Lecture 5 Feedforward Stanford University

The eight-volume set comprising LNCS volumes 9905-9912 constitutes the refereed proceedings of the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016. The 415 revised papers presented were carefully reviewed and selected from 1480 submissions. The papers cover all aspects of computer vision and pattern recognition such as 3D computer vision; computational photography, sensing and display; face and gesture; low-level vision and image processing; motion and tracking; optimization methods; physics-based vision, photometry and shape-from-X; recognition: detection, categorization, indexing, matching; segmentation, grouping and shape representation; statistical methods and learning; video: events, activities and surveillance; applications. They are organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; learning; action activity and tracking; 3D; and 9 poster sessions.

This open access book presents the first comprehensive overview of general methods in Automated Machine Learning (AutoML), collects descriptions of existing systems based on these methods, and discusses the first series of international challenges of AutoML systems. The recent success of commercial ML applications and the rapid growth of the field has created a high demand for off-the-shelf ML methods that can be used easily and without expert knowledge. However, many of the recent machine learning successes crucially rely on human experts, who manually select appropriate ML architectures (deep learning architectures or more traditional ML workflows) and their hyperparameters. To overcome this problem, the field of AutoML targets a progressive automation of machine learning, based on principles from optimization and machine learning itself. This book serves as a point of entry into this quickly-developing field for researchers and advanced students alike, as well as providing a reference for practitioners aiming to use AutoML in their work. Discover foundational and advanced techniques in quantitative equity trading from a veteran insider In Quantitative Portfolio Management: The Art and Science of

Statistical Arbitrage, distinguished physicist-turned-quant Dr. Michael Isichenko delivers a systematic review of the quantitative trading of equities, or statistical arbitrage. The book teaches you how to source financial data, learn patterns of asset returns from historical data, generate and combine multiple forecasts, manage risk, build a stock portfolio optimized for risk and trading costs, and execute trades. In this important book, you'll discover: Machine learning methods of forecasting stock returns in efficient financial markets How to combine multiple forecasts into a single model by using secondary machine learning, dimensionality reduction, and other methods Ways of avoiding the pitfalls of overfitting and the curse of dimensionality, including topics of active research such as "benign overfitting" in machine learning The theoretical and practical aspects of portfolio construction, including multi-factor risk models, multi-period trading costs, and optimal leverage Perfect for investment professionals, like quantitative traders and portfolio managers, Quantitative Portfolio Management will also earn a place in the libraries of data scientists and students in a variety of statistical and quantitative disciplines. It is an indispensable

guide for anyone who hopes to improve their understanding of how to apply data science, machine learning, and optimization to the stock market.

Signal Processing for Active Control sets out the signal processing and automatic control techniques that are used in the analysis and implementation of active systems for the control of sound and vibration. After reviewing the performance limitations introduced by physical aspects of active control, Stephen Elliott presents the calculation of the optimal performance and the implementation of adaptive real time controllers for a wide variety of active control systems. Active sound and vibration control are technologically important problems with many applications. 'Active control' means controlling disturbance by superimposing a second disturbance on the original source of disturbance. Put simply, initial noise + other specially-generated noise or vibration = silence [or controlled noise]. This book presents a unified approach to techniques that are used in the analysis and implementation of different control systems. It includes practical examples at the end of each chapter to illustrate the use of various approaches. This book is intended for

researchers, engineers, and students in the field of acoustics, active control, signal processing, and electrical engineering.
Intelligent Computing Techniques for Smart Energy Systems
International Summer School on Neural Networks, "E.R. Caianiello", Vietri Sul Mare, Salerno, Italy, September 6-13, 1997, Tutorial Lectures
Lectures on Wiener and Kalman Filtering
1971 NRL—MRC Conference
Discovery Science
Neural Computation
Proceedings of the European Computing Conference

Ordinary Differential Equations: 1971 NRL–MRC Conference provides information pertinent to the fundamental aspects of ordinary differential equations. This book covers a variety of topics, including geometric and qualitative theory, analytic theory, functional differential equation, dynamical systems, and algebraic theory. Organized into two parts encompassing 51 chapters, this book begins with an overview of the results on the existence of periodic solutions of a differential equation. This text then describes an index for the isolated invariant sets of a flow on a compact metric space, which contains exactly the information of the Morse index. Other chapters consider the studies of certain classes of equations that can be interpreted as models of biological

or economic processes. This book discusses as well the absolute stability of some classes of integro-differential systems. The final chapter deals with first-order differential equations. This book is a valuable resource for mathematicians, graduate students, and research workers.

This book constitutes the proceedings of the 20th International Conference on Discovery Science, DS 2017, held in Kyoto, Japan, in October 2017, co-located with the International Conference on Algorithmic Learning Theory, ALT 2017. The 18 revised full papers presented together with 6 short papers and 2 invited talks in this volume were carefully reviewed and selected from 42 submissions. The scope of the conference includes the development and analysis of methods for discovering scientific knowledge, coming from machine learning, data mining, intelligent data analysis, big data analysis as well as their application in various scientific domains. The papers are organized in topical sections on machine learning: online learning, regression, label classification, deep learning, feature selection, recommendation system; and knowledge discovery: recommendation system, community detection, pattern mining, misc.

This book gathers the proceedings of the Sixth International Conference on Computational Science and Technology 2019 (ICCST2019), held in Kota Kinabalu, Malaysia, on 29–30 August 2019. The respective contributions offer practitioners and researchers a range of new computational techniques and solutions, identify

emerging issues, and outline future research directions,
while also showing them how to apply the latest large-
scale, high-performance computational methods.
The proceedings set LNCS 12891, LNCS 12892, LNCS
12893, LNCS 12894 and LNCS 12895 constitute the
proceedings of the 30th International Conference on
Artificial Neural Networks, ICANN 2021, held in
Bratislava, Slovakia, in September 2021.* The total of 265
full papers presented in these proceedings was carefully
reviewed and selected from 496 submissions, and
organized in 5 volumes. In this volume, the papers focus
on topics such as model compression, multi-task and multi-
label learning, neural network theory, normalization and
regularization methods, person re-identification,
recurrent neural networks, and reinforcement learning.
*The conference was held online 2021 due to the
COVID-19 pandemic.
Quantitative Portfolio Management
Genetic Programming III
Speech & Language Processing
Darwinian Invention and Problem Solving
Feedback Systems
Intelligent Speech Signal Processing
Automated Machine Learning
Intelligent Systems can be defined as systems whose
design, mainly based on computational techniques, is
supported, in some parts, by operations and processing
skills inspired by human reasoning and behaviour.
Intelligent Systems must typically operate in a scenario

in which non-linearities are the rule and not as a disturbing effect to be corrected. Finally, Intelligent Systems also have to incorporate advanced sensory technology in order to simplify man-machine interactions. Several algorithms are currently the ordinary tools of Intelligent Systems. This book contains a selection of contributions regarding Intelligent Systems by experts in diverse fields. Topics discussed in the book are: Applications of Intelligent Systems in Modelling and Prediction of Environmental Changes, Cellular Neural Networks for NonLinear Filtering, NNs for Signal Processing, Image Processing, Transportation Intelligent Systems, Intelligent Techniques in Power Electronics, Applications in Medicine and Surgery, Hardware Implementation and Learning of NNs. The essential introduction to the principles and applications of feedback systems—now fully revised and expanded This textbook covers the mathematics needed to model, analyze, and design feedback systems. Now more user-friendly than ever, this revised and expanded edition of Feedback Systems is a one-volume resource for students and researchers in mathematics and engineering. It has applications across a range of disciplines that utilize feedback in physical, biological, information, and economic systems. Karl Åström and Richard Murray use techniques from physics, computer science, and operations research to introduce control-oriented modeling. They begin with state space tools for analysis and design, including stability of solutions, Lyapunov functions, reachability, state feedback

observability, and estimators. The matrix exponential plays a central role in the analysis of linear control systems, allowing a concise development of many of the key concepts for this class of models. Åström and Murray then develop and explain tools in the frequency domain, including transfer functions, Nyquist analysis, PID control, frequency domain design, and robustness. Features a new chapter on design principles and tools, illustrating the types of problems that can be solved using feedback Includes a new chapter on fundamental limits and new material on the Routh-Hurwitz criterion and root locus plots Provides exercises at the end of every chapter Comes with an electronic solutions manual An ideal textbook for undergraduate and graduate students Indispensable for researchers seeking a self-contained resource on control theory Dependency-based methods for syntactic parsing have become increasingly popular in natural language processing in recent years. This book gives a thorough introduction to the methods that are most widely used today. After an introduction to dependency grammar and dependency parsing, followed by a formal characterization of the dependency parsing problem, the book surveys the three major classes of parsing models that are in current use: transition-based, graph-based, and grammar-based models. It continues with a chapter on evaluation and one on the comparison of different methods, and it closes with a few words on current trends and future prospects of dependency parsing. The book presupposes a knowledge of basic concepts in linguistics and computer science, as well as

some knowledge of parsing methods for constituency-based representations. Table of Contents: Introduction / Dependency Parsing / Transition-Based Parsing / Graph-Based Parsing / Grammar-Based Parsing / Evaluation / Comparison / Final Thoughts

The book compiles the research works related to smart solutions concept in context to smart energy systems, maintaining electrical grid discipline and resiliency, computational collective intelligence consisted of interaction between smart devices, smart environments and smart interactions, as well as information technology support for such areas. It includes high-quality papers presented in the International Conference on Intelligent Computing Techniques for Smart Energy Systems organized by Manipal University Jaipur. This book will motivate scholars to work in these areas. The book also prophesies their approach to be used for the business and the humanitarian technology development as research proposal to various government organizations for funding approval.

Decision Forests for Computer Vision and Medical Image Analysis

Neural Nets

Introduction to Applied Linear Algebra

Proceedings of ICTSES 2018

Future Data and Security Engineering

13th Italian Workshop on Neural Nets, WIRN VIETRI 2002, Vietri sul Mare, Italy, May 30-June 1, 2002. Revised Papers

Introduction to Deep Learning

This book constitutes the proceedings of the 15th IFIP TC8 International Conference on Computer Information Systems and Industrial Management, CISIM 2016, held in Vilnius, Lithuania, in September 2016. The 63 regular papers presented together with 1 inivted paper and 5 keynotes in this volume were carefully reviewed and selected from about 89 submissions. The main topics covered are rough set methods for big data analytics; images, visualization, classification; optimization, tuning; scheduling in manufacturing and other applications; algorithms; decisions; intelligent distributed systems; and biometrics, identification, security.

The Handbook of Neural Computation is a practical, hands-on guide to the design and implementation of neural networks used by scientists and engineers to tackle difficult and/or time-consuming problems. The handbook bridges an information pathway between scientists and engineers in different disciplines who apply neural networks to similar probl

The presentation of a novel theory in orthogonal regression The literature about neural-based algorithms is often dedicatedto principal component analysis (PCA) and considers minor componentanalysis (MCA) a mere consequence. Breaking the mold,Neural-Based Orthogonal Data Fitting is the first book tostart with the MCA problem and arrive at important conclusionsabout the PCA problem. The book proposes several neural networks, all endowed with acomplete theory that not only explains their behavior, but alsocompares them with the existing neural and traditional algorithms.EXIN neurons, which are of the authors' invention, are

introduced,explained, and analyzed. Further, it studies the algorithms as adifferential geometry problem, a dynamic problem, a stochasticproblem, and a numerical problem. It demonstrates the novel aspectsof its main theory, including its applications in computer visionand linear system identification. The book shows both thederivation of the TLS EXIN from the MCA EXIN and the originalderivation, as well as: Shows TLS problems and gives a sketch of their history andapplications Presents MCA EXIN and compares it with the other existingapproaches Introduces the TLS EXIN neuron and the SCG and BFGS accelerationtechniques and compares them with TLS GAO Outlines the GeTLS EXIN theory for generalizing and unifying theregression problems Establishes the GeMCA theory, starting with the identificationof GeTLS EXIN as a generalization eigenvalue problem In dealing with mathematical and numerical aspects of EXINneurons, the book is mainly theoretical. All the algorithms,however, have been used in analyzing real-time problems and showaccurate solutions. Neural-Based Orthogonal Data Fitting isuseful for statisticians, applied mathematics experts, andengineers.

This volume focuses on recursion and reveals a host of new theoretical arguments, philosophical perspectives, formal representations and empirical evidence from parsing, acquisition and computer models, highlighting its central role in modern science. Noam Chomsky, whose work introduced recursion to linguistics and cognitive science and other leading researchers in the fields of philosophy, semantics, computer science and

psycholinguistics in showing the profound reach of this concept into modern science. Recursion has been at the heart of generative grammar from the outset. Recent work in minimalism has put it at center-stage with a wide range of consequences across the intellectual landscape. The contributor to this volume both advance the field and provide a cross-sectional view of the place that recursion takes in modern science.

Artificial Neural Networks-Icann '97

A Textbook

Build Intelligent Language Applications Using Deep Learning

Computer Information Systems and Industrial Management

Artificial Neural Networks and Machine Learning – ICANN 2021

Neural Networks and Deep Learning

6th International Conference, FDSE 2019, Nha Trang City, Vietnam, November 27–29, 2019, Proceedings

The development of "intelligent" systems that can take decisions and perform autonomously might lead to faster and more consistent decisions. A limiting factor for a broader adoption of AI technology is the inherent risks that come with giving up human control and oversight to "intelligent" machines. For sensitive tasks involving critical infrastructures and affecting human well-being or health, it is crucial to limit the possibility of improper, non-robust and unsafe decisions and actions. Before deploying an AI system, we see a strong need to validate its behavior, and thus establish guarantees that it will continue to perform as expected when deployed in a real-world environment. In pursuit of that objective, ways for humans to verify the agreement between the AI decision structure and

their own ground-truth knowledge have been explored. Explainable AI (XAI) has developed as a subfield of AI, focused on exposing complex AI models to humans in a systematic and interpretable manner. The 22 chapters included in this book provide a timely snapshot of algorithms, theory, and applications of interpretable and explainable AI and AI techniques that have been proposed recently reflecting the current discourse in this field and providing directions of future development. The book is organized in six parts: towards AI transparency; methods for interpreting AI systems; explaining the decisions of AI systems; evaluating interpretability and explanations; applications of explainable AI; and software for explainable AI.

This book constitutes the proceedings of the 6th International Conference on Future Data and Security Engineering, FDSE 2019, held in Nha Trang City, Vietnam, in November 2019. The 38 full papers and 14 short papers presented together with 2 papers of keynote speeches were carefully reviewed and selected from 159 submissions. The selected papers are organized into the following topical headings: Invited Keynotes, Advanced Studies in Machine Learning, Advances in Query Processing and Optimization, Big Data Analytics and Distributed Systems, Deep Learning and Applications, Cloud Data Management and Infrastructure, Security and Privacy Engineering, Authentication and Access Control, Blockchain and Cybersecurity, Emerging Data Management Systems and Applications, Short papers: Security and Data Engineering. This internationally authored volume presents major findings, concepts, and methods of behavioral neuroscience coordinated with their simulation via neural networks. A central theme is that biobehaviorally constrained simulations provide a rigorous means to explore the implications of relatively simple processes for the understanding of cognition (complex behavior). Neural networks are held to serve the same function for behavioral

neuroscience as population genetics for evolutionary science. The volume is divided into six sections, each of which includes both experimental and simulation research: (1) neurodevelopment and genetic algorithms, (2) synaptic plasticity (LTP), (3) sensory/hippocampal systems, (4) motor systems, (5) plasticity in large neural systems (reinforcement learning), and (6) neural imaging and language. The volume also includes an integrated reference section and a comprehensive index.

This practical and easy-to-follow text explores the theoretical underpinnings of decision forests, organizing the vast existing literature on the field within a new, general-purpose forest model. Topics and features: with a foreword by Prof. Y. Amit and Prof. D. Geman, recounting their participation in the development of decision forests; introduces a flexible decision forest model, capable of addressing a large and diverse set of image and video analysis tasks; investigates both the theoretical foundations and the practical implementation of decision forests; discusses the use of decision forests for such tasks as classification, regression, density estimation, manifold learning, active learning and semi-supervised classification; includes exercises and experiments throughout the text, with solutions, slides, demo videos and other supplementary material provided at an associated website; provides a free, user-friendly software library, enabling the reader to experiment with forests in a hands-on manner.

Natural Language Processing with PyTorch

Biobehavioral Foundations

AGARD Lecture Series

Adaptive Processing of Sequences and Data Structures

Graph Representation Learning

Models, Methods, and Applications

The Quest for Artificial Intelligence

This book constitutes the thoroughly refereed post-

proceedings of the 13th Italian Workshop on Neural Nets, WIRN VIETRI 2002, held in Vietri sul Mare, Italy in May/June 2002.The 21 revised full papers presented together with three invited papers were carefully reviewed and revised during two rounds of selection and improvement. The papers are organized in topical sections on architectures and algorithms, image and signal processing applications, and learning in neural networks.

The European Computing Conference offers a unique forum for establishing new collaborations within present or upcoming research projects, exchanging useful ideas, presenting recent research results, participating in discussions and establishing new academic collaborations, linking university with the industry. Engineers and Scientists working on various areas of Systems Theory, Applied Mathematics, Simulation, Numerical and Computational Methods and Parallel Computing present the latest findings, advances, and current trends on a wide range of topics. This proceedings volume will be of interest to students, researchers, and practicing engineers.

A groundbreaking introduction to vectors, matrices, and least squares for engineering applications, offering a wealth of practical examples.

A project-based guide to the basics of deep learning. This concise, project-driven guide to deep learning takes readers through a series of program-writing tasks that introduce them to the use of deep learning in such areas of artificial intelligence as computer vision, natural-language processing, and reinforcement learning. The author, a longtime artificial intelligence researcher specializing in natural-language processing, covers feed-forward neural nets, convolutional neural nets, word embeddings, recurrent neural nets, sequence-to-sequence learning, deep reinforcement learning, unsupervised models, and other

fundamental concepts and techniques. Students and practitioners learn the basics of deep learning by working through programs in Tensorflow, an open-source machine learning framework. "I find I learn computer science material best by sitting down and writing programs," the author writes, and the book reflects this approach. Each chapter includes a programming project, exercises, and references for further reading. An early chapter is devoted to Tensorflow and its interface with Python, the widely used programming language. Familiarity with linear algebra, multivariate calculus, and probability and statistics is required, as is a rudimentary knowledge of programming in Python. The book can be used in both undergraduate and graduate courses; practitioners will find it an essential reference.

Neural-Based Orthogonal Data Fitting

Vectors, Matrices, and Least Squares

Dependency Parsing

20th International Conference, DS 2017, Kyoto, Japan, October 15–17, 2017, Proceedings

An Introduction to Neural Networks

Handbook of Neural Computation

Recursion: Complexity in Cognition

Content Description #Includes bibliographical references and index.

The RNNs (Recurrent Neural Networks) are a general case of artificial neural networks where the connections are not feed-forward ones only. In RNNs, connections between units form directed cycles, providing an implicit internal memory. Those RNNs are adapted to problems dealing with signals evolving through time. Their internal memory gives them the ability to naturally take time into account. Valuable approximation results have been obtained for dynamical systems.

Tenascin, a recently characterized extracellular matrix (ECM)

protein which is expressed during embryonic and fetal development, wound healing and various benign and malignant tumors (but highly restricted in normal adult tissues) is believed to affect a number of cellular functions such as cellular growth, differentiation, adhesion and motility. It has been extensively studied in recent years to elucidate cellular phenomena that are associated with development, tissue regeneration and neoplastic growth and behavior. It may be a potential target in the treatment of cancers and other disorders. This book focuses mainly on tissue expression and the poorly known biological role of this ECM protein.

Intelligent Speech Signal Processing investigates the utilization of speech analytics across several systems and real-world activities, including sharing data analytics related information, creating collaboration networks between several participants, and implementing video-conferencing in different application areas. It provides a forum for readers to discover the characteristics of intelligent speech signal processing systems across different domains. Chapters focus on the latest applications of speech data analysis and management tools across different recording systems. The book emphasizes the multi-disciplinary nature of the field, presenting different applications and challenges with extensive studies on the design, implementation, development, and management of intelligent systems, neural networks, and related machine learning techniques for speech signal processing. Highlights different data analytics techniques in speech signal processing, including machine learning, and data mining Illustrates different applications and challenges across the design, implementation, and management of intelligent systems and neural networks techniques for speech signal processing Includes coverage of biomodal speech recognition, voice activity detection, spoken

language and speech disorder identification, automatic speech to speech summarization, and convolutional neural networks

The Art and Science of Statistical Arbitrage

14th European Conference, Amsterdam, The Netherlands, October 11-14, 2016, Proceedings, Part II

XML Data Mining: Models, Methods, and Applications

7th International Conference, Lausanne, Switzerland, October 8-10, 1997 Proceedings

Ordinary Differential Equations

6th ICCST 2019, Kota Kinabalu, Malaysia, 29-30 August 2019

Methods, Systems, Challenges

Natural Language Processing (NLP) provides boundless opportunities for solving problems in artificial intelligence, making products such as Amazon Alexa and Google Translate possible. If you're a developer or data scientist new to NLP and deep learning, this practical guide shows you how to apply these methods using PyTorch, a Python-based deep learning library. Authors Delip Rao and Brian McMahon provide you with a solid grounding in NLP and deep learning algorithms and demonstrate how to use PyTorch to build applications involving rich representations of text specific to the problems you face. Each chapter includes several code examples and illustrations. Explore computational graphs and the supervised learning paradigm Master the basics of the PyTorch optimized tensor manipulation library Get an overview of traditional NLP concepts and methods Learn the basic ideas involved in building neural networks Use embeddings to represent words, sentences, documents, and other features Explore sequence prediction and generate sequence-to-sequence models Learn design patterns for building production NLP systems

Genetic programming is a method for getting a computer to solve a problem by telling it what needs to be done instead of how to do it. Koza, Bennett, Andre, and Keane present genetically evolved

solutions to dozens of problems of design, optimal control, classification, system identification, function learning, and computational molecular biology. Among the solutions are 14 results competitive with human-produced results, including 10 rediscoveries of previously patented inventions. Researchers in artificial intelligence, machine learning, evolutionary computation, and genetic algorithms will find this an essential reference to the most recent and most important results in the rapidly growing field of genetic programming. * Explains how the success of genetic programming arises from seven fundamental differences distinguishing it from conventional approaches to artificial intelligence and machine learning * Describes how genetic programming uses architecture-altering operations to make on-the-fly decisions on whether to use subroutines, loops, recursions, and memory * Demonstrates that genetic programming possesses 16 attributes that can reasonably be expected of a system for automatically creating computer programs * Presents the general-purpose Genetic Programming Problem Solver * Focuses on the previously unsolved problem of analog circuit synthesis, presenting genetically evolved filters, amplifiers, computational circuits, a robot controller circuit, source identification circuits, a temperature-measuring circuit, a voltage reference circuit, and more * Introduces evolvable hardware in the form of field-programmable gate arrays * Includes an introduction to genetic programming for the uninitiated This book is the first to provide a comprehensive survey of the computational models and methodologies used for studying the evolution and origin of language and communication. Comprising contributions from the most influential figures in the field, it presents and summarises the state-of-the-art in computational approaches to language evolution, and highlights new lines of development. Essential reading for researchers and students in the fields of evolutionary and adaptive systems, language evolution modelling and linguistics, it will also be of interest to researchers working on applications of neural networks to language problems.

Furthermore, due to the fact that language evolution models use multi-agent methodologies, it will also be of great interest to computer scientists working on multi-agent systems, robotics and internet agents.

Though mathematical ideas underpin the study of neural networks, the author presents the fundamentals without the full mathematical apparatus. All aspects of the field are tackled, including artificial neurons as models of their real counterparts; the geometry of network action in pattern space; gradient descent methods, including back-propagation; associative memory and Hopfield nets; and self-organization and feature maps. The traditionally difficult topic of adaptive resonance theory is clarified within a hierarchical description of its operation. The book also includes several real-world examples to provide a concrete focus. This should enhance its appeal to those involved in the design, construction and management of networks in commercial environments and who wish to improve their understanding of network simulator packages. As a comprehensive and highly accessible introduction to one of the most important topics in cognitive and computer science, this volume should interest a wide range of readers, both students and professionals, in cognitive science, psychology, computer science and electrical engineering.

Neural Network Models of Cognition

Signal Processing for Active Control

Computer Vision – ECCV 2016

The EXIN Neural Networks

Simulating the Evolution of Language

15th IFIP TC8 International Conference, CISIM 2016, Vilnius, Lithuania, September 14-16, 2016, Proceedings

Explainable AI: Interpreting, Explaining and Visualizing Deep Learning

The widespread use of XML in business and scientific databases has prompted the development

of methodologies, techniques, and systems for effectively managing and analyzing XML data. This has increasingly attracted the attention of different research communities, including database, information retrieval, pattern recognition, and machine learning, from which several proposals have been offered to address problems in XML data management and knowledge discovery. XML Data Mining: Models, Methods, and Applications aims to collect knowledge from experts of database, information retrieval, machine learning, and knowledge management communities in developing models, methods, and systems for XML data mining. This book addresses key issues and challenges in XML data mining, offering insights into the various existing solutions and best practices for modeling, processing, analyzing XML data, and for evaluating performance of XML data mining algorithms and systems.

Adaptive Processing of Sequences and Data StructuresInternational Summer School on Neural Networks, "E.R. Caianiello", Vietri Sul Mare, Salerno, Italy, September 6-13, 1997, Tutorial LecturesSpringer Science & Business Media Graph-structured data is ubiquitous throughout the natural and social sciences, from telecommunication networks to quantum chemistry. Building relational inductive biases into deep learning architectures is crucial for creating systems that can learn, reason,

and generalize from this kind of data. Recent years have seen a surge in research on graph representation learning, including techniques for deep graph embeddings, generalizations of convolutional neural networks to graph-structured data, and neural message-passing approaches inspired by belief propagation. These advances in graph representation learning have led to new state-of-the-art results in numerous domains, including chemical synthesis, 3D vision, recommender systems, question answering, and social network analysis. This book provides a synthesis and overview of graph representation learning. It begins with a discussion of the goals of graph representation learning as well as key methodological foundations in graph theory and network analysis. Following this, the book introduces and reviews methods for learning node embeddings, including random-walk-based methods and applications to knowledge graphs. It then provides a technical synthesis and introduction to the highly successful graph neural network (GNN) formalism, which has become a dominant and fast-growing paradigm for deep learning with graph data. The book concludes with a synthesis of recent advancements in deep generative models for graphs—a nascent but quickly growing subset of graph representation learning.

Artificial intelligence (AI) is a field within computer

science that is attempting to build enhanced intelligence into computer systems. This book traces the history of the subject, from the early dreams of eighteenth-century (and earlier) pioneers to the more successful work of today's AI engineers. AI is becoming more and more a part of everyone's life. The technology is already embedded in face-recognizing cameras, speech-recognition software, Internet search engines, and health-care robots, among other applications. The book's many diagrams and easy-to-understand descriptions of AI programs will help the casual reader gain an understanding of how these and other AI systems actually work. Its thorough (but unobtrusive) end-of-chapter notes containing citations to important source materials will be of great use to AI scholars and researchers. This book promises to be the definitive history of a field that has captivated the imaginations of scientists, philosophers, and writers for centuries.

Computational Science and Technology

Advances in Intelligent Systems
Volume 1
30th International Conference on Artificial Neural Networks, Bratislava, Slovakia, September 14–17, 2021, Proceedings, Part IV
Recurrent Neural Networks for Temporal Data Processing

This book covers both classical and modern models in deep learning. The primary focus is on the theory and algorithms of deep learning. The theory and algorithms of neural networks are particularly important for understanding important concepts, so that one can understand the important design concepts of neural architectures in different applications. Why do neural networks work? When do they work better than off-the-shelf machine-learning models? When is depth useful? Why is training neural networks so hard? What are the pitfalls? The book is also rich in discussing different applications in order to give the practitioner a flavor of how neural architectures are designed for different types of problems. Applications associated with many different areas like recommender systems, machine translation, image captioning, image classification, reinforcement-learning based gaming, and text analytics are covered. The chapters of this book span three categories: The basics of neural networks: Many traditional machine learning models can be understood as special cases of neural networks. An emphasis is placed in the first two chapters on understanding the relationship between traditional machine learning and neural networks. Support vector machines,

linear/logistic regression, singular value decomposition, matrix factorization, and recommender systems are shown to be special cases of neural networks. These methods are studied together with recent feature engineering methods like word2vec. Fundamentals of neural networks: A detailed discussion of training and regularization is provided in Chapters 3 and 4. Chapters 5 and 6 present radial-basis function (RBF) networks and restricted Boltzmann machines. Advanced topics in neural networks: Chapters 7 and 8 discuss recurrent neural networks and convolutional neural networks. Several advanced topics like deep reinforcement learning, neural Turing machines, Kohonen self-organizing maps, and generative adversarial networks are introduced in Chapters 9 and 10. The book is written for graduate students, researchers, and practitioners. Numerous exercises are available along with a solution manual to aid in classroom teaching. Where possible, an application-centric view is highlighted in order to provide an understanding of the practical uses of each class of techniques.