Alex Graves

Supervised Sequence Labelling with Recurrent Neural Networks

Supervised Sequence Labelling With Recurrent Neural Networks Studies In Computational Intelligence

Junwen Bai

Supervised Sequence Labelling With Recurrent Neural Networks Studies In Computational Intelligence: **Supervised Sequence Labelling with Recurrent Neural Networks** Alex Graves,2012-02-09 Supervised sequence labelling is a vital area of machine learning encompassing tasks such as speech handwriting and gesture recognition protein secondary structure prediction and part of speech tagging Recurrent neural networks are powerful sequence learning tools robust to input noise and distortion able to exploit long range contextual information that would seem ideally suited to such problems However their role in large scale sequence labelling systems has so far been auxiliary The goal of this book is a complete framework for classifying and transcribing sequential data with recurrent neural networks only Three main innovations are introduced in order to realise this goal Firstly the connectionist temporal classification output layer allows the framework to be trained with unsegmented target sequences such as phoneme level speech transcriptions this is in contrast to previous connectionist approaches which were dependent on error prone prior segmentation Secondly multidimensional recurrent neural networks extend the framework in a natural way to data with more than one spatio temporal dimension such as images and videos Thirdly the use of hierarchical subsampling makes it feasible to apply the framework to very large or high resolution sequences such as raw audio or video Experimental validation is provided by state of the art results in speech and handwriting recognition **Supervised Sequence Labelling with Recurrent Neural Networks** ,2012-02-07 **Deep Learning Approach for Natural Language Processing, Speech, and Computer Vision** L. Ashok Kumar,D. Karthika Renuka,2023-05-22 Deep Learning Approach for Natural Language Processing Speech and Computer Vision provides an overview of general deep learning methodology and its applications of natural language processing NLP speech and computer vision tasks It simplifies and presents the concepts of deep learning in a comprehensive manner with suitable full fledged examples of deep learning models with an aim to bridge the gap between the theoretical and the applications using case studies with code experiments and supporting analysis Features Covers latest developments in deep learning techniques as applied to audio analysis computer vision and natural language processing Introduces contemporary applications of deep learning techniques as applied to audio textual and visual processing Discovers deep learning frameworks and libraries for NLP speech and computer vision in Python Gives insights into using the tools and libraries in Python for real world applications Provides easily accessible tutorials and real world case studies with code to provide hands on experience This book is aimed at researchers and graduate students in computer engineering image speech and text processing *Deep Learning in Drug Design* Qifeng Bai,Tingyang Xu,Junzhou Huang,2025-10-01 Deep Learning in Drug Design Methods and Applications summarizes the most recent methods applications and technological advances of deep learning for drug design which mainly consists of molecular representations the architectures of deep learning geometric deep learning large models for drugs and the deep learning applications in various aspects of drug design This book will give readers an intuitive and simple understanding of the encoding and decoding of drugs for

model training while deep learning methods profile the different training perspectives for drug design including sequence based 2D and 3D drug design based on geometric deep learning This book is suitable for readers who are seeking to learn and use deep learning methods and applications for drug discovery and other related fields Deep Learning in Drug Design Methods and Applications is particularly helpful to graduate students in need of a practical guide to the principles of the discipline Established researchers in the area will benefit from the detailed case studies and algorithms presented Introduces the basic theories current methods and cases of deep learning for drug design Presents the major application fields of drug design based on deep learning including protein folding retrosynthesis prediction molecular docking and ADMET prediction among others Explains the artificial intelligence of deep learning for drug design models *Encyclopedia of Bioinformatics and Computational Biology* ,2018-08-21 Encyclopedia of Bioinformatics and Computational Biology ABC of Bioinformatics Three Volume Set combines elements of computer science information technology mathematics statistics and biotechnology providing the methodology and in silico solutions to mine biological data and processes The book covers Theory Topics and Applications with a special focus on Integrative omics and Systems Biology The theoretical methodological underpinnings of BCB including phylogeny are covered as are more current areas of focus such as translational bioinformatics cheminformatics and environmental informatics Finally Applications provide guidance for commonly asked questions This major reference work spans basic and cutting edge methodologies authored by leaders in the field providing an invaluable resource for students scientists professionals in research institutes and a broad swath of researchers in biotechnology and the biomedical and pharmaceutical industries Brings together information from computer science information technology mathematics statistics and biotechnology Written and reviewed by leading experts in the field providing a unique and authoritative resource Focuses on the main theoretical and methodological concepts before expanding on specific topics and applications Includes interactive images multimedia tools and crosslinking to further resources and databases **Deep Learning** Ian Goodfellow,Yoshua Bengio,Aaron Courville,2016-11-10 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 *Frontiers in Handwriting Recognition* Utkarsh Porwal,Alicia Fornés,Faisal Shafait,2022-11-25 This book constitutes the refereed proceedings of the 18th International Conference on Frontiers in Handwriting Recognition ICFHR 2022 which took place in Hyderabad India during December 4 7 2022 The 36 full papers and 1 short paper presented in this volume were carefully reviewed and selected from 61 submissions The contributions were organized in topical sections as follows Historical Document Processing Signature Verification and Writer Identification Symbol and Graphics Recognition Handwriting Recognition and Understanding Handwriting Datasets and Synthetic Handwriting Generation Document Analysis and Processing PRICAI 2019: Trends in Artificial Intelligence Abhaya C. Nayak,Alok Sharma,2019-08-23 This three volume set LNAI 11670 LNAI 11671 and LNAI 11672 constitutes the thoroughly refereed proceedings of the 16th Pacific Rim Conference on Artificial Intelligence PRICAI 2019 held in Cuvu Yanuca Island Fiji in August 2019 The 111 full papers and 13 short papers presented in these volumes were carefully reviewed and selected from 265 submissions PRICAI covers a wide range of topics such as AI theories technologies and their applications in the areas of social and economic importance for countries in the Pacific Rim **Evolving BCI Therapy** Denis Larrivee,2018-10-17 As a strategic response to cognitive and CNS impairments BCI is a theoretical outgrowth of several generations of endogenous devices for peripheral nerves which have as a prime goal the direct replacement of lost neural function In these earlier applications therapeutic intervention has been premised only on the restoration of signal generating capacity where nerve transmission is largely unidirectional and temporally sequenced It is increasingly apparent however that the brain not only employs a very different type of syntax from that of peripheral nerves but also structures the semantic content of motor activity fundamentally altering the conception of BCI as a therapeutic medium The book presented here documents this change proposing a multi faceted strategy in which BCI therapy can restore the loss of multi tiered brain based motor function Computational Intelligence Techniques for New Product Design Kit Yan Chan,Yuk Shan Wong,Tharam S. Dillon,2012-02-18 Applying computational intelligence for product design is a fast growing and promising research area in computer sciences and industrial engineering However there is currently a lack of books which discuss this research area This book discusses a wide range of computational intelligence techniques for implementation on product

design It covers common issues on product design from identification of customer requirements in product design determination of importance of customer requirements determination of optimal design attributes relating design attributes and customer satisfaction integration of marketing aspects into product design affective product design to quality control of new products Approaches for refinement of computational intelligence are discussed in order to address different issues on product design Cases studies of product design in terms of development of real world new products are included in order to illustrate the design procedures as well as the effectiveness of the computational intelligence based approaches to product design This book covers the state of art of computational intelligence methods for product design which provides a clear picture to post graduate students in industrial engineering and computer science It is particularly suitable for researchers and professionals working on computational intelligence for product design It provides concepts techniques and methodologies for product designers in applying computational intelligence to deal with product design *Advanced Applications of Generative AI and Natural Language Processing Models* Obaid, Ahmed J.,Bhushan, Bharat,S., Muthmainnah,Rajest, S. Suman,2023-12-21 The rapid advancements in Artificial Intelligence AI specifically in Natural Language Processing NLP and Generative AI pose a challenge for academic scholars Staying current with the latest techniques and applications in these fields is difficult due to their dynamic nature while the lack of comprehensive resources hinders scholars ability to effectively utilize these technologies Advanced Applications of Generative AI and Natural Language Processing Models offers an effective solution to address these challenges This comprehensive book delves into cutting edge developments in NLP and Generative AI It provides insights into the functioning of these technologies their benefits and associated challenges Targeting students researchers and professionals in AI NLP and computer science this book serves as a vital reference for deepening knowledge of advanced NLP techniques and staying updated on the latest advancements in generative AI By providing real world examples and practical applications scholars can apply their learnings to solve complex problems across various domains Embracing Advanced Applications of Generative AI and Natural Language Processing Modelsequips academic scholars with the necessary knowledge and insights to explore innovative applications and unleash the full potential of generative AI and NLP models for effective problem solving Supervised and Unsupervised Pattern Recognition Evangelia Miche Tzanakou,2017-12-19 There are many books on neural networks some of which cover computational intelligence but none that incorporate both feature extraction and computational intelligence as Supervised and Unsupervised Pattern Recognition does This volume describes the application of a novel unsupervised pattern recognition scheme to the classification of various types of waveforms and images This substantial collection of recent research begins with an introduction to Neural Networks classifiers and feature extraction methods It then addresses unsupervised and fuzzy neural networks and their applications to handwritten character recognition and recognition of normal and abnormal visual evoked potentials The third section deals with advanced neural network architectures including

modular design and their applications to medicine and three dimensional NN architecture simulating brain functions The final section discusses general applications and simulations such as the establishment of a brain computer link speaker identification and face recognition In the quickly changing field of computational intelligence every discovery is significant Supervised and Unsupervised Pattern Recognition gives you access to many notable findings in one convenient volume

Exploring and Exploiting Structure and Self-supervision in Sequence Learning Junwen Bai,2022 Sequence data which consists of values organized in a certain order is one of the most commonly seen data types in our everyday lives For instance the daily temperature and precipitation measurements throughout a year form a sequence of weather conditions The crop yields each year over the past several decades depict a trend in agricultural production These are also known as time series data Time indexed data is not the only kind of sequence data Linguistic data such as speech and texts are sequential in nature DNA sequences are indexed based on the physical order of the bases and materials density of states are indexed by energy levels In fact any reasonably ordered data can be viewed as a sequence Sequence data has been a long standing area of interest in the artificial intelligence AI field and this class of problems is often called sequence learning Various kinds of sequence learning tasks have been defined such as predicting the general properties of a sequence tagging the sequence with labels at each index or generating a new sequence from the input Different types of sequence data have unique structures and it is often challenging to develop a model to encode or decode the data taking account the inherent sequential relationship so each sub field has historically relied on separate sequence learning tools and frameworks However recent advances in machine learning ML and deep neural networks DNN have provided the capacity to handle arbitrarily long sequences and store historical states in a more unified fashion regardless of the modality of the data Deep models like recurrent neural networks RNN long short term memory LSTM gated recurrent units GRU and transformers have become the foundation of most modern sequence learning and feature extraction methods A new challenge is to efficiently and effectively utilize these deep models to capture intrinsic features from the input sequences In this thesis I will study both supervised and self supervised sequence learning using deep models Conventional methods for supervised sequence learning are typically designed to study sequences of scalar values or vectors and are not suitable for structured data such as graphs I will illustrate three novel yet challenging scenarios involving graphs and sequences dynamic node property prediction for a fixed graph sequence prediction from a graph and multi label prediction of sequential inputs Structured input data can be modeled using a framework that combines graph neural networks GNN with sequence models e g GRU and transformer This framework is validated on several tasks including crop yield prediction and density of states prediction Self supervised learning is another trending direction in the sequence learning field Self supervision obtains supervisory signals from the data itself and leverages the underlying structure in the data It has the potential to improve the sample efficiency for downstream tasks and contribute to better model interpretability In recent years self supervised sequence learning has been

successfully applied to language and acoustic model pretraining In my thesis I will demonstrate that self supervision can enforce latent structure disentangle static and dynamic factors and supplement supervised signals in model training by applying it to speech recognition video understanding and sequence generation In general I will show in this thesis different methods to capture and exploit structure from sequence data and diverse explorations of the self supervision for sequence learning   **Balancing Signals for Semi-supervised Sequence Learning** Ge Ya Xu,2019 Recurrent Neural Networks RNNs are powerful models that have obtained outstanding achievements in many sequence learning tasks Despite their accomplishments RNN models still suffer with long sequences during training It is because error propagate backwards from output to input layers carrying gradient signals and with long input sequence issues like vanishing and exploding gradients can arise This thesis reviews many current studies and existing architectures designed to circumvent the long term dependency problems in backpropagation through time BPTT Mainly we focus on the method proposed by Trinh et al 2018 which uses semi supervised learning method to alleviate the long term dependency problems in BPTT Despite the good results Trinh et al 2018 s model achieved we suggest that the model can be further improved with a more systematic way of balancing auxiliary signals In this thesis we present our paper RNNs with Private and Shared Representations for Semi Supervised Learning which is currently under review for AAAI 2019 We propose a semi supervised RNN architecture with explicitly designed private and shared representations that regulates the gradient flow from auxiliary task to main task   **Supervised and Unsupervised Pattern Recognition** Evangelia Miche Tzanakou,1999-12-28 There are many books on neural networks some of which cover computational intelligence but none that incorporate both feature extraction and computational intelligence as Supervised and Unsupervised Pattern Recognition does This volume describes the application of a novel unsupervised pattern recognition scheme to the classification of various types of waveforms and images This substantial collection of recent research begins with an introduction to Neural Networks classifiers and feature extraction methods It then addresses unsupervised and fuzzy neural networks and their applications to handwritten character recognition and recognition of normal and abnormal visual evoked potentials The third section deals with advanced neural network architectures including modular design and their applications to medicine and three dimensional NN architecture simulating brain functions The final section discusses general applications and simulations such as the establishment of a brain computer link speaker identification and face recognition In the quickly changing field of computational intelligence every discovery is significant Supervised and Unsupervised Pattern Recognition gives you access to many notable findings in one convenient volume   **Analysis of Sequence Prediction in Recurrent Neural Networks** Rodney D. Blake,1996   **Implicit Sequence Learning in Recurrent Neural Networks** Stefan Glüge,2013   **Sequence Processing with Recurrent Neural Networks** Kei-wai Yeung,1994   **Recurrent neural networks training algorithms and backpropagation for sequences** ,1999   **Making the world differentiable** Jürgen Schmidhuber,1990

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