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Deep and Reinforcement Learning

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Editors Book Series ID: IIPER1688111298

Iterative International Publishers
Novi, Michigan, USA
Chikkamagaluru, Karnataka, India

Imprint IIP
Registered publisher under Raja Rammohun Roy Agency, Government of India and also under Bowker My identifiers agency, USA

Important dates:
Chapter/paper submission starts on: 31/09/2024
Last date for chapter/paper submission: 31/11/2024
Acceptance notification:31/1/2025
Last date for registration:30/11/2024

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Call for Chapters

Deep and Reinforcement Learning

Aims and Scope:

This book, titled "Deep and Reinforcement Learning" aims to provide an in-depth understanding of the foundational concepts and advanced techniques in the fields of deep learning and reinforcement learning. Designed to align with the RGPV University syllabus, the book seeks to bridge the gap between theoretical principles and practical applications, making it an invaluable resource for students, educators, and practitioners. By offering clear explanations, real-world examples, the book aspires to equip readers with the skills necessary to develop and implement sophisticated machine learning models, thereby preparing them for the challenges of the rapidly evolving technology landscape.The scope of this book encompasses a broad range of topics essential to mastering deep and reinforcement learning. It covers fundamental concepts such as neural networks, backpropagation, and gradient descent, as well as more advanced subjects like convolutional neural networks, recurrent neural networks, and generative adversarial networks. Additionally, the book delves into the principles of reinforcement learning, including Markov decision processes, policy gradients, and Q-learning. By integrating these topics with practical coding examples and case studies, the book provides a comprehensive learning experience. It is designed to be accessible to beginners while also offering depth and complexity for more advanced learners, ensuring that it serves as a complete reference for anyone studying or working in the field of machine learning.

List of Topics:

Chapter 1: History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Activation functions, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalue Decomposition. Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs, Encoder Decoder Models, Attention Mechanism, Attention overimages.

- Chapter 2: Autoencoders and relation to PCA, Regularization in autoencoders, Denoisingautoencoders, Sparse autoencoders, Contractive autoencoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Batch Normalization, Instance Normalization, Group Normalization.

- Chapter 3: Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Learning Vectorial Representations Of Words, Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Recent Trends in Deep Learning Architectures.

- Chapter 4: Introduction to reinforcement learning(RL), Bandit algorithms – UCB, PAC,Median Elimination, Policy Gradient, Full RL & MDPs, Bellman Optimality, Dynamic Programming - Value iteration, Policy iteration, and Q-learning & Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces, Function Approximation, Least Squares Methods

- Chapter 5: Fitted Q, Deep Q-Learning , Advanced Q-learning algorithms , Learning policies by imitating optimal controllers , DQN & Policy Gradient, Policy Gradient Algorithms for Full RL, Hierarchical RL,POMDPs, Actor-Critic Method, Inverse reinforcement learning, Maximum Entropy Deep Inverse Reinforcement Learning, Generative Adversarial Imitation Learning,Recent Trends in RL Architectures.

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