Artificial Intelligence In Games

Move beyond the foundations of machine learning and game theory in cyber security to the latest research in this cutting-edge field In Game Theory and Machine Learning for Cyber Security, a team of expert security researchers delivers a collection of central research contributions from both machine learning and game theory applicable to cybersecurity. The distinguished editors have included resources that address open research questions in game theory and machine learning applied to cyber security systems and examine the strengths and limitations of current game theoretic models for cyber security. Readers will explore the vulnerabilities of traditional machine learning algorithms and how they can be mitigated in an adversarial machine learning approach. The book offers a comprehensive suite of solutions to a broad range of technical issues in applying game theory and machine learning to solve cyber security challenges. Beginning with an introduction to foundational concepts in game theory, machine learning, cyber security, and cyber deception, the editors provide readers with resources that discuss the latest in hypergames, behavioral game theory, adversarial machine learning, generative adversarial networks, and multi-agent reinforcement learning. Readers will also enjoy: A thorough introduction to game theory for cyber deception, including scalable algorithms for identifying stealthy attackers in a game theoretic framework, honeypot allocation over attack graphs, and behavioral games for cyber deception An exploration of game theory for cyber security, including actionable game-theoretic adversarial intervention detection against persistent and advanced threats Practical discussions of adversarial machine learning for cyber security, including adversarial machine learning in 5G security and machine learning-driven fault injection in cyber-physical systems In-depth examinations of generative models for cyber security Perfect for researchers, students, and experts in the fields of computer science and engineering, Game Theory and Machine Learning for Cyber Security is also an indispensable resource for industry professionals, military researchers, researchers, faculty, and students with an interest in cyber security.

Explore reinforcement learning (RL) techniques to build cutting-edge games using Python libraries such as PyTorch, OpenAI Gym, and TensorFlow Key FeaturesGet to grips with the different reinforcement and DRL algorithms for game developmentLearn how to implement components such as artificial agents, map and level generation, and audio generationGain insights into cutting-edge RL research and understand how it is similar to artificial general researchBook Description With the increased presence of AI in the gaming industry, developers are challenged to create highly responsive and adaptive games by integrating artificial intelligence into their projects. This book is your guide to learning how various reinforcement learning techniques and algorithms play an important role in game development with Python. Starting with the basics, this book will help you build a strong foundation in reinforcement learning for game development. Each chapter will assist you in implementing different reinforcement learning techniques, such as Markov decision processes (MDPs), Q-learning, actor-critic methods, SARSA, and deterministic policy gradient algorithms, to build logical self-learning agents. Learning these techniques will enhance your game development skills and add a variety of features to improve your game agent's productivity. As you advance, you'll understand how deep reinforcement learning (DRL) techniques can be used to devise strategies to help agents learn from their actions and build engaging games. By the end of this book, you'll be ready to apply reinforcement learning techniques to build a variety of projects and contribute to open source applications. What you will learnUnderstand how deep learning can be integrated into an RL agentExplore basic to advanced algorithms commonly used in game developmentBuild agents that can learn and solve problems in all types of environmentsTrain a Deep Q-Network (DQN) agent to solve the CartPole balancing problemDevelop game AI agents by understanding the mechanism behind complex AIIntegrate all the concepts learned into new projects or gaming agentsWho this book is for If you're a game developer looking to implement AI techniques to build next-generation games from scratch, this book is for you. Machine learning and deep learning practitioners, and RL researchers who want to understand how to use self-learning agents in the game domain will also find this book useful. Knowledge of game development and Python programming experience are required.

General game players are computer systems able to play strategy games based solely on formal game descriptions supplied at "runtime" (n other words, they don't know the rules until the game starts). Unlike specialized game players, such as Deep Blue, general game players cannot rely on algorithms designed in advance for specific games; they must discover such algorithms themselves. General game playing expertise depends on intelligence on the part of the game player and not just intelligence of the programmer of the game player. GGP is an interesting application in its own right. It is intellectually engaging and more than a little fun. But it is much more than that. It provides a theoretical framework for modeling discrete dynamic systems and defining rationality in a way that takes into account problem representation and complexities like incompleteness of information and resource bounds. It has practical applications in areas where these features are important, e.g., in business and law. More fundamentally, it raises questions about the nature of intelligence and serves as a laboratory in which to evaluate competing approaches to artificial intelligence. This book is an elementary introduction to General Game Playing (GGP). (1) It presents the theory of General Game Playing and leading GGP technologies. (2) It shows how to create GGP programs capable of competing against other programs and humans. (3) It offers a glimpse of some of the real-world applications of General Game Playing. Table of Contents: Preface / Introduction / Game Description / Game Management / Game Playing / Small Single-Player Games / Small Multiple-Player Games / Heuristic Search / Probabilistic Search / Propositional Nets / General Game Playing With Propnets / Factoring / Discovery of Heuristics / Logic / Analyzing Games with Logic / Solving Single-Player Games with Logic / Discovering Heuristics with Logic / Games with Incomplete Information / Games with Historical Constraints / Incomplete Game Descriptions / Advanced General Game Playing / Authors' Biographies

Search is an important component of problem solving in artificial intelligence (AI) and, more generally, in computer science, engineering and operations research. Combinatorial optimization, decision analysis, game playing, learning, planning, pattern recognition, robotics and theorem proving are some of the areas in which search algorithms playa key role. Less than a decade ago the conventional wisdom in artificial intelligence was that the best search algorithms had already been invented and the likelihood of finding new results in this area was very small. Since then many new insights and results have been obtained. For example, new algorithms for state space, AND/OR graph, and game tree search were discovered. Articles on new theoretical developments and experimental results on backtracking, heuristic search and constraint propaga tion were published. The relationships among various search and combinatorial algorithms in AI, Operations Research, and other fields were clarified. This volume brings together some of this recent work in a manner designed to be accessible to students and professionals interested in these new insights and developments.

Game AI Pro 3

Biologically Inspired Artificial Intelligence for Computer Games

Game Theory and Machine Learning for Cyber Security

General Video Game Artificial Intelligence

Proceedings of the International Conference on Artificial Intelligence in China

An Introduction

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Research on general video game playing aims at designing agents or content generators that can perform well in multiple video games, possibly without knowing the game in advance and with little to no specific domain knowledge. The general video game AI framework and competition propose a challenge in which researchers can test their favorite AI methods with a potentially infinite number of games created using the Video Game Description Language. The open-source framework has been used since 2014 for running a challenge. Competitors around the globe submit their best approaches that aim to generalize well across games. Additionally, the framework has been used in AI modules by many higher-education institutions as assignments, or as proposed projects for final year (undergraduate and Master's) students and Ph.D. candidates. The present book, written by the developers and organizers of the framework, presents the most interesting highlights of the research performed by the authors during these years in this domain. It showcases work on methods to play the games, generators of content, and video game optimization. It also outlines potential further work in an area that offers multiple research directions for the future.
The core message of this book is: computer games best realise affective interaction. This book brings together contributions from specialists in affective computing, game studies, game artificial intelligence, user experience research, sensor technology, multi-modal interfaces and psychology that will advance the state-of-the-art in player experience research; affect modelling, induction, and sensing; affect-driven game adaptation and game-based learning and assessment. In 3 parts the books covers Theory, Emotion Modelling and Affect-Driven Adaptation, and Applications. This book will be of interest to researchers and scholars in the fields of game research, affective computing, human computer interaction, and artificial intelligence.
What is artificial intelligence? How is artificial intelligence used in game development? Game development lives in its own technical world. It has its own idioms, skills, and challenges. That's one of the reasons games are so much fun to work on. Each game has its own rules, its own aesthetic, and its own trade-offs, and the hardware it will run on keeps changing. AI for Games is designed to help you understand one element of game development: artificial intelligence (AI).
Learn to make games that are more fun and engaging! Building on fundamental principles of Artificial Intelligence, Funge explains how to create Non-Player Characters (NPCs) with progressively more sophisticated capabilities. Starting with the basic capability of acting in the game world, the book explains how to develop NPCs who can perceive, remem
AI for Games
Hands-On Artificial Intelligence with Unreal Engine
Theory and Praxis
AI for Game Developers
AI for Games, Third Edition
Why AI Can't Think But Can Transform Jobs
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Provides an introduction to AI game techniques used in game programming.

AI is an integral part of every video game. This book helps propfessionals keep up with the constantly evolving technological advances in the fast growing game industry and equips students with up-to-date infortmation they need to jumpstart their careers. This revised and updated Third Edition includes new techniques, algorithms, data structures and representations needed to create powerful AI in games. The companion website includes downloadable and executable source code that will be regularly updated by the author. Key Features A comprehensive professional tutorial and reference to implement ture AI in games Includes new exercises so readers can test their comprehension and understanding of the concepts and practices presented Revised and updated to cover new techniques and advances in AI Walks the reader through the entire game AI development process New and improved companion website with easily downloaded and executable source code

Explores the role of artificial intelligence in the development of a claim that morality is person made and rational.This book explores the role of artificial intelligence in the development of a claim that morality is person-made and rational. Professor Danielson builds moral robots that do better than amoral competitors in a tournament of games like the Prisoners Dilemma and Chicken. The book thus engages in current controversies over the adequacy of the received theory of rational choice. It sides with Gauthier and McClennan, who extend the devices of rational choice to include moral constraint. Artificial Morality goes further, by promoting communication, testing and copying of principles and by stressing empirical tests.

Create AI applications in Python and lay the foundations for your career in data science Key FeaturesPractical examples that explain key machine learning algorithmsExplore neural networks in detail with interesting examplesMaster core AI concepts with engaging activitiesBook Description Machine learning and neural networks are pillars on which you can build intelligent applications. Artificial Intelligence and Machine Learning Fundamentals begins by introducing you to Python and discussing AI search algorithms. You will cover in-depth mathematical topics, such as regression and classification, illustrated by Python examples. As you make your way through the book, you will progress to advanced AI techniques and concepts, and work on real-life datasets to form decision trees and clusters. You will be introduced to neural networks, a powerful tool based on Moore's law. By the end of this book, you will be confident when it comes to building your own AI applications with your newly acquired skills! What you will learnUnderstand the importance, principles, and fields of AIImplement basic artificial intelligence concepts with PythonApply regression and classification concepts to real-world problemsPerform predictive analysis using decision trees and random forestsCarry out clustering using the k-means and mean shift algorithmsUnderstand the fundamentals of deep learning via practical examplesWho this book is for Artificial Intelligence and Machine Learning Fundamentals is for software developers and data scientists who want to enrich their projects with machine learning. You do not need any prior experience in AI. However, it's recommended that you have knowledge of high school-level mathematics and at least one programming language (preferably Python).

Reinforcement Learning and Games

Artificial Morality

Game AI Pro 2

Hands-On Reinforcement Learning for Games

Implementing self-learning agents in games using artificial intelligence techniques

General Game Playing

Summary Deep Learning and the Game of Go teaches you how to apply the power of deep learning to complex reasoning tasks by building a Go-playing AI. After exposing you to the foundations of machine and deep learning, you'll use Python to build a bot and then teach it the rules of the game. Foreword by Thore Graepel, DeepMind Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology The ancient strategy game of Go is an incredible case study for AI. In 2016, a deep learning-based system shocked the Go world by defeating a world champion. Shortly after that, the upgraded AlphaGo Zero crushed the original bot by using deep reinforcement learning to master the game. Now, you can learn those same deep learning techniques by building your own Go bot! About the Book Deep Learning and the Game of Go introduces deep learning by teaching you to build a Go-winning bot. As you progress, you'll apply increasingly complex training techniques and strategies using the Python deep learning library Keras. You'll enjoy watching your bot master the game of Go, and along the way, you'll discover how to apply your new deep learning skills to a wide range of other scenarios! What's inside Build and teach a self-improving game AI Enhance classical game AI systems with deep learning Implement neural networks for deep learning About the Reader All you need are basic Python skills and high school-level math. No deep learning experience required. About the Author Max Pumperla and Kevin Ferguson are experienced deep learning specialists skilled in distributed systems and data science. Together, Max and Kevin built the open source bot BetaGo. Table of Contents PART 1 - FOUNDATIONS Toward deep learning: a machine-learning introduction Go as a machine-learning problem Implementing your first Go bot PART 2 - MACHINE LEARNING AND GAME AI Playing games with tree search Getting started with neural networks Designing a neural network for Go data Learning from data: a deep-learning bot Deploying bots in the wild Learning by practice: reinforcement learning Reinforcement learning with policy gradients Reinforcement learning with value methods Reinforcement learning with actor-critic methods PART 3 - GREATER THAN THE SUM OF ITS PARTS AlphaGo: Bringing it all together AlphaGo Zero: Integrating tree search with reinforcement learning

Game AI Pro2: Collected Wisdom of Game AI Professionals presents cutting-edge tips, tricks, and techniques for artificial intelligence (AI) in games, drawn from developers of shipped commercial games as well as some of the best-known academics in the field. It contains knowledge, advice, hard-earned wisdom, and insights gathered from across the community of developers and researchers who have devoted themselves to game AI. In this book, 47 expert developers and researchers have come together to bring you their newest advances in game AI, along with twists on proven techniques that have shipped in some of the most successful commercial games of the last few years. The book provides a toolbox of proven techniques that can be applied to many common and not-so-common situations. It is written to be accessible to a broad range of readers. Beginners will find good general coverage of game AI techniques and a number of comprehensive overviews, while intermediate to expert professional game developers will find focused, deeply technical chapters on specific topics of interest to them. Covers a wide range of AI in games, with topics applicable to almost any game Touches on most, if not all, of the topics necessary to get started in game AI Provides real-life case studies of game AI in published commercial games Gives in-depth, technical solutions from some of the industry's best-known games Includes downloadable demos and/or source code, available at http://www.gameaipro.com

"This book examines modern artificial intelligence to display how it may be applied to computer games. It spans the divide that exists between the academic research community working with advanced artificial intelligence and the games programming community which must create and release new and interesting games, creating an invaluable collection supporting both technological research and the gaming industry"--Provided by publisher.

Over the last decade, progress in deep learning has had a profound and transformational effect on many complex problems, including speech recognition, machine translation, natural language understanding, and computer vision. As a result, computers can now achieve human-competitive performance in a wide range of perception and recognition tasks. Many of these systems are now available to the programmer via a range of so-called cognitive services. More recently, deep reinforcement learning has achieved ground-breaking success in several complex challenges. This book makes an enormous contribution to this beautiful, vibrant area of study: an area that is developing rapidly both in breadth and depth. Deep learning can cope with a broader range of tasks (and perform those tasks to increasing levels of excellence). This book lays a good foundation for the core concepts and principles of deep learning in gaming and animation, walking you through the fundamental ideas with expert ease. This book progresses in a step-by-step manner. It reinforces theory with a full-fledged pedagogy designed to enhance students' understanding and offer them a practical insight into its applications. Also, some chapters introduce and cover novel ideas about how artificial intelligence (AI), deep learning, and machine learning have changed the world in gaming and animation. It gives us the idea that AI can also be applied in gaming, and there are limited textbooks in this area. This book comprehensively addresses all the aspects of AI and deep learning in gaming. Also, each chapter follows a similar structure so that students, teachers, and industry experts can orientate themselves within the text. There are few books in the field of gaming using AI. Deep Learning in Gaming and Animations teaches you how to apply the power of deep learning to build complex reasoning tasks. After being exposed to the foundations of machine and deep learning, you will use Python to build a bot and then teach it the game's rules. This book also focuses on how different technologies have revolutionized gaming and animation with various illustrations.

Feminist Confrontations in Digital Culture

Artificial Intelligence for Computer Games

Artificial Intelligence in Games

Artificial Intelligence and Games

Programming Artificial Intelligence with C#

AI and Artificial Life in Video Games

Game AI Pro3: Collected Wisdom of Game AI Professionals presents state-of-the-art tips, tricks, and techniques drawn from developers of shipped commercial games as well as some of the best-known academics in the field. This book acts as a toolbox of proven techniques coupled with the newest advances in game AI. These techniques can be applied to almost any game and include topics such as behavior trees, utility theory, path planning, character behavior, and tactical reasoning. KEY FEATURES Contains 42 chapters from 50 of the game industry's top developers and researchers. Provides real-life case studies of game AI in published commercial games. Covers a wide range of AI in games, with topics applicable to almost any game. Includes downloadable demos and/or source code, available at http://www.gameaipro.com SECTION EDITORS Neil Kirby General Wisdom Alex Champandard Architecture Nathan Sturtevant Movement and Pathfinding Damian Isla Character Behavior Kevin Dill Tactics and Strategy; Odds and Ends

Complicating perspectives on diversity in video games Gamers have been troublemakers as long as games have existed. As our popular understanding of "gamer" shifts beyond its historical construction as a white, straight, adolescent, cisgender male, the troubles that emerge both confirm and challenge our understanding of identity politics. In Gamer Trouble, Amanda Phillips excavates the turbulent relationships between surface and depth in contemporary gaming culture, taking readers under the hood of the mechanisms of video games in order to understand the ways that difference gets baked into its technological, ludic, ideological, and social systems. By centering the insights of queer and women of color feminisms in readings of online harassment campaigns, industry animation practices, and popular video games like Portal and Mass

Effect, Phillips adds essential analytical tools to our conversations about video games. She embraces the trouble that attends disciplinary crossroads, linking the violent hate speech of trolls and the representational practices marginalizing people of color, women, and queers in entertainment media to the dehumanizing logic undergirding computation and the optimization strategies of gameplay. From the microcosmic level of electricity and flicks of a thumb to the grand stages of identity politics and global capitalism, wherever gamers find themselves, gamer trouble follows. As reinvigorated forms of racism, sexism, and homophobia thrive in games and gaming communities, Phillips follows the lead of those who have been making good trouble all along, agitating for a better world.

Game theory is the mathematical study of interaction among independent, self-interested agents. The audience for game theory has grown dramatically in recent years, and now spans disciplines as diverse as political science, biology, psychology, economics, linguistics, sociology, and computer science, among others. What has been missing is a relatively short introduction to the field covering the common basis that anyone with a professional interest in game theory is likely to require. Such a text would minimize notation, ruthlessly focus on essentials, and yet not sacrifice rigor. This Synthesis Lecture aims to fill this gap by providing a concise and accessible introduction to the field. It covers the main classes of games, their representations, and the main concepts used to analyze them.

In this textbook the author takes as inspiration recent breakthroughs in game playing to explain how and why deep reinforcement learning works. In particular he shows why two-person games of tactics and strategy fascinate scientists, programmers, and game enthusiasts and unite them in a common goal: to create artificial intelligence (AI). After an introduction to the core concepts, environment, and communities of intelligence and games, the book is organized into chapters on reinforcement learning, heuristic planning, adaptive sampling, function approximation, and self-play. The author takes a hands-on approach throughout, with Python code examples and exercises that help the reader understand how AI learns to play. He also supports the main text with detailed pointers to online machine learning frameworks, technical details for AlphaGo, notes on how to play and program Go and chess, and a comprehensive bibliography. The content is class-tested and suitable for advanced undergraduate and graduate courses on artificial intelligence and games. It's also appropriate for self-study by professionals engaged with applications of machine learning and with games development. Finally it's valuable for any reader engaged with the philosophical implications of artificial and general intelligence, games represent a modern Turing test of the power and limitations of AI.

Artificial Intelligence and Machine Learning Fundamentals

Gaming AI

Virtuous Robots for Virtual Games

On Games, Intelligence, and Artificial Intelligence

Practical Game AI Programming

Jump into the world of Game AI development About This Book Move beyond using libraries to create smart game AI, and create your own AI projects from scratch Implement the latest algorithms for AI development and in-game interaction Customize your existing game AI and make it better and more efficient to improve your overall game performance Who This Book Is For This book is for game developers with a basic knowledge of game development techniques and some basic programming techniques in C# or C++. What You Will Learn Get to know the basics of how to create different AI for different type of games Know what to do when something interferes with the AI choices and how the AI should behave if that happens Plan the interaction between the AI character and the environment using Smart Zones or Triggering Events Use animations correctly, blending one animation into another and rather than stopping one animation and starting another Calculate the best options for the AI to move using Pruning Strategies, Wall Distances, Map Preprocess Implementation, and Forced Neighbours Create Theta algorithms to the AI to find short and realistic looking paths Add many characters into the same scene and make them behave like a realistic crowd In Detail The book starts with the basics examples of AI for different game genres and directly jumps into defining the probabilities and possibilities of the AI character to determine character movement. Next, you'll learn how AI characters should behave within the environment created. Moving on, you'll explore how to work with animations. You'll also plan and create pruning strategies, and create Theta algorithms to find short and realistic looking game paths. Next, you'll learn how the AI should behave when there is a lot of characters in the same scene. You'll explore which methods and algorithms, such as possibility maps, Forward Chaining Plan, Rete Algorithm, Pruning Strategies, Wall Distances, and Map Preprocess Implementation should be used on different occasions. You'll discover how to overcome some limitations, and how to deliver a better experience to the player. By the end of the book, you think differently about AI. Style and approach The book has a step-by-step tutorial style approach. The algorithms are explained by implementing them in #.

A definitive overview of a variety of popular AI techniques for game development takes experienced programmers through the entire design process, explaining how to create autonomous synthetic creatures and their unique abilities and skills and covering such topics as fuzzy logic, genetic algorithms, weapon selection, adaptive strategies, and more. Original. (Advanced)

"Course technology Cengage learning"--Cover.

This book covers all the necessary topics that a professional game AI programmer needs to know, from math and steering behaviours to terrain analysis, pathfinding and decision-making. Written to be easily accessible, each topic is accompanied by an example game that allows the reader to add their own code to see the effects their changes have. Each chapter is split into two parts. The first part covers the necessary theory in a friendly, conversational manner, using visual examples and fictional game scenarios to give additional context. The second part is a coding tutorial in C# for the topic at hand. Each chapter has its own example game available to download, written in C# in the Unity Game Engine. This book will be suitable for students and aspiring games programmers looking to gain a grounding in game AI techniques.

AI Game Development

Collected Wisdom of Game AI Professionals

Behavioral Mathematics for Game AI

Beginning Game AI with Unity

Deep Learning in Gaming and Animations

Markov Decision Processes in Artificial Intelligence

A new vision of the future of games and game design, enabled by AI. Can games measure intelligence? How will artificial intelligence inform games of the future? In Playing Smart, Julian Togelius explores the connections between games and intelligence to offer a new vision of future games and game design. Video games already depend on AI. We use games to test AI algorithms, challenge our thinking, and better understand both natural and artificial intelligence. In the future, Togelius argues, game designers will be able to create smarter games that make us smarter in turn, applying advanced AI to help design games. In this book, he tells us how. Games are the past, present, and future of artificial intelligence. In 1948, Alan Turing, one of the founding fathers of computer science and artificial intelligence, handwrote a program for chess. Today we have IBM's Deep Blue and DeepMind's AlphaGo, and huge efforts go into developing AI that can play such arcade games as Pac-Man. Programmers continue to use games to test and develop AI, creating new benchmarks for AI while also challenging human assumptions and cognitive abilities. Game design is at heart a cognitive science, Togelius reminds us—when we play or design a game, we plan, think spatially, make predictions, move, and assess ourselves and our performance. By studying how we play and design games, Togelius writes, we can better understand how humans and machines think. AI can do more for game design than providing a skillful opponent. We can harness it to build game-playing and game-designing AI agents, enabling a new generation of AI-augmented games. With AI, we can explore new frontiers in learning and play.

Game developers will use this book to gain a basic knowledge of programming artificial intelligence using Unity and C#. You will not be bored learning the theory underpinning AI. Instead, you will learn by experience and practice, and complete an engaging project in each chapter. AI is the one of the most popular subjects in gaming today, ranging from controlling the behavior of non-player characters to procedural generated levels. This book starts with an introduction to AI and its use in games. Basic moving behaviors and pathfinding are covered, and then you move through more complex concepts of pathfinding and decision making. What You Will Learn Understand the fundamentals of AI Create gameplay-based AI to address navigation and decision-making problems Put into practice graph theory and behavior models Address pathfinding problems Use the A* algorithm, the deus ex machina of pathfinding algorithms Create a mini stealth game Who This Book Is For Developers and programming enthusiasts with a basic knowledge of Unity and C# who want to understand and master the foundations of artificial intelligence in games

Learn to make games that are more fun and engaging! Building on fundamental principles of Artificial Intelligence, Funge explains how to create Non-Player Characters (NPCs) with progressively more sophisticated capabilities. Starting with the basic capability of acting in the game world, the book explains how to develop NPCs who can perceive, remember what they perceive, and then continue in the game play to think about the effects of possible actions, and finally learn from their experience. Funge considers the system architecture and explains how to implement potential behaviors (both reactive and deliberate) for intelligent and responsive NPCs allowing for games that are more fun and engaging. Emphasizing enduring design principles, Funge covers the basics of Game AI and provides a clear, easy to read introduction that beginning programmers and game designers will enjoy.

Markov Decision Processes (MDPs) are a mathematical framework for modeling sequential decision problems under uncertainty as well as Reinforcement Learning problems. Written by experts in the field, this book provides a global view of current research using MDPs in Artificial Intelligence. It starts with an introductory presentation of the fundamental aspects of MDPs (planning in MDPs, Reinforcement Learning, Partially Observable MDPs, Markov games and the use of non-classical criteria). Then it presents more advanced research trends in the domain and gives some concrete examples using illustrative applications.

Synthetic Creatures with Learning and Reactive Behaviors

Programming Game AI by Example

Essentials of Game Theory

Gamer Trouble

Learning to Play

Develop real-world applications powered by the latest AI advances

Artificial Intelligence for GamesCRC Press

The book presents some of the most relevant results from academia in the area of Artificial Intelligence for games. It emphasizes well theoretically supported work supported by developed prototypes, which should lead into integration of academic AI techniques into current electronic entertainment games. The book elaborates on the main results produced in Academia within the last 10 years regarding all aspects of Artificial Intelligence for games, including pathfinding, decision making, and learning. A general theme of the book is the coverage of techniques for facilitating the construction of flexible not prescripted AI for agents in games. Regarding pathfinding, the book includes new techniques for implementing real-time search methods that improve the results obtained through AI, as well as techniques for learning pathfinding behavior by observing actual players. Regarding decision making, the book describes new techniques for authoring tools that facilitate the construction by game designers (typically nonprogrammers) of behavior controlling software, by reusing patterns or actual cases of past behavior. Additionally, the book will cover a number of approaches proposed for extending the essentially pre-scripted nature of current commercial videogames AI into a more interactive form of narrative, where the story emerges from the interaction with the player. Some of those approaches rely on a layered architecture for the character AI, including beliefs, intentions and emotions, taking ideas from research on agent systems. The book also includes chapters on techniques for automatically or semiautomatically learning complex behavior from recorded traces of human or automatic players using different combinations of reinforcement learning, case-based reasoning, neural networks and genetic algorithms.

This book brings together papers presented at the International Conference on Artificial Intelligence in China (ChinaAI) 2019, which provided a venue for disseminating the latest advances and discussing the interactions and links between the various subfields of AI. Addressing topics that cover virtually all aspects of AI and the latest developments in China, the book is chiefly intended for undergraduate and graduate students in Electrical Engineering, Computer Science, and Mathematics, for researchers and engineers from academia and industry, and for government employees (e.g. at the NSF, DOD, and DOE).

Written for the novice AI programmer, this text introduces the reader to techniques such as finite state machines, fuzzy logic, neural networks and many others in an easy-to-understand language, supported with code samples throughout the text.

Artificial Intelligence for Games

Everything you want to know about Game AI using Blueprints or C++

Artificial Intelligence in China

Search in Artificial Intelligence

Deep Learning and the Game of Go

A Concise Multidisciplinary Introduction

Learn to build intelligent and responsive Non-Player Characters for your games with Unreal Engine Game AI. Key Features Understand the built-in AI systems in Unreal Engine for building intelligent games Leverage the power of Unreal Engine 4 programming to create game AI that focuses on motion, animation, and tactics Learn to profile, visualize, and debug your Game AI for checking logic and optimizing performance Book Description Learning how to apply artificial intelligence (AI) is crucial and can take the fun factor to the next level, whether you're developing a traditional, educational, or any other kind of game. If you want to use AI to extend the life of your games and make them challenging and more interesting, this book is for you. The book starts by breaking down AI into simple concepts to get a fundamental understanding of it. Using a variety of examples, you will work through actual implementations designed to highlight key concepts and features related to game AI in UE4. You will learn to work through the built-in AI framework in order to build believable characters for every game genre (including RPG, Strategic, Platform, FPS, Simulation, Arcade, and Educational). You will learn to configure the Navigation, Environmental Querying, and Perception systems for your AI agents and couple these with Behavior Trees, all accompanied with practical examples. You will also explore how the engine handles dynamic crowds. In the concluding chapters, you will learn how to profile, visualize, and debug your AI systems to correct the AI logic and increase performance. By the end of the book, your AI knowledge of the built-in AI system in Unreal will be deep and comprehensive, allowing you to build powerful AI agents within your projects. What you will learn Get an in-depth knowledge about all the AI Systems within Unreal Engine Create complex AIs, understanding the art of designing and developing Behavior Tree Learn how to perform Environmental Queries (EQS) Master the Navigation, Perception, and Crowd Systems Profile and Visualize the AI Systems with powerful debugging tools Extend every AI and Debug system with custom nodes and functions Who this book is for Hands-On Artificial Intelligence with Unreal Engine is for you if you are a game developer with a bit experience in Unreal Engine, and now want to understand and implement believable game AI within Unreal Engine. The book will be both in Blueprint and C++, allowing people from every background to enjoy the book. Whether you're looking to build your first game or expand your knowledge to the edge as a Game AI Programmer, you will find plenty of exciting information and examples of game AI in terms of concepts and implementation, including how to extend some of these systems.

AI is an integral part of every video game. This book helps professionals keep up with the constantly evolving technological advances in the fast growing game industry and equips students with up-to-date information they need to jumpstart their careers. This revised and updated Third Edition includes new techniques, algorithms, data structures and representations needed to create powerful AI in games. Key Features A comprehensive professional tutorial and reference to implement true AI in games Includes new exercises so readers can test their comprehension and understanding of the concepts and practices presented Revised and updated to cover new techniques and advances in AI Walks the reader through the entire game AI development process

Human behavior is never an exact science, making the design and programming of artificial intelligence that seeks to replicate human behavior difficult. Usually, the answers cannot be found in sterile algorithms that are often the focus of artificial intelligence programming. However, by analyzing why people behave the way we do, we can break down the process into increasingly smaller components. We can model many of those individual components in the language of logic and mathematics and then reassemble them into larger, more involved decision-making processes. Drawing from classical game theory, "Behavioral Mathematics for Game AI" covers both the psychological foundations of human decisions and the mathematical modeling techniques that AI designers and programmers can use to replicate them. With examples from both real life and game situations, you'll explore topics such as utility, the fallacy of rational behavior, and the inconsistencies and contradictions that human behavior often exhibits. You'll examine various ways of using statistics, formulas, and algorithms to create believable simulations and to model these dynamic, realistic, and interesting behaviors in video games. Finally, you'll be introduced to a number of tools you can use in conjunction with standard AI algorithms to make it easier to utilize the mathematical models.

This is the first textbook dedicated to explaining how artificial intelligence (AI) techniques can be used in and for games. After introductory chapters that explain the background and key techniques in AI and games, the authors explain how to use AI to play games, to generate content for games and to model players. The book will be suitable for undergraduate and graduate courses in games, artificial intelligence, design, human-computer interaction, and computational intelligence, and also for self-study by industrial game developers and practitioners. The authors have developed a website (http://www.gameaibook.org) that complements the material covered in the book with up-to-date exercises, lecture slides and reading.

Emotion in Games

Playing Smart

Principles and Applications

Creating robust artificial intelligence is one of the greatest challenges for game developers, yet the commercial success of a game is often dependent upon the quality of the AI. In this book, Ian Millington brings extensive professional experience to the problem of improving the quality of AI in games. He describes numerous examples from real games and explores the underlying ideas through detailed case studies. He goes further to introduce many techniques little used by developers today. The book's associated web site contains a library of C++ source code and demonstration programs, and a complete commercial source code library of AI algorithms and techniques. "Artificial Intelligence for Games - 2nd edition" will be highly useful to academics teaching courses on game AI, in that it includes exercises with each chapter. It will also include new and expanded coverage of the following: AI-oriented gameplay; Behavior driven AI; Casual games (puzzle games). Key Features * The first comprehensive, professional tutorial and reference to implement true AI in games written by an engineer with extensive industry experience. * Walks through the entire development process from beginning to end. * Includes examples from over 100 real games, 10 in-depth case studies, and web site with sample code.

Pointing to the triumph of artificial intelligence over unaided humans in everything from games such as chess and Go to vital tasks such as protein folding and securities trading, many experts uphold the theory of a "singularity." This is the trigger point when human history ends and artificial intelligence prevails in an exponential cascade of self-replicating machines rocketing toward godlike supremacy in the universe. Gaming AI suggests that this belief is both dumb and self-defeating. Displaying a profound and crippling case of professional amnesia, the computer science establishment shows an ignorance of the most important findings of its own science, from Kurt Gö del's "incompleteness" to Alan Turing's "oracle" to Claude Shannon's "entropy." Dabbling in quantum machines, these believers in machine transcendence defy the deepest findings of quantum theory. Claiming to create minds, they are clinically "out of their minds." Despite the quasi-religious pretensions of techno-elites nobly saving the planet from their own devices, their faith in a techno-utopian singularity is a serious threat to real progress. An industry utterly dependent on human minds will not prosper by obsoleting both their customers and their creators. Gaming AI calls for a remedial immersion in the industry's own heroic history and an understanding of the actual science of their own human minds.