

Atlantis Thinking Machines
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Computational Creativity Research: Towards Creative Machines

Computational Creativity Research Towards Creative Machines Atlantis Thinking Machines

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P. Camilleri**



Computational Creativity Research Towards Creative Machines Atlantis Thinking Machines:

Computational Creativity Research: Towards Creative Machines Tarek R. Besold, Marco Schorlemmer, Alan Smaill, 2014-12-04 Computational Creativity Concept Invention and General Intelligence in their own right all are flourishing research disciplines producing surprising and captivating results that continuously influence and change our view on where the limits of intelligent machines lie each day pushing the boundaries a bit further By 2014 all three fields also have left their marks on everyday life machine composed music has been performed in concert halls automated theorem provers are accepted tools in enterprises R D departments and cognitive architectures are being integrated in pilot assistance systems for next generation airplanes Still although the corresponding aims and goals are clearly similar as are the common methods and approaches the developments in each of these areas have happened mostly individually within the respective community and without closer relationships to the goings on in the other two disciplines In order to overcome this gap and to provide a common platform for interaction and exchange between the different directions the International Workshops on Computational Creativity Concept Invention and General Intelligence C3GI have been started At ECAI 2012 and IJCAI 2013 the first and second edition of C3GI each gathered researchers from all three fields presenting recent developments and results from their research and in dialogue and joint debates bridging the disciplinary boundaries The chapters contained in this book are based on expanded versions of accepted contributions to the workshops and additional selected contributions by renowned researchers in the relevant fields Individually they give an account of the state of the art in their respective area discussing both theoretical approaches as well as implemented systems When taken together and looked at from an integrative perspective the book in its totality offers a starting point for a re integration of Computational Creativity Concept Invention and General Intelligence making visible common lines of work and theoretical underpinnings and pointing at chances and opportunities arising from the interplay of the three fields Swarm Intelligence Algorithms (Two Volume Set) Adam Slowik, 2021-01-26 Swarm intelligence algorithms are a form of nature based optimization algorithms Their main inspiration is the cooperative behavior of animals within specific communities This can be described as simple behaviors of individuals along with the mechanisms for sharing knowledge between them resulting in the complex behavior of the entire community Examples of such behavior can be found in ant colonies bee swarms schools of fish or bird flocks Swarm intelligence algorithms are used to solve difficult optimization problems for which there are no exact solving methods or the use of such methods is impossible e g due to unacceptable computational time This set comprises two volumes Swarm Intelligence Algorithms A Tutorial and Swarm Intelligence Algorithms Modifications and Applications The first volume thoroughly presents the basics of 24 algorithms selected from the entire family of swarm intelligence algorithms It contains a detailed explanation of how each algorithm works along with relevant program codes in Matlab and the C programming language as well as numerical examples illustrating step by step how individual algorithms work The second volume

describes selected modifications of these algorithms and presents their practical applications This book presents 24 swarm algorithms together with their modifications and practical applications Each chapter is devoted to one algorithm It contains a short description along with a pseudo code showing the various stages of its operation In addition each chapter contains a description of selected modifications of the algorithm and shows how it can be used to solve a selected practical problem

Digitized Gali Einav,2019-02-08 Gali Einav and a strong group of international contributors offer a timely collection that combines academic insights and entrepreneurial case studies focused on digital innovation By exploring the effect of disruptive technologies within media health music and employment they help readers to take their next steps into the digital future *Knowledge Discovery, Knowledge Engineering and Knowledge Management* Ana Fred,Jan L.G. Dietz,David Aveiro,Kecheng Liu,Joaquim Filipe,2017-01-21 This book constitutes the thoroughly refereed proceedings of the 7th International Joint Conference on Knowledge Discovery Knowledge Engineering and Knowledge Management IC3K 2015 held in Lisbon Portugal in November 2015 The 25 full papers presented together with 2 invited papers were carefully reviewed and selected from 280 submissions The papers are organized in topical sections on knowledge discovery and information retrieval knowledge engineering and ontology development and knowledge management and information sharing

Image Schemas and Concept Invention Maria M. Hedblom,2020-06-13 In this book the author s theoretical framework builds on linguistic and psychological research arguing that similar image schematic notions should be grouped together into interconnected family hierarchies with complexity increasing with regard to the addition of spatial and conceptual primitives She introduces an image schema logic as a language to model image schemas and she shows how the semantic content of image schemas can be used to improve computational concept invention The book will be of value to researchers in artificial intelligence cognitive science psychology and creativity Representation in the Brain Asim Roy,Leonid Perlovsky,Tarek Besold,Juyang Weng,Jonathan Edwards,2018-09-28 This eBook contains ten articles on the topic of representation of abstract concepts both simple and complex at the neural level in the brain Seven of the articles directly address the main competing theories of mental representation localist and distributed Four of these articles argue either on a theoretical basis or with neurophysiological evidence that abstract concepts simple or complex exist have to exist at either the single cell level or in an exclusive neural cell assembly There are three other papers that argue for sparse distributed representation population coding of abstract concepts There are two other papers that discuss neural implementation of symbolic models The remaining paper deals with learning of motor skills from imagery versus actual execution A summary of these papers is provided in the Editorial *Music and AI* Alexandra Bonnici,Roger B. Dannenberg,Steven Kemper,Kenneth P. Camilleri,2021-03-16 **The Evolution of Rhythm Cognition: Timing in Music and Speech** Andrea Ravignani,Henkjan Honing,Sonja A. Kotz,2018-07-24 Human speech and music share a number of similarities and differences One of the closest similarities is their temporal nature as both i develop over time ii form sequences of temporal intervals

possibly differing in duration and acoustical marking by different spectral properties which are perceived as a rhythm and iii generate metrical expectations Human brains are particularly efficient in perceiving producing and processing fine rhythmic information in music and speech However a number of critical questions remain to be answered Where does this human sensitivity for rhythm arise How did rhythm cognition develop in human evolution How did environmental rhythms affect the evolution of brain rhythms Which rhythm specific neural circuits are shared between speech and music or even with other domains Evolutionary processes long time scales often prevent direct observation understanding the psychology of rhythm and its evolution requires a close fitting integration of different perspectives First empirical observations of music and speech in the field are contrasted and generate testable hypotheses Experiments exploring linguistic and musical rhythm are performed across sensory modalities ages and animal species to address questions about domain specificity development and an evolutionary path of rhythm Finally experimental insights are integrated via synthetic modeling generating testable predictions about brain oscillations underlying rhythm cognition and its evolution Our understanding of the cognitive neurobiological and evolutionary bases of rhythm is rapidly increasing However researchers in different fields often work on parallel potentially converging strands with little mutual awareness This research topic builds a bridge across several disciplines focusing on the cognitive neuroscience of rhythm as an evolutionary process It includes contributions encompassing although not limited to 1 developmental and comparative studies of rhythm e g critical acquisition periods innateness 2 evidence of rhythmic behavior in other species both spontaneous and in controlled experiments 3 comparisons of rhythm processing in music and speech e g behavioral experiments systems neuroscience perspectives on music speech networks 4 evidence on rhythm processing across modalities and domains 5 studies on rhythm in interaction and context social affective etc 6 mathematical and computational e g connectionist symbolic models of rhythmicity as an evolved behavior

Beyond the Creative Species Oliver Bown, 2021-02-23 A multidisciplinary introduction to the field of computational creativity analyzing the impact of advanced generative technologies on art and music As algorithms get smarter what role will computers play in the creation of music art and other cultural artifacts Will they be able to create such things from the ground up and will such creations be meaningful In *Beyond the Creative Species* Oliver Bown offers a multidisciplinary examination of computational creativity analyzing the impact of advanced generative technologies on art and music Drawing on a wide range of disciplines including artificial intelligence and machine learning design social theory the psychology of creativity and creative practice research Bown argues that to understand computational creativity we must not only consider what computationally creative algorithms actually do but also examine creative artistic activity itself

Computational Creativity Tony Veale, F. Amílcar Cardoso, 2019-07-25 Computational creativity is an emerging field of research within AI that focuses on the capacity of machines to both generate and evaluate novel outputs that would if produced by a human be considered creative This book is intended to be a canonical text for this new discipline through

which researchers and students can absorb the philosophy of the field and learn its methods After a comprehensive introduction to the idea of systematizing creativity the contributions address topics such as autonomous intentionality conceptual blending literature mining computational design models of novelty evaluating progress in related research computer supported human creativity and human supported computer creativity common sense knowledge and models of social creativity Products of this research will have real consequences for the worlds of entertainment culture science education design and art in addition to artificial intelligence and the book will be of value to practitioners and students in all these domains

Cognition and the Creative Machine Ana-Maria Oltețeanu, 2020-05-23 How would you assemble a machine that can be creative what would its cogs be Starting from how humans do creative problem solving the author has developed a framework to explore whether a diverse set of creative problem solving tasks can be solved computationally using a unified set of principles In this book she describes the implementation of related prototype AI systems and the computational and empirical experiments conducted The book will be of interest to researchers graduate students and laypeople engaged with ideas in artificial intelligence cognitive science and creativity

Forthcoming Books Rose Arny, 1989 Toward Super-Creativity Sílvio Manuel Brito, 2020-01-29 What is super creativity From the simple creation of a meal to the most sophisticated artificial intelligence system the human brain is capable of responding to the most diverse challenges and problems in increasingly creative and innovative ways This book is an attempt to define super creativity by examining creativity in humans machines and human machine interactions Organized into three sections the volume covers such topics as increasing personal creativity the impact of artificial intelligence and digital devices and the interaction of humans and machines in fields such as healthcare and economics

Computers and Creativity Jon McCormack, Mark d'Inverno, 2012-08-21 This interdisciplinary volume introduces new theories and ideas on creativity from the perspectives of science and art Featuring contributions from leading researchers theorists and artists working in artificial intelligence generative art creative computing music composition and cybernetics the book examines the relationship between computation and creativity from both analytic and practical perspectives Each contributor describes innovative new ways creativity can be understood through and inspired by computers The book tackles critical philosophical questions and discusses the major issues raised by computational creativity including whether a computer can exhibit creativity independently of its creator what kinds of creativity are possible in light of our knowledge from computational simulation artificial intelligence evolutionary theory and information theory and whether we can begin to automate the evaluation of aesthetics and creativity in silico These important often controversial questions are contextualised by current thinking in computational creative arts practice Leading artistic practitioners discuss their approaches to working creatively with computational systems in a diverse array of media including music sound art visual art and interactivity The volume also includes a comprehensive review of computational aesthetic evaluation and judgement research alongside discussion and

insights from pioneering artists working with computation as a creative medium over the last fifty years A distinguishing feature of this volume is that it explains and grounds new theoretical ideas on creativity through practical applications and creative practice Computers and Creativity will appeal to theorists researchers in artificial intelligence generative and evolutionary computing practicing artists and musicians students and any reader generally interested in understanding how computers can impact upon creativity It bridges concepts from computer science psychology neuroscience visual art music and philosophy in an accessible way illustrating how computers are fundamentally changing what we can imagine and create and how we might shape the creativity of the future Computers and Creativity will appeal to theorists researchers in artificial intelligence generative and evolutionary computing practicing artists and musicians students and any reader generally interested in understanding how computers can impact upon creativity It bridges concepts from computer science psychology neuroscience visual art music and philosophy in an accessible way illustrating how computers are fundamentally changing what we can imagine and create and how we might shape the creativity of the future Computers and Creativity,2012-08-31 **Thinking Machines and the Philosophy of Computer Science** Jordi Vallverdú,2010-01-01 This book offers a high interdisciplinary exchange of ideas pertaining to the philosophy of computer science from philosophical and mathematical logic to epistemology engineering ethics or neuroscience experts and outlines new problems that arise with new tools Provided by publisher **The Inspiration Machine** Eitan Y. Wilf,2023-11-27 Explores how creative digital technologies and artificial intelligence are embedded in culture and society In The Inspiration Machine Eitan Y Wilf explores the transformative potentials that digital technology opens up for creative practice through three ethnographic cases two with jazz musicians and one with a group of poets At times dissatisfied with the limitations of human creativity these artists do not turn to computerized algorithms merely to execute their preconceived ideas Rather they approach them as creative partners delegating to them different degrees of agentive control and artistic decision making in the hopes of finding inspiration in their output and thereby expanding their own creative horizons The algorithms these artists develop and use however remain rooted in and haunted by the specific social predicaments and human shortfalls that they were intended to overcome Experiments in the digital thus hold an important lesson although Wilf s interlocutors returned from their adventures with computational creativity with modified novel and enriched capacities and predilections they also gained a renewed appreciation for and at times a desire to re inhabit non digital creativity In examining the potentials and pitfalls of seemingly autonomous digital technologies in the realm of art Wilf shows that computational solutions to the real or imagined insufficiencies of human practice are best developed in relation to rather than away from the social and cultural contexts that gave rise to those insufficiencies in the first place **Shape Understanding System** Zbigniew Les,Magdalena Les,2008-01-11 This book presents the results of research into one of the most complex and difficult areas research into thinking and understanding The research was carried out at the newly founded Queen Jadwiga Research Institute of

Understanding and is focused on the problem of visual understanding and visual thinking The authors believe this is the first book to attempt to investigate the complexity of visual thinking problems in the context of building the thinking machine

Thirteen Ways of Looking Dishita Girish Turakhia, 2017 The vision of this research is to propose a novel computational framework to study Creative Thinking If we are to embed machines with creative thinking abilities then we first need to study the evanescent nature of human creative thinking Creative thinking is neither entirely random nor strictly logical making it difficult to t its computation into structured logical models of thinking Given this conundrum how can we computationally study the process of thinking creatively In this research I first present the current scientific definitions of creative thinking Through literary survey of cognitive computational and design thinking frameworks I identify the missing links between human creativity and AI models of creative thinking I assert that creative thinking is result of two features of human intelligence cognitive diversity and social interaction Cognitive diversity or the ability to parse knowledge in dierent ways is a crucial aspect of creative thinking Furthermore social interaction between cognitively diverse individuals results in restructuring of thoughts leading to creativity and epiphanies the aha moments I posit that Shape Grammar with its ability to fluidly restructure computation can be used to study and demonstrate cognitive diversity and interaction If we conceive thoughts as shapes and ideas as configurations of those shapes then cognitive diversity can be described as rule based computation on shapes to generate those configurations and interaction as the exchange of rules between cognitive diverse entities humans or machines The contributions of this research are threefold First I present a literature review of current frameworks and identify the two gaps between machine and human creativity Secondly I demonstrate how shape grammar can ll those gaps of cognitive diversity and interaction Thirdly I propose thought shape framework that adapts principles of shape grammar for computational creative thinking

ARTIFICIAL INTELLIGENCE Prabhu TL, 2025-04-05 Artificial Intelligence From Fundamentals to the Future Master the World of Thinking Machines Unlock the secrets behind the most transformative technology of our time Whether you re a student tech enthusiast entrepreneur or simply curious about the future Artificial Intelligence is your ultimate guide to understanding building and ethically navigating intelligent systems This comprehensive easy to follow book takes you on a powerful journey through the core principles tools applications and philosophical challenges of AI from the basics to the bleeding edge Inside this book you will discover What AI really is and how it differs from human intelligence The history evolution and types of AI Narrow General and Super Intelligence Foundations of machine learning deep learning NLP and computer vision Real world AI applications in healthcare finance education marketing and more How to build your own AI models with hands on examples Emerging technologies quantum AI emotional intelligence and AGI Ethics bias consciousness and the role of AI in reshaping humanity Who is this book for Students professionals looking to upskill in AI Entrepreneurs product creators wanting to leverage AI Academics researchers exploring the cutting edge Policy makers thinkers interested in ethical implications Anyone curious about how AI is shaping

our present and future More than a book it s a roadmap for the intelligent age In a world increasingly shaped by algorithms this book empowers you to not just understand AI but to use it wisely build it responsibly and shape its future with intention and impact Start your journey today The future isn t just coming AI is already here Are you ready

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