Neural Network Methods For Natural Language Processing Synthesis Lectures On Human Language Technologies

Artificial Intelligence in the Age of Neural Networks and Brain Computing demonstrates that existing disruptive implications and applications of AI is a development of the unique attributes of neural networks, mainly machine learning, distributed architectures, massive parallel processing, black-box inference, intrinsic nonlinearity and smart autonomous search engines. The book covers the major basic ideas of brain-like computing behind AI, provides a framework to deep learning, and launches novel and intriguing paradigms as future alternatives. The success of AI-based commercial products proposed by top industry leaders, such as Google, IBM, Microsoft, Intel and Amazon can be interpreted using this book. Developed from the 30th anniversary of the International Neural Network Society (INNS) and the 2017 International Joint Conference on Neural Networks (IJCNN) Authored by top experts, global field pioneers and researchers working on cutting-edge applications in signal processing, speech recognition, games, adaptive control and decision-making Edited by high-level academics and researchers in intelligent systems and neural networks

Neural networks are a family of powerful machine learning models. This book focuses on the application of neural network models to natural language data. The first half of the book (Parts I and II) covers the basics of supervised machine learning and feed-forward neural networks, the basics of working with machine learning over language data, and the use of vector-based rather than symbolic representations for words. It also covers the computation-graph abstraction, which allows to easily define and train arbitrary neural networks, and is the basis behind the design of contemporary neural network software libraries. The second part of the book (Parts III and IV) introduces more specialized neural network architectures, including 1D convolutional neural networks, recurrent neural networks, conditioned-generation models, and attention-based models. These architectures and techniques are the driving force behind state-of-the-art algorithms for machine translation, syntactic parsing, and many other applications. Finally, we also discuss tree-structured networks, structured prediction, and the prospects of multi-task learning.

Neural networks are a computing paradigm that is finding increasing attention among computer scientists. In this book, theoretical laws and models previously scattered in the literature are brought together into a general theory of artificial neural nets. The book begins with a view to biology and starting with the simplest nets, it is shown how the properties of models change when more general neural networks, and then topologies are introduced. Each chapter contains examples, numerous illustrations, and a bibliography. The book is aimed at readers who seek an overview of the field or who wish to deepen their knowledge. It is suitable as a basis for university courses in neurocomputing.

Many approaches have sprouted from artificial intelligence (AI) and produced major breakthroughs in the computer science and engineering industries. Deep learning is a method that is transforming the world of data and analytics. Optimization of this new approach is still unclear, however, and there’s a need for research on the various applications and techniques of deep learning in the field of computing. Deep Learning Techniques and Optimization Strategies in Big Data Analytics is a collection of innovative research on the methods and applications of deep learning strategies in the fields of computer science and information systems. While highlighting topics including data integration, computational modeling, and scheduling systems, this book is ideally designed for engineers, IT specialists, data analysts, data scientists, engineers, researchers, academicians, and students seeking current research on deep learning methods and its application in the digital industry.

Embeddings have undoubtedly been one of the most influential research areas in Natural Language Processing (NLP). Encoding information into a low-dimensional vector representation, which is easily integrable in modern machine learning models, has played a central role in the development of NLP. Embedding techniques initially focused on words, but the attention soon started to shift to other forms: from graph structures, such as knowledge bases, to other types of textual content, such as sentences and documents. This book provides a high-level synthesis of the main embedding techniques in NLP, in the broad sense. The book starts by explaining conventional word vector space models and word embeddings (e.g., Word2Vec and GloVe) and then moves to other types of embeddings, such as word sense, sentence and document, and graph embeddings. The book also provides an overview of recent developments in contextualized representations (e.g., ELMo and BERT) and explains their potential in NLP. Throughout the book, the reader can find key baseline models to experiment with and generate competitive performance in NLP. The book also provides an overview of current research on deep learning methods and their applications in various fields of computer science.

Deep learning is transforming software, facilitating powerful new artificial intelligence capabilities, and driving unprecedented algorithm performance. Deep Learning Illustrated is uniquely intuitive and offers a complete introduction to the discipline’s techniques. Packed with full-color figures and easy-to-follow code, it sweeps away the complexity of building deep learning models, making the subject approachable and fun to learn. World-class instructor and practitioner Jon Krohn–with visionary content from Grant Beyleveld and beautiful illustrations by Aglaé Bassens–presents straightforward analogies to explain what deep learning is, why it has become so popular, and how it relates to other machine learning approaches. Krohn has created a practical reference and tutorial for developers, data scientists, researchers, analysts, and students who want to start applying it. He illuminates theory with hands-on Python code in accompanying Jupyter notebooks. To help you progress quickly, he focuses on the versatile deep learning library Keras to nimbly construct efficient TensorFlow models; PyTorch, the leading alternative library, is also covered. You’ll gain a pragmatic understanding of all major deep learning approaches and their uses in applications ranging from machine vision and natural language processing to image generation and game-playing algorithms. Discover what makes deep learning systems unique, and the implications for practitioners Explore new tools that make deep learning models easier to build, use, and improve Master essential theory: artificial neurons, training, optimization, convolutional nets, recurrent nets, generative adversarial networks (GANs), deep reinforcement learning, and more Walk through building interactive deep learning applications, and move forward with your own artificial intelligence projects Register your book for convenient access to downloads, updates, and/or corrections as they become available. See inside book for details.

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 structured Boltzmann machines. Advanced topics in neural networks: Chapters 7 and 8 discuss recurrent neural networks and convolutional networks.
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. Uncover the power of artificial neural networks by implementing them through R code. About This Book Develop a strong background in neural networks with R, to implement them in your applications Build smart systems using the power of deep learning. Real-world case studies to illustrate the power of neural network models. Who This Book Is For This book is intended for anyone who has a statistical background with R and wants to work with neural networks to get better results from complex data. If you are interested in artificial intelligence and deep learning and you want to level up, then this book is what you need! What You Will Learn Set up R packages for neural networks and deep learning. Understand the core concepts of artificial neural networks. Understand neurons, perceptrons, bias, weights, and activation functions. Implement supervised and unsupervised machine learning in R for neural networks. Predict and classify data automatically using neural networks. Evaluate and fine-tune the models you build. In Detail Neural networks are one of the most fascinating machine learning models for solving complex computational problems efficiently. Neural networks are used to solve wide range of problems in different areas of AI and machine learning. This book explains the niche aspects of neural networking and provides you with foundation to get started with advanced topics. The book begins with neural network design using the neural net package, then it will build a solid foundation knowledge of how a neural network learns from data, and the principles behind it. This book covers various types of neural network including recurrent neural networks and convoluted neural networks. You will not only learn how to train neural networks, but will also explore generalization of these networks. Later we will delve into combining different neural network models and work with the real-world use cases. By the end of this book, you will learn to implement neural network models in your applications with the help of practical examples in the book. Style and approach A step-by-step guide filled with real-world practical examples. NEURAL NETWORKS Buy the Paperback version of this book, and get the Kindle e-book version included for FREE! Do You Want to Become An Expert Of Neural Networks? Start Getting this Book and Follow My Step by Step Explanations! Click Add To Cart Now! This book on neural networks will provide you with an excellent overview of the domain of deep learning neural networks. You will gain an understanding of the conception of neural networks and how biological and artificial neural networks differ from each other. You will learn about artificial neural networks and understand how neural networks function in general. Finally, you will learn how to teach your networks. To understand this book, you'll need to understand some preliminary mathematical concepts. This book contains illustrations and step-by-step explanations with bullet points and exercises for easy and enjoyable learning. Benefits of reading this book that you're not going to find anywhere else: Introduction to Neural Networks Structures of Neural Networks Building a Neural Network The Construction of Artificial Neurons The Biological Neurons Model How They Work The Capabilities of Neural Network Structure Teaching Your Networks Methods of Gathering Information Organizing Your Network Usage of Momentum Using Neural Networks Using Neural Networks in a Practical Way The Capacity of a Single Neuron Don't miss out on this new step-by-step guide to Neural Networks. All you need to do is scroll up and click on the BUY NOW button to learn all about it! This textbook explains Deep Learning Architecture, with applications to various NLP Tasks, including Document Classification, Machine Translation, Language Modeling, and Speech Recognition. With the widespread adoption of deep learning, natural language processing (NLP), and speech applications in many areas (including Finance, Healthcare, and Government) there is a growing need for one comprehensive resource that maps deep learning techniques to NLP and speech and provides insights into using the tools and libraries for real-world applications. Deep Learning for NLP and Speech Recognition explains recent deep learning methods applicable to NLP and speech, provides state-of-the-art approaches, and offers real-world case studies with code to provide hands-on experience. Many books focus on deep learning theory or deep learning for NLP-specific tasks while others are cookbooks for tools and libraries, but the constant flux of new algorithms, tools, frameworks, and libraries in a rapidly evolving landscape means that there are few available texts that offer the material in this book. The book is organized into three parts, aligning to different groups of readers and their expertise. The three parts are: Machine Learning, NLP, and Speech Introduction. The first part has three chapters that introduce readers to the fields of NLP, speech recognition, deep learning and machine learning with basic theory and hands-on case studies using Python-based tools and libraries. Deep Learning Basics The five chapters in the second part introduce deep learning and various topics that are crucial for speech and text processing, including word embeddings, convolutional neural networks, recurrent neural networks and speech recognition basics. Theory, practical tips, state-of-the-art methods, experimentations and analysis in using the methods discussed in theory on real-world tasks. Advanced Deep Learning Techniques For Text and Speech The third part has five chapters that discuss the latest and cutting-edge research in the areas of deep learning that intersect with NLP and speech. Topics including attention mechanisms, memory augmented networks, transfer learning, multi-task learning, domain adaptation, reinforcement learning, and end-to-end deep learning for speech recognition are covered using case studies. A human-inspired, linguistically sophisticated model of language understanding for intelligent agent systems. One of the original goals of artificial intelligence research was to endow intelligent agents with human-level natural language capabilities. Recent AI research, however, has focused on applying statistical and machine learning approaches to big data rather than attempting to model what people do and how they do it. In this book, Marjorie McShane and Sergei Nirenburg return to the original goal of recreating human-level intelligence in a machine. They present a human-inspired, linguistically sophisticated model of language understanding for intelligent agent systems that emphasizes meaning—the deep, context-sensitive meaning that a person derives from spoken or written language. This book introduces a variety of neural network methods for solving differential equations arising in science and engineering. The emphasis is placed on a deep understanding of the neural network techniques, which has been presented in a mostly heuristic and intuitive manner. This approach will enable the reader to understand the working, efficiency...
and shortcomings of each neural network technique for solving differential equations. The objective of this book is to provide the reader with a sound understanding of the foundations of neural networks and a comprehensive introduction to neural network methods for solving differential equations together with recent developments in the techniques and their applications. The book comprises four major sections. Section I consists of a brief overview of differential equations and the relevant physical problems arising in science and engineering. Section II illustrates the history of neural networks starting from their beginnings in the 1940s through to the renewed interest of the 1980s. A general introduction to neural networks and learning technologies is presented in Section III. This section also includes the description of the multilayer perceptron and its learning methods. In Section IV, the different neural network methods for solving differential equations are introduced, including discussion of the most recent developments in the field. Advanced students and researchers in mathematics, computer science and various disciplines in science and engineering will find this book a valuable reference source. A survey of computational methods for understanding, generating, and manipulating human language, which offers a synthesis of classical representations and algorithms with contemporary machine learning techniques. This textbook provides a technical perspective on natural language processing—methods for building computer software that understands, generates, and manipulates human language. It emphasizes contemporary data-driven approaches, focusing on techniques from supervised and unsupervised machine learning. The first section establishes a foundation in machine learning by building a set of tools that will be used throughout the book and applying them to word-based textual analysis. The second section introduces structured representations of language, including sequences, trees, and graphs. The third section explores different approaches to the representation and analysis of linguistic meaning, ranging from formal logic to neural word embeddings. The final section offers chapter-length treatments of three transformative applications of natural language processing: information extraction, machine translation, and text generation. End-of-chapter exercises include both paper-and-pencil analysis and software implementation. The text synthesizes and distills a broad and diverse research literature, linking contemporary machine learning techniques with the field's linguistic and computational foundations. It is suitable for use in advanced undergraduate and graduate-level courses and as a reference for software engineers and data scientists. Readers should have a background in computer programming and college-level mathematics. After mastering the material presented, students will have the technical skill to build and analyze novel natural language processing systems and to understand the latest research in the field. Handbook of Neural Computation explores neural computation applications, ranging from conventional fields of mechanical and civil engineering, to electronics, electrical engineering and computer science. This book covers the numerous applications of artificial and deep neural networks and their uses in learning machines, including image and speech recognition, natural language processing and risk analysis. Edited by renowned authorities in this field, this work is comprised of articles from reputable industry and academic scholars and experts from around the world. Each contributor presents a specific research issue with its recent and future trends. As the demand rises in the engineering and medical industries for neural networks and other machine learning methods to solve different types of operations, such as data prediction, classification of images, analysis of big data, and intelligent decision-making, this book provides readers with the latest, cutting-edge research in one comprehensive text. Features high-quality research articles on multivariate adaptive regression splines, the minimax probability machine, and more Discusses machine learning techniques, including classification, clustering, regression, web mining, information retrieval and natural language processing Covers supervised, unsupervised, reinforced, ensemble, and nature-inspired learning methods The idea of simulating the brain was the goal of many pioneering works in Artificial Intelligence. The brain has been seen as a neural network, or a set of nodes, or neurons, connected by communication lines. Currently, there has been increasing interest in the use of neural network models. This book contains chapters on basic concepts of artificial neural networks, recent connectionist architectures and several successful applications in various fields of knowledge, from assisted speech therapy to remote sensing of hydrological parameters, from fabric defect classification to application in civil engineering. This is a current book on Artificial Neural Networks and Applications, bringing recent advances in the area to the reader interested in this always-evolving machine learning technique. Neural networks represent a powerful data processing technique that has reached maturity and broad application. When clearly understood and appropriately used, they are a mandatory component in the toolbox of any engineer who wants make the best use of the available data, in order to build models, make predictions, mine data, recognize shapes or signals, etc. Ranging from theoretical foundations to real-life applications, this book is intended to provide engineers and researchers with clear methodologies for taking advantage of neural networks in industrial, financial or banking applications, many instances of which are presented in the book. For the benefit of readers wishing to gain deeper knowledge of the topics, the book features appendices that provide theoretical details for greater insight, and algorithmic details for efficient programming and implementation. The chapters have been written by experts and edited to present a coherent and comprehensive, yet not redundant, practically oriented introduction. Discover the concepts of deep learning used for natural language processing (NLP), with full-fledged examples of neural network models such as recurrent neural networks, long short-term memory networks, and sequence-2-sequence models. You’ll start by covering the mathematical prerequisites and the fundamentals of deep learning and NLP with practical examples. The first three chapters of the book cover the basics of NLP, starting with word-vector representation before moving onto advanced algorithms. The final chapters focus entirely on implementation, and deal with sophisticated architectures such as RNN, LSTM, and Seq2Seq, using Python tools: TensorFlow, and Keras. Deep Learning for Natural Language Processing follows a progressive approach and combines all the knowledge you have gained to.
build a question-answer chatbot system. This book is a good starting point for people who want to get started in deep learning for NLP. All the code presented in the book will be available in the form of IPython notebooks and scripts, which allow you to try out the examples and extend them in interesting ways. What You Will Learn Gain the fundamentals of deep learning and its mathematical prerequisites Discover deep learning frameworks in Python Develop a chatbot Implement a research paper on sentiment classification Who This Book Is For Software developers who are curious to try out deep learning with NLP. This book provides a broad yet detailed introduction to neural networks and machine learning in a statistical framework. A single, comprehensive resource for study and further research, it explores the major popular neural network models and statistical learning approaches with examples and exercises and allows readers to gain a practical working understanding of the content. This updated new edition presents recently published results and includes six new chapters that correspond to the recent advances in computational learning theory, sparse coding, deep learning, big data and cloud computing. Each chapter features state-of-the-art descriptions and significant research findings. The topics covered include: • multilayer perceptron; • the Hopfield network; • associative memory models; • clustering models and algorithms; • t he radial basis function network; • recurrent neural networks; • nonnegative matrix factorization; • independent component analysis; • probabilistic and Bayesian networks; and • fuzzy sets and logic. Focusing on the prominent accomplishments and their practical aspects, this book provides academic and technical staff, as well as graduate students and researchers with a solid foundation and comprehensive reference on the fields of neural networks, pattern recognition, signal processing, and machine learning. Summary Natural Language Processing in Action is your guide to creating machines that understand human language using the power of Python with its ecosystem of packages dedicated to NLP and AI. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Recent advances in deep learning empower applications to understand text and speech with extreme accuracy. The result? Chatbots that can imitate real people, meaningful resume-to-job matches, superb predictive search, and automatically generated document summaries—all at a low cost. New techniques, along with accessible tools at a low cost and TensorFlow, make professional-quality NLP easier than ever before. About the Authors Natural Language Processing in Action is your guide to building machines that can read and interpret human language. In it, you'll use readily available Python packages to capture the meaning in text and react accordingly. The book expands traditional NLP approaches to include neural networks, modern deep learning algorithms, and generative techniques as you tackle real-world problems like extracting dates and names, composing text, and answering free-form questions. What's inside Some sentences in this book were written by NLP! Can you guess which ones? Working with Keras, TensorFlow, gensim, and scikit-learn Rule-based and data-based NLP Scalable pipelines About the Reader This book requires a basic understanding of deep learning and intermediate Python skills. About the Author Hobson Lane, Cole Howard, and Hannes Max Hapke are experienced NLP engineers who use these techniques in production. Table of Contents PART 1 - WORDY MACHINES Packets of thought (NLP overview) Build your vocabulary (word tokenization) Math with words (TF-IDF vectors) Getting meaning in word counts (semantic analysis) PART 2 - DEEPER LEARNING (NEURAL NETWORKS) Baby steps with neural networks (perceptrons and backpropagation) Reasoning with word vectors (Word2vec) Getting words in order with convolutional neural networks (CNNs) Loop (recurrent) neural networks (RNNs) Improving retention with long short-term memory networks Sequence-to-sequence models and attention PART 3 - GETTING REAL (REAL-WORLD NLP CHALLENGES) Information extraction (named entity extraction and question answering) Getting chatty (dialog engines) Scaling up (optimization, parallelization, and batch processing) Graphs are useful data structures in complex real-life applications such as modeling physical systems, learning molecular fingerprints, controlling traffic networks, and recommending friends in social networks. However, these tasks require dealing with non-Euclidean graph data that contains rich relational information between elements and cannot be well handled by traditional deep learning models (e.g., convolutional neural networks (CNNs) or recurrent neural networks (RNNs)). Nodes in graphs usually contain useful feature information that cannot be well addressed in most unsupervised representation learning methods (e.g., network embedding methods). Graph neural networks (GNNs) are proposed to combine the feature information and the graph structure to learn better representations on graphs via feature propagation and aggregation. Due to its convincing performance and high interpretability, GNN has recently become a widely applied graph analysis tool. This book provides a comprehensive introduction to the basic concepts, models, and applications of graph neural networks. It starts with the introduction of the vanilla GNN model. Then several variants of the vanilla model are introduced such as graph convolutional networks, graph recurrent networks, graph attention networks, graph residual networks, and several general frameworks. Variants for different graph types and advanced training methods are also included. As for the applications of GNNs, the book categorizes them into structural, non-structural, and other scenarios, and then it introduces several typical models on solving these tasks. Finally, the closing chapters provide GNN open resources and the outlook of several future directions. This must-read text/reference introduces the fundamental concepts of convolutional neural networks (ConvNets), offering practical guidance on using libraries to implement ConvNets in applications of traffic sign detection and classification. The work presents techniques for optimizing the computational efficiency of ConvNets, as well as visualization techniques to better understand the underlying processes. The proposed models are also thoroughly evaluated from different perspectives, using exploratory and quantitative analysis. Topics and features: explains the fundamental concepts behind training linear classifiers and feature learning; discusses the wide range of loss functions for training binary and multi-class classifiers; illustrates how to derive ConvNets from fully connected neural networks, and reviews different techniques for evaluating neural networks; presents a practical library for implementing ConvNets, explaining how to use a Python interface for the library to create and assess neural networks; describes two real-world examples of the detection and classification of traffic signs using deep learning methods; examines a range of varied techniques for visualizing neural networks, using a Python interface; provides self-study exercises at the end of each chapter, in addition to a helpful glossary, with relevant Python scripts supplied at an associated website. This self-contained guide will benefit those who seek to both understand the theory behind deep learning, and to gain hands-on experience in implementing ConvNets in practice. As no prior background knowledge in the field is required to follow the material, the book is ideal for all students of computer vision and machine learning, and will also be of great interest to practitioners working on autonomous cars and advanced driver assistance systems. Artificial neural networks are used to model systems that receive inputs and produce outputs. The relationships between the inputs and outputs and the representation parameters are critical issues in the design of related engineering systems, and sensitivity analysis concerns methods for analyzing these relationships. Perturbations of neural networks are caused by machine imprecision, and they can be simulated by embedding disturbances in the original inputs or connection weights, allowing us to study the characteristics of a function under small perturbations of its parameters. This is the first book to present a systematic description of sensitivity analysis methods for artificial neural networks. It covers sensitivity analysis of multilayer perceptron neural networks and radial basis function neural networks, two widely used models in the machine learning field. The authors examine the applications of such analysis in tasks such as feature selection, sample reduction, and network optimization. The book will be useful for engineers applying neural network sensitivity analysis to solve practical problems, and for researchers interested in foundational problems in neural networks. In response to the exponentially increasing need to analyze vast amounts of data, Neural Networks for Applied Sciences and Engineering: From Fundamentals to Complex Pattern Recognition provides scientists with a simple but systematic introduction to neural networks. Beginning with an introductory discussion on the role of neural networks in
This book is a collection of chapters describing work carried out as part of a large project at BT Laboratories to study the application of connectionist methods to problems in vision, speech and natural language processing. Also, since the theoretical formulation and the hardware realization of neural networks are significant tasks in themselves, these problems too were addressed. The book, therefore, is divided into five Parts, reporting results in vision, speech, natural language, hardware implementation and network architectures. The three editors of this book have, at one time or another, been involved in planning and running the connectionist project. From the outset, we were concerned to involve the academic community as widely as possible, and consequently, in its first year, over thirty university research groups were funded for small scale studies on the various topics. Co-ordinating such a widely spread project was no small task, and in order to concentrate minds and resources, sets of test problems were devised which were typical of the application areas and were difficult enough to be worthy of study. These are described in the text, and constitute one of the successes of the project.

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.

Deep learning methods offer a lot of promise for time series forecasting, such as the automatic learning of temporal dependence and the automatic handling of temporal structures like trends and seasonality. With clear explanations, standard Python libraries, and step-by-step tutorial lessons you'll discover how to develop deep learning models for your own time series forecasting projects.

Neural Network Methods in Natural Language Processing
Morgan & Claypool Publishers

Originating from models of biological neural systems, artificial neural networks (ANN) are the cornerstones of artificial intelligence research. Catalyzed by the upsurge in computational power and availability, and made widely accessible with the co-evolution of software, algorithms, and methodologies, artificial neural networks have had a profound impact in the elucidation of complex biological, chemical, and environmental processes. Artificial Neural Networks in Biological and Environmental Analysis provides an in-depth and timely perspective on the fundamental, technological, and applied aspects of computational neural networks. Presenting the basic principles of neural networks together with applications in the field, the book stimulates communication and partnership among scientists in fields as diverse as biology, chemistry, mathematics, medicine, and environmental science. This interdisciplinary discourse is essential not only for the success of independent and collaborative research and teaching programs, but also for the continued interest in the use of neural network tools in scientific inquiry. The book covers: A brief history of computational neural network models in relation to brain function Neural network operations, including neuron connectivity and layer arrangement Basic building blocks of model design, selection, and application from a statistical perspective Neurofuzzy systems, neuro-genetic systems, and neuro-fuzzy-genetic systems Function of neural networks in the study of complex natural processes Scientists deal with very complicated systems, much of the inner workings of which are frequently unknown to researchers. Using only simple, linear mathematical methods, information that is needed to truly understand natural systems may be lost. The development of new algorithms to model such processes is needed, and ANNs can play a major role. Balancing basic principles and diverse applications, this text introduces newcomers to the field and reviews recent developments of interest to active neural network practitioners.

This book covers the current state-of-the-art theories and applications of neural networks with high-dimensional parameters”--Provided by publisher.

Being the first book in the market to dive deep into the Transformers, it is a step-by-step guide for data and AI practitioners to help enhance the performance of language understanding and gain expertise with hands-on implementation of transformers using PyTorch, TensorFlow, Hugging Face, Trax, and AllenNLP.

Gain the knowledge of various deep neural network architectures and their application areas to conquer your NLP issues. Key Features Gain insights into the basic building blocks of natural language processing Learn how to select the best deep neural network to solve your NLP problems Explore convolutional and recurrent neural networks and long short-term memory networks Book Description Applying deep learning approaches to various NLP tasks can take your computational algorithms to a completely new level in terms of speed and accuracy. Deep Learning for Natural Language Processing starts off by highlighting the basic building blocks of the natural language processing domain. The book goes on to introduce the problems that you can solve using state-of-the-art neural network models. After this, delving into the various neural network architectures and their specific areas of application will help you to understand how to select the best model to suit your needs. As you advance through this deep learning book, you'll study convolutional, recurrent, and recursive neural networks, in addition to covering long short-term memory networks (LSTM). Understanding these networks will help you to implement their models using Keras. In the later chapters, you will be able to develop a trigger word detection application using NLP techniques such as attention model and beam search. By the end of this book, you will not only have sound knowledge of natural language processing but also be able to select the best text pre-processing and neural network models to solve a number of NLP issues. What you will learn Understand various pre-processing techniques for deep learning problems Build a vector representation of text using word2vec and GloVe Create a named entity recognizer and parts-of-speech tagger with Apache OpenNLP Build a machine translation model in Keras Develop a text generation application using LSTM Build a trigger word detection application using an attention model Who this book is for If you're an aspiring data scientist looking for an introduction to deep learning in the NLP domain, this is just the book for you. Strong working knowledge of Python, linear algebra, and machine learning is a must. A comprehensive text on foundations and techniques of graph neural networks with applications in NLP, data mining, vision and healthcare. Deep learning methods are achieving state-of-the-art results on challenging machine learning problems such as describing photos and translating text from one language to another. In this new laser-focused Ebook, finally cut through the math, research papers and patchwork descriptions about natural language processing. Using clear explanations, standard Python libraries and step-by-step tutorial lessons you
will discover what natural language processing is, the promise of deep learning in the field, how to clean and prepare text data for modeling, and how to develop deep learning models for your own natural language processing projects.

This 1996 book explains the statistical framework for pattern recognition and machine learning, now in paperback.

An introduction to a broad range of topics in deep learning, covering mathematical and conceptual background, deep learning techniques used in industry, and research perspectives. “Written by three experts in the field, Deep Learning is the only comprehensive book on the subject.” —Elon Musk, cochair of OpenAI; cofounder and CEO of Tesla and SpaceX

Deep learning is a form of machine learning that enables computers to learn from experience and understand the world in terms of a hierarchy of concepts. Because the computer gathers knowledge from experience, there is no need for a human computer operator to formally specify all the knowledge that the computer needs. The hierarchy of concepts allows the computer to learn complicated concepts by building them out of simpler ones; a graph of these hierarchies would be many layers deep. This book introduces a broad range of topics in deep learning. The text offers mathematical and conceptual background, covering relevant concepts in linear algebra, probability theory and information theory, numerical computation, and machine learning. It describes deep learning techniques used by practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology; and it surveys such applications as natural language processing, speech recognition, computer vision, online recommendation systems, bioinformatics, and videogames. Finally, the book offers research perspectives, covering such theoretical topics as linear factor models, autoencoders, representation learning, structured probabilistic models, Monte Carlo methods, the partition function, approximate inference, and deep generative models. Deep Learning can be used by undergraduate or graduate students planning careers in either industry or research, and by software engineers who want to begin using deep learning in their products or platforms. A website offers supplementary material for both readers and instructors.

Data assimilation is a process of fusing data with a model for the singular purpose of estimating unknown variables. It can be used, for example, to predict the evolution of the atmosphere at a given point and time. This book examines data assimilation methods including Kalman filtering, artificial intelligence, neural networks, machine learning, and cognitive computing.

Build your Machine Learning portfolio by creating 6 cutting-edge Artificial Intelligence projects using neural networks in Python Key Features Discover neural network architectures (like CNN and LSTM) that are driving recent advancements in AI Build expert neural network projects in Python using popular libraries such as Keras Includes projects such as object detection, face identification, sentiment analysis, and more Book Description Neural networks are at the core of recent AI advances, providing some of the best resolutions to many real-world problems, including image recognition, medical diagnosis, text analysis, and more. This book goes through some basic neural network and deep learning concepts, as well as some popular libraries in Python for implementing them. It contains practical demonstrations of neural networks in domains such as fare prediction, image classification, sentiment analysis, and more. In each case, the book provides a problem statement, the specific neural network architecture required to tackle that problem, the reasoning behind the algorithm used, and the associated Python code to implement the solution from scratch. In the process, you will gain hands-on experience with using popular Python libraries such as Keras to build and train your own neural networks from scratch. By the end of this book, you will have mastered the different neural network architectures and created cutting-edge AI projects in Python that will immediately strengthen your machine learning portfolio. What you will learn Learn various neural network architectures and its advancements in AI Master deep learning in Python by building and training neural network Master neural networks for regression and classification Discover convolutional neural networks for image recognition Learn sentiment analysis on textual data using Long Short-Term Memory Build and train a highly accurate facial recognition security system Who this book is for This book is a perfect match for data scientists, machine learning engineers, and deep learning enthusiasts who wish to create practical neural network projects in Python. Readers should already have some basic knowledge of machine learning and neural networks. Information in today’s advancing world is rapidly expanding and becoming widely available. This eruption of data has made handling it a daunting and time-consuming task. Natural language processing (NLP) is a method that applies linguistics and algorithms to large amounts of this data to make it more valuable. NLP improves the interaction between humans and computers, yet there remains a lack of research that focuses on the practical implementations of this trending approach. Neural Networks for Natural Language Processing is a collection of innovative research on the methods and applications of linguistic information processing and its computational properties. This publication will support readers with performing sentence classification and language generation using neural networks, apply deep learning models to solve machine translation and conversation problems, and apply deep structured semantic models on information retrieval and natural language applications. While highlighting topics including deep learning, query entity recognition, and information retrieval, this book is ideally designed for research and development professionals, IT specialists, industrialists, technology developers, data analysts, data scientists, academics, researchers, and students seeking current research on the fundamental concepts and techniques of natural language processing.