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Titolo	Deep Neural Evolution [[electronic resource]] : Deep Learning with Evolutionary Computation / / edited by Hitoshi Iba, Nasimul Noman
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Chapter 1: Evolutionary Computation and meta-heuristics -- Chapter 2: A Shallow Introduction to Deep Neural Networks -- Chapter 3: On the Assessment of Nature-Inspired Meta-Heuristic Optimization Techniques to Fine-Tune Deep Belief Networks -- Chapter 4: Automated development of DNN based spoken language systems using evolutionary algorithms -- Chapter 5: Search heuristics for the optimization of DBN for Time Series Forecasting -- Chapter 6: Particle Swarm Optimisation for Evolving Deep Convolutional Neural Networks for Image Classification: Single- and Multi-objective Approaches -- Chapter 7: Designing Convolutional Neural Network Architectures Using Cartesian Genetic Programming -- Chapter 8: Fast Evolution of CNN Architecture for Image Classificaiton -- Chapter 9: Discovering Gated Recurrent Neural Network Architectures -- Chapter 10: Investigating Deep Recurrent Connections and Recurrent Memory Cells Using Neuro-Evolution -- Chapter 11: Neuroevolution of Generative Adversarial Networks -- Chapter 12: Evolving deep neural networks for X-ray based detection of dangerous objects -- Chapter 13: Evolving the architecture and hyperparameters of DNNs for malware detection -- Chapter 14: Data Dieting in GAN Training -- Chapter 15: One-Pixel Attack: Understanding and Improving Deep Neural Networks with Evolutionary Computation.

Sommario/riassunto

This book delivers the state of the art in deep learning (DL) methods hybridized with evolutionary computation (EC). Over the last decade, DL has dramatically reformed many domains: computer vision, speech recognition, healthcare, and automatic game playing, to mention only a few. All DL models, using different architectures and algorithms, utilize multiple processing layers for extracting a hierarchy of abstractions of data. Their remarkable successes notwithstanding, these powerful models are facing many challenges, and this book presents the collaborative efforts by researchers in EC to solve some of the problems in DL. EC comprises optimization techniques that are useful when problems are complex or poorly understood, or insufficient information about the problem domain is available. This family of algorithms has proven effective in solving problems with challenging characteristics such as non-convexity, non-linearity, noise, and irregularity, which dampen the performance of most classic optimization schemes. Furthermore, EC has been extensively and successfully applied in artificial neural network (ANN) research —from parameter estimation to structure optimization. Consequently, EC researchers are enthusiastic about applying their arsenal for the design and optimization of deep neural networks (DNN). This book brings together the recent progress in DL research where the focus is particularly on three sub-domains that integrate EC with DL: (1) EC for hyper-parameter optimization in DNN; (2) EC for DNN architecture design; and (3) Deep neuroevolution. The book also presents interesting applications of DL with EC in real-world problems, e.g., malware classification and object detection. Additionally, it covers recent applications of EC in DL, e.g. generative adversarial networks (GAN) training and adversarial attacks. The book aims to prompt and facilitate the research in DL with EC both in theory and in practice.