Advances in Pattern Recognition Systems
Using Neural Network Technologies
Springer Science & Business Media
This book constitutes the joint refereed proceedings of the 8th International Workshop on Structural and Syntactic Pattern Recognition and the 3rd International Workshop on Statistical Techniques in Pattern Recognition, SSPR 2000 and SPR 2000, held in Alicante, Spain in August/September 2000. The 52 revised full papers presented together with five invited papers and 35 posters were carefully reviewed and selected from a total of 130 submissions. The book offers topical sections on hybrid and combined methods, document image analysis, grammar and language methods, structural matching, graph-based methods, shape analysis, clustering and density estimation, object recognition, general methodology, and feature extraction and selection.

Pattern Recognition and Prediction with Applications to Signal Processing
John Wiley & Sons
This book discusses how to combine type-2 fuzzy sets and graphical models to solve a range of real-world pattern recognition problems such as speech recognition, handwritten Chinese character recognition, topic modeling as well as human action recognition. It covers these recent developments while also providing a comprehensive introduction to the fields of type-2 fuzzy sets and
graphical models. Though primarily intended for graduate students, researchers and practitioners in fuzzy logic and pattern recognition, the book can also serve as a valuable reference work for researchers without any previous knowledge of these fields. Dr. Jia Zeng is a Professor at the School of Computer Science and Technology, Soochow University, China. Dr. Zhi-Qiang Liu is a Professor at the School of Creative Media, City University of Hong Kong, China.

**Markov Models for Pattern Recognition** Springer Science & Business Media

Market: Engineers and researchers in neural networks, image processing, audio/speech, and medical imaging. This book begins by focusing on the theoretical aspect of pattern recognition and introduces an integrated pattern recognition paradigm, which combines preprocessing, low dimensional signal characterization, feature optimization, and mapping classifier architecture to good features in a seamless fashion. Later, the authors reinforce the concepts of pattern recognition and prediction with challenging real-world examples, encompassing financial market prediction, image coding, active and passive sonar processing, chaos modeling, and intelligent product design.

**Model Building in Neural Networks with Hidden Markov Models** World Scientific

This volume contains 18 papers of high quality, selected to represent the work that is being developed by Spanish research groups in pattern recognition and image analysis. It is partly the result of the efforts of the Spanish Association for Pattern Recognition and Image Analysis (AERFAI). It is hoped that this volume will increase awareness of Spanish work in the international scientific community and initiate contacts with research groups worldwide.


**Readership:** Computer scientists, computer and electrical engineering.

**keywords:**

**Progress In Handwriting Recognition** World Scientific

This thoroughly revised and expanded new edition now includes a more detailed treatment of the EM algorithm, a description of an efficient approximate Viterbi-training procedure, a theoretical derivation of the perplexity measure and coverage of multi-pass decoding based on n-best search. Supporting the discussion of the theoretical foundations of
Markov modeling, special emphasis is also placed on practical algorithmic solutions.

Features: introduces the formal framework for Markov models; covers the robust handling of probability quantities; presents methods for the configuration of hidden Markov models for specific application areas; describes important methods for efficient processing of Markov models, and the adaptation of the models to different tasks; examines algorithms for searching within the complex solution spaces that result from the joint application of Markov chain and hidden Markov models; reviews key applications of Markov models.

**Pattern Recognition and Image Analysis**

This thesis concerns the automatic generation of architectures for neural networks and other pattern recognition models comprising many elements of the same type. The requirement for such models, with automatically determined topology and connectivity, arises from two needs. The first is the need to develop commercial applications of the technology without resorting to laborious trial and error with different network sizes; the second is the need, in large and complex pattern processing applications such as speech recognition, to optimise the allocation of computing resources for problem solving. The state of the art in adaptive architectures is reviewed, and a mechanism is proposed for adding new processing elements to models. The scheme is developed in the context of multi-layer perceptron networks, and is linked to the best network-pruning mechanism available using a numerical criterion with construction required at one extreme and pruning at the other. The construction mechanism does not work in the multi-layer perceptron for which it was developed, owing to the long-range effects occurring in many applications of these networks. It works demonstrably well in density estimation models based on Gaussian mixtures, which are of the same family as the increasingly popular radial basis function networks. The construction mechanism is applied to the initialization of the density estimators embedded in the states of a hidden Markov model for speaker-independent speech recognition, where it offers a considerable increase in recogniser performance, provided cross-validation is used to prevent over-training.

**Handbook of Pattern Recognition and Computer Vision**

This book constitutes the joint refereed proceedings of the 8th International Workshop on Structural and Syntactic Pattern Recognition and the 3rd International Workshop on Statistical Techniques in Pattern Recognition, SSPR 2000 and SPR 2000, held in Alicante, Spain in August/September 2000. The 52 revised full papers presented together with five invited papers and 35 posters were carefully reviewed and selected from a total of 130 submissions. The book offers topical sections on hybrid and combined methods, document image analysis, grammar and language methods, structural matching, graph-based methods, shape analysis, clustering and density estimation, object recognition, general methodology, and feature extraction and selection.

**Selected Papers from the IVth Spanish Symposium**

The era of detailed comparisons of the merits of techniques of pattern recognition and artificial intelligence and of the integration of such techniques into flexible and powerful systems has begun. So confirm the editors of this fourth volume of Pattern Recognition in Practice, in their preface to the book. The 42 quality papers are sourced from a broad range of international specialists involved in developing pattern recognition methodologies and those using pattern recognition techniques in their professional work. The publication is divided into six sections: Pattern Recognition, Signal and Image Processing, Probabilistic Reasoning, Neural Networks, Comparative Studies, and Hybrid Systems, giving prospective users a feeling for the applicability of the various methods in their particular field.
of specialization.
Springer Science & Business Media
Markov chains and hidden Markov chains have applications in many areas of engineering and genomics. This book provides a basic introduction to the subject by first developing the theory of Markov processes in an elementary discrete time, finite state framework suitable for senior undergraduates and graduates. The authors then introduce semi-Markov chains and hidden semi-Markov chains, before developing related estimation and filtering results. Genomics applications are modelled by discrete observations of these hidden semi-Markov chains. This book contains new results and previously unpublished material not available elsewhere. The approach is rigorous and focused on applications.

Hybrid Methods in Pattern Recognition
Springer Science & Business Media
Hidden Markov Models (HMMs), although known for decades, have made a big career nowadays and are still in state of development. This book presents theoretical issues and a variety of HMMs applications in speech recognition and synthesis, medicine, neurosciences, computational biology, bioinformatics, seismology, environment protection and engineering. I hope that the reader will find this book useful and helpful for their own research.

Spatio-Temporal Pattern Recognition Using
Hidden Markov Models
Springer Science & Business Media
The International Conference on Machine Learning and Data Mining (MLDM) is the third meeting in a series of biennial events, which started in 1999, organized by the Institute of Computer Vision and Applied Computer Sciences (I BAI) in Leipzig. MLD M began as a workshop and is now a conference, and has brought the topic of machine learning and data mining to the attention of the research community. Seventy-five papers were submitted to the conference this year. The program committee worked hard to select the most progressiver search in a fair and competent review process which led to the acceptance of 33 papers for presentation at the conference. The 33 papers in these proceedings cover a wide variety of topics related to machine learning and data mining. The two invited talks deal with learning in case-based reasoning and with mining for structural data. The contributed papers can be grouped into nine areas: support vector machines; pattern discovery; decision trees; clustering; classification and retrieval; case-based reasoning; Bayesian models and methods; association rules; and applications. We would like to express our appreciation to the reviewers for their precise and highly professional work. We are grateful to the German Science Foundation for its support of the Eastern European researchers. We appreciate the help and understanding of the editorial staff at Springer Verlag, and in particular Alfred Hofmann, who supported the publication of these proceedings in the LNAI series. Last, but not least, we wish to thank all the speakers and participants who contributed to the success of the conference.

Connectionist Speech Recognition
World Scientific
Since their first inception, automatic reading systems have evolved substantially, yet the recognition of handwriting remains an open research problem due to its substantial variation in appearance. With the introduction of Markovian models to the field, a promising modeling and recognition paradigm was established for automatic handwriting recognition. However, no standard procedures for building Markov model-based recognizers have yet been established. This text provides a comprehensive overview of the application of Markov models in the field of handwriting recognition, covering both hidden Markov models and Markov-chain or n-gram models. First, the text introduces the typical architecture of a Markov model-based handwriting recognition system, and familiarizes the reader with the essential theoretical concepts behind Markovian models. Then, the text reviews proposed solutions in the literature for open problems in applying Markov model-based
approaches to automatic handwriting recognition.

**Artificial Neural Network, Supervised Learning, Hidden Markov Model, Pattern Recognition, Reinforcement Learning, Principal Component**

*World Scientific*

Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online.


*Joint IAPR International Workshops SSPR 2000 and SPR 2000 Alicante, Spain, August 30 - September 1, 2000 Proceedings World Scientific*

The research and development of pattern recognition have proven to be of importance in science, technology, and human activity. Many useful concepts and tools from different disciplines have been employed in pattern recognition. Among them is string matching, which receives much theoretical and practical attention. String matching is also an important topic in combinatorial optimization. This book is devoted to recent advances in pattern recognition and string matching. It consists of twenty eight chapters written by different authors, addressing a broad range of topics such as those from classification, matching, mining, feature selection, and applications. Each chapter is self-contained, and presents either novel methodological approaches or applications of existing theories and techniques. The aim, intent, and motivation for publishing this book is to provide a reference tool for the increasing number of readers who depend upon pattern recognition or string matching in some way. This includes students and professionals in computer science, mathematics, statistics, and electrical engineering. We wish to thank all the authors for their valuable efforts, which made this book a reality. Thanks also go to all reviewers who gave generously of their time and expertise.
Special Issue: Hidden Markov Models in Vision

Vieweg+Teubner Verlag

This dissertation, "Hand-written Chinese Character Recognition by First and Second Order Hidden Markov Models and Radical Modeling" by Ho-ting, Wong, ???, was obtained from The University of Hong Kong (Pokfulam, Hong Kong) and is being sold pursuant to Creative Commons: Attribution 3.0 Hong Kong License. The content of this dissertation has not been altered in any way. We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation. All rights not granted by the above license are retained by the author. Abstract: Abstract of thesis entitled "Hand-written Chinese Character Recognition by First and Second Order Hidden Markov Models and Radical Modeling" Submitted by Wong Ho Ting for the degree of Master of Philosophy at The University of Hong Kong in December 2003

Numerous handwritten Chinese character recognition systems are available on the market at present. Most of them are not robust enough, and handwritten Chinese character recognition remains a common research topic in pattern recognition. This research project exploits the fact that most Chinese characters can be broken down into simpler units (radicals). We hypothesize that using information from radicals will improve the recognition rate, and propose a recognition system deploying radical modeling. We also show that the recognition rate can be improved by using second order Hidden Markov Model (HMM) classifiers instead of first order HMM. A method for improving the rate of recognition of Chinese characters by modeling radicals instead of the whole character is presented. Because a radical is necessarily more primitive than the character in which it occurs, the complexity of the character models can be significantly reduced. The application of this concept requires an effective radical extraction scheme, and a modified version of Han's radical extraction method is presented. However, because we believe that the concept of radical modeling should be used only when it is needed, we introduce a criterion into the recognition system that determines when to apply the concept. We also compare the performance of second order HMM classifiers against first order HMM classifiers, due to their greater descriptive power. Experiments were conducted on the ETL8B2 character set, and a 0.43% improvement was obtained by introducing the concept of radical modeling in a recognition system with a first order HMM fine-classifier and a Bayes pre-classifier. This is an encouraging result because this 0.43% represented about one third of all characters which were wrongly recognized by the recognition system without radical modeling. If a comparison is made only with a first order HMM classifier, a 0.52% improvement can be observed. On the other hand, although second order HMM did not show a constant improvement from the experiment results, the improvement in the case of codebook size equal to 64 suggests that constant improvement may be observed by having enough training samples or performing a KL transform in the training phase. In conclusion, we have proposed a method for improving the recognition rate of handwritten Chinese characters by using the concept of radical modeling. We applied this concept to certain appropriate character samples, using a modified version of Han's
radical extraction method in the recognition system. We also compared the performance of a second order HMM classifier with a typical first order HMM classifier. Encouraging results were observed, and the results indicate that a combination of radical modeling and use of second order HMM could help to improve the rate of recognition of handwritten Chinese characters. DOI: 10.5353/th_b2777086

Subjects: Pattern recognition systems
Chinese characters - Data processing
Markov processes

Hidden Markov Models Springer

Contents:A Connectionist Approach to Speech Recognition (Y Bengio)Signature Verification Using a “Siamese” Time Delay Neural Network (J Bromley et al.)Boosting Performance in Neural Networks (H Drucker et al.)An Integrated Architecture for Recognition of Totally Unconstrained Handwritten Numerals (A Gupta et al.)Time-Warping Network: A Neural Approach to Hidden Markov Model Based Speech Recognition (E Levin et al.)Computing Optical Flow with a Recurrent Neural Network (H Li & J Wang)Integrated Segmentation and Recognition through Exhaustive Scans or Learned Saccadic Jumps (G L Martin et al.)Experimental Comparison of the Effect of Order in Recurrent Neural Networks (C B Miller & C L Giles)Adaptive Classification by Neural Net Based Prototype Populations (K Peleg & U Ben-Hanan)A Neural System for the Recognition of Partially Occluded Objects in Cluttered Scenes: A Pilot Study (L Wiskott & C von der Malsburg)and other papers

Readership: Computer scientists and engineers. Pattern Recognition and String Matching Springer Hidden Markov models (HMMs) originally emerged in the domain of speech recognition. In recent years, they have attracted growing interest in the area of computer vision as well. This book is a collection of articles on new developments in the theory of HMMs and their application in computer vision. It addresses topics such as handwriting recognition, shape recognition, face and gesture recognition, tracking, and image database retrieval. This book is also published as a special issue of the International Journal of Pattern Recognition and Artificial Intelligence (February 2001).


Readership: Graduate students of computer science, electrical engineering and related fields, as well as researchers at academic and industrial institutions.

Keywords:Hidden Markov Models;Gesture Recognition;Bayesian Networks;Optical Character Recognition;Handwriting Character Recognition;Cartography;Shape Extraction;Image Feature Extraction.

Methodological Issues and Applications Elsevier

Both pattern recognition and computer vision have experienced rapid progress in the last twenty-five years. This book provides the latest advances in pattern recognition and computer vision along with their many applications. It features articles written by renowned leaders in the field while topics are presented in readable form.
to a wide range of readers. The book is divided into five parts: basic methods in pattern recognition, basic methods in computer vision and image processing, recognition applications, life science and human identification, and systems and technology. There are eight new chapters on the latest developments in life sciences using pattern recognition as well as two new chapters on pattern recognition in remote sensing.

*Third International Conference, MLDM 2003, Leipzig, Germany, July 5-7, 2003, proceedings*

World Scientific

The first edition, published in 1973, has become a classic reference in the field. Now with the second edition, readers will find information on key new topics such as neural networks and statistical pattern recognition, the theory of machine learning, and the theory of invariances. Also included are worked examples, comparisons between different methods, extensive graphics, expanded exercises and computer project topics.

An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

*Pattern Recognition and Image Analysis* World Scientific

Part of a two-volume set, this book constitutes the refereed proceedings of the Third Iberian Conference on Pattern Recognition and Image Analysis, IbPRIA 2007, held in Girona, Spain in June 2007. It covers pattern recognition, human language technology, special architectures and industrial applications, motion analysis, image analysis, biomedical applications, shape and texture analysis, 3D, and image coding and processing.