAiSE 2019 tutorials can be found in the back matter of the volume

Data Scientist Diploma (master's level) - City of London College of Economics - 6 months - 100% online / self-paced City of London College of Economics, Overview This diploma course covers all aspects you need to know to become a successful Data Scientist Content Getting Started with Data Science Data Analytic Thinking Business Problems and Data Science Solutions Introduction to Predictive Modeling From Correlation to Supervised Segmentation Fitting a Model to Data Overfitting and Its Avoidance Similarity Neighbors and Clusters Decision Analytic Thinking I What Is a Good Model Visualizing Model Performance Evidence and Probabilities Representing and Mining Text Decision Analytic Thinking II Toward Analytical Engineering Other Data Science Tasks and Techniques Data Science and Business Strategy Machine Learning Learning from Data with Your Machine And much more Duration 6 months Assessment The assessment will take place on the basis of one assignment at the end of the course Tell us when you feel ready to take the exam and we ll send you the assignment questions Study material The study material will be provided in separate files by email download link

Designing Human-Swarm Interaction Systems Oscar Bjurling, 2025-02-20 Swarms of Unmanned Aerial Vehicles UAVs or drones are envisioned to transform various fields from emergency response to law enforcement and military operations Drone swarms provide scalable adaptable and decentralized solutions for dynamic work environments However the successful integration of these multi agent systems into real world settings presents significant challenges particularly in terms of how humans can safely and effectively interact with and control these systems Human Swarm Interaction HSI aims to address these challenges by

exploring how human operators can manage multiple drones in a cohesive manner even under highly complex uncertain conditions This thesis studies the problem of designing effective interaction mechanisms and interfaces for human operators to command drone swarms specifically addressing challenges such as managing a large number of drones supporting operators situational awareness and balancing between centralized and decentralized control The research highlights the necessity of rethinking conventional approaches by introducing alternative conceptual models such as the choir metaphor which re imagines drone swarms as coordinated semi centralized ensembles rather than purely emergent decentralized collectives This metaphor aims to balance the collective often unpredictable behavior of drone swarms with the predictable directed actions needed in operational environments By demonstrating how this metaphor can be operationalized in an HSI system architecture the thesis provides new avenues for conceptualizing human interaction with autonomous systems Using a design research approach incorporating multiple case study and scenario based design activities to envision future swarm application in dialogue with prospective end users the thesis develops and evaluates prototypes that embody these nuanced HSI concepts The interface prototypes draw design inspiration from Real Time Strategy RTS games These elements include group commands high level mission planning and resource pooling to create a hybrid interaction model that allows operators to maintain both a broad overview and precise control of multiple autonomous and collaborating drones Domain expert evaluations of these prototypes in contexts such as firefighting and airport management validate the practical utility of these concepts The findings emphasize the value of adopting a Human Technology Organization HTO perspective in the design of HSI systems Rather than focusing solely on the interaction between humans and technology this systems thinking approach acknowledges that drone swarms must be integrated into larger organizational frameworks such as emergency response command structures or airport ground operations teams It demonstrates that successful deployment requires accounting for the broader organizational context including roles workflows and coordination needs This holistic approach to HSI system design ensures that drone swarms not only meet technical performance criteria such as reliability responsiveness and scalability but also align with human and organizational needs facilitating their adoption and effective use in a wide range of real world scenarios Ultimately these contributions are intended to bridge the gap between theoretical models of swarm control and practical deployment advancing both the field of HSI and the broader adoption of drone swarm technologies

Sv rmar av obemannade luftfarkoster UAV eller dr nare f rv ntas omvandla flera omr den exempelvis r ddningsinsatser brottsbek mpning och milit roperationer Dr narsv rmar innebar skalbara anpassningsbara och decentraliserade l sningar for dynamiska arbetsuppgifter Den lyckade integreringen av dessa multi agent system i verkliga milj er innebar dock betydande utmaningar s rskilt med avseende p hur m nniskor s kert och effektivt interagerar med och kontrollerar dessa system Forskningsf llet M nniska Sv rm Interaktion MSI syftar till att m ta dessa utmaningar genom att unders ka hur m nskliga operatorer kan hantera flera dr nare p ett sammanh ngande vis ven under komplexa och os kra f rh llanden Denna avhandling utreder problemet att

utforma effektiva och s kra interaktionsmekanismer och gr nssnitt for m nskliga operatorer att leda dr narsv rmar specifikt genom att adressera utmaningar som att hantera ett stort antal dr nare st dja operatorers situationsmedvetenhet och balansera mellan centraliserad och decentraliserad kontroll Avhandlingen betonar vikten av att ifr gasatta konventionella tillv gag ngss tt genom att introducera alternativa konceptuella modeller s som k r metaforen som omtolkar dr narsv rmar som koordinerade semicentraliserade ensembler snarare n rent decentraliserade kollektiv Denna metafor syftar till att balansera det kollektiva ofta of ruts gbara beteendet hos dr narsv rmar med de f ruts gbara riktade handlingar som beh vs i operativa milj er Genom att visa hur denna metafor kan operationaliseras i en MSI systemarkitektur erbjuder avhandlingen nya s tt att konceptualisera m nsklig interaktion med autonoma system Genom att till mpa en designforskningsmetod som innefattar fallstudier och scenariobaserade designaktiviteter f r att f rest lla sig framtida sv rmtill mpningar i dialog med potentiella slutanv ndare utvecklar och utv rderar avhandlingen prototyper som manifesterar dessa nyanserade MSI koncept Gr nssnittens prototyper drar designinspiration fr n realtidsstrategispel RTS Dessa element inkluderar enhetshantering och kommandon p gruppniv strategisk uppdragsplanering och resursdelning f r att skapa en hybrid interaktionsmodell som g r det m jligt f r operat rer att b de bibeh lla en bred l gesbild och ut va precis kontroll ver flera autonoma och samverkande dr nare Dom nexperters utv rderingar av dessa prototyper i arbetskontexter som brandbek mpning och flygplatsledning p visar den praktiska anv ndbarheten av dessa koncept Resultaten betonar v rdet av att anta ett M nniska Teknik Organisation MTO perspektiv vid utformningen av MSI system Snarare n att enbart fokusera p interaktionen mellan m nniskor och teknik erk nner detta systemt nkande tillv gag ngss tt att dr narsv rmar m ste integreras i st rre organisatoriska ramar s som ledningsstrukturer for r ddningsinsatser eller markoperativa team p flygplatser Det visar att framg ngsrik implementering av dr narsv rmar kr ver att systemutvecklare tar h nsyn till det bredare organisatoriska sammanhanget inklusive roller arbetsfl den och samverkansbehov Detta holistiska tillv gag ngssatt f r utformningen av MSI system s kerst ller att dr narsv rmar inte bara uppfyller tekniska prestandakriterier s som tillf rlitlighet responsivitet och skalbarhet utan ocks verensst mmer med m nskliga och organisatoriska behov vilket underl ttar deras inf rande och effektiv anv ndning i en m ngd olika till mpningsscenarier ver lag r dessa forskningsbidrag avsedda att verbrygga gapet mellan teoretiska modeller f r sv rmstyrning och praktisk implementering och d rmed avancera och fr mja b de MSI omr det och den bredare anv ndningen av sv rrmteknologier

Social Robotics Shuzhi Sam Ge, John-John Cabibihan, Miguel A. Salichs, Elizabeth Broadbent, Hongsheng He, Alan R. Wagner, Álvaro Castro-González, 2018-11-26 This book constitutes the refereed proceedings of the 10th International Conference on Social Robotics ICSR 2018 held in Qingdao China in November 2018 The 60 full papers presented were carefully reviewed and selected from 79 submissions The theme of the 2018 conference is Social Robotics and AI In addition to the technical sessions ICSR 2018 included 2 workshops Smart Sensing Systems Towards Safe Navigation and Social Human Robot Interaction of Service Robots

Musical Instruments in the 21st Century Till

Bovermann,Alberto de Campo,Hauke Egermann,Sarah-Indriyati Hardjowirogo,Stefan Weinzierl,2016-12-09 By exploring the many different types and forms of contemporary musical instruments this book contributes to a better understanding of the conditions of instrumentality in the 21st century Providing insights from science humanities and the arts authors from a wide range of disciplines discuss the following questions What are the conditions under which an object is recognized as a musical instrument What are the actions and procedures typically associated with musical instruments What kind of mental and physical knowledge do we access in order to recognize or use something as a musical instrument How is this knowledge being shaped by cultural conventions and temporal conditions How do algorithmic processes change the game of musical performance and as a result how do they affect notions of instrumentality How do we address the question of instrumental identity within an instrument s design process What properties can be used to differentiate successful and unsuccessful instruments Do these properties also contribute to the instrumentality of an object in general What does success mean within an artistic commercial technological or scientific context

Artificial Cognitive Systems A Primer Book Review: Unveiling the Magic of Language

In an electronic era where connections and knowledge reign supreme, the enchanting power of language has been apparent than ever. Its power to stir emotions, provoke thought, and instigate transformation is actually remarkable. This extraordinary book, aptly titled "**Artificial Cognitive Systems A Primer**," written by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect on our existence. Throughout this critique, we shall delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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Artificial Cognitive Systems A Primer Introduction

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