

Research On Feature Extraction Based On Deep Learning

Image data has portrayed immense potential as a foundation of information for numerous applications. Recent trends in multimedia computing have witnessed a rapid growth in digital image collections, resulting in a need for increased image data management. Feature Dimension Reduction for Content-Based Image Identification is a pivotal reference source that explores the contemporary trends and techniques of content-based image recognition. Including research covering topics such as feature extraction, fusion techniques, and image segmentation, this book explores different theories to facilitate timely identification of image data and managing, archiving, maintaining, and extracting information. This book is ideally designed for engineers, IT specialists, researchers, academicians, and graduate-level students seeking interdisciplinary research on image processing and analysis.

Focusing on feature extraction while also covering issues and techniques such as image acquisition, sampling theory, point operations and low-level feature extraction, the authors have a clear and coherent approach that will appeal to a wide range of students and professionals. Ideal module text for courses in artificial intelligence, image processing and computer vision Essential reading for engineers and academics working in this cutting-edge field Supported by free software on a companion website

This book constitutes the refereed proceedings of the Third International Conference on Information, Communication and Computing Technology, ICICCT 2018, held in New Delhi,

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India, in May 2018. The 18 revised full papers presented in this volume were carefully reviewed and selected from 295 submissions. The papers are organized in topical sections on communication and network systems and emerging computing technologies.

The book presents selected research papers on current developments in the field of soft computing and signal processing from the International Conference on Soft Computing and Signal Processing (ICSCSP 2018). It includes papers on current topics such as soft sets, rough sets, fuzzy logic, neural networks, genetic algorithms and machine learning, discussing various aspects of these topics, like technological, product implementation, contemporary research as well as application issues.

Content-Based Image Classification: Efficient Machine Learning Using Robust Feature Extraction Techniques is a comprehensive guide to research with invaluable image data. Social Science Research Network has revealed that 65% of people are visual learners. Research data provided by Hyerle (2000) has clearly shown 90% of information in the human brain is visual. Thus, it is no wonder that visual information processing in the brain is 60,000 times faster than text-based information (3M Corporation, 2001). Recently, we have witnessed a significant surge in conversing with images due to the popularity of social networking platforms. The other reason for embracing usage of image data is the mass availability of high-resolution cellphone cameras. Wide usage of image data in diversified application areas including medical science, media, sports, remote sensing, and so on, has spurred the need for further research in optimizing archival, maintenance, and retrieval of appropriate image content to leverage data-driven decision-making. This book demonstrates several techniques of image processing to represent image data in a desired format for information identification. It

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discusses the application of machine learning and deep learning for identifying and categorizing appropriate image data helpful in designing automated decision support systems. The book offers comprehensive coverage of the most essential topics, including: Image feature extraction with novel handcrafted techniques (traditional feature extraction) Image feature extraction with automated techniques (representation learning with CNNs) Significance of fusion-based approaches in enhancing classification accuracy MATLAB® codes for implementing the techniques Use of the Open Access data mining tool WEKA for multiple tasks The book is intended for budding researchers, technocrats, engineering students, and machine learning/deep learning enthusiasts who are willing to start their computer vision journey with content-based image recognition. The readers will get a clear picture of the essentials for transforming the image data into valuable means for insight generation. Readers will learn coding techniques necessary to propose novel mechanisms and disruptive approaches. The WEKA guide provided is beneficial for those uncomfortable coding for machine learning algorithms. The WEKA tool assists the learner in implementing machine learning algorithms with the click of a button. Thus, this book will be a stepping-stone for your machine learning journey. Please visit the author's website for any further guidance at <https://www.rikdas.com/>

Recent years have seen a vast development in various methodologies for object detection and feature extraction and recognition, both in theory and in practice. When processing images, videos, or other types of multimedia, one needs efficient solutions to perform fast and reliable processing. Computational intelligence is used for medical screening where the detection of disease symptoms is carried out, in prevention monitoring to detect suspicious behavior, in

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agriculture systems to help with growing plants and animal breeding, in transportation systems for the control of incoming and outgoing transportation, for unmanned vehicles to detect obstacles and avoid collisions, in optics and materials for the detection of surface damage, etc. In many cases, we use developed techniques which help us to recognize some special features. In the context of this innovative research on computational intelligence, the Special Issue “Advanced Computational Intelligence for Object Detection, Feature Extraction and Recognition in Smart Sensor Environments” present an excellent opportunity for the dissemination of recent results and achievements for further innovations and development. It is my pleasure to present this collection of excellent contributions to the research community. -

Prof. Marcin Woźniak, Silesian University of Technology, Poland –

Theoretical results suggest that in order to learn the kind of complicated functions that can represent high-level abstractions (e.g. in vision, language, and other AI-level tasks), one may need deep architectures. Deep architectures are composed of multiple levels of non-linear operations, such as in neural nets with many hidden layers or in complicated propositional formulae re-using many sub-formulae. Searching the parameter space of deep architectures is a difficult task, but learning algorithms such as those for Deep Belief Networks have recently been proposed to tackle this problem with notable success, beating the state-of-the-art in certain areas. This paper discusses the motivations and principles regarding learning algorithms for deep architectures, in particular those exploiting as building blocks unsupervised learning of single-layer models such as Restricted Boltzmann Machines, used to construct deeper models such

as Deep Belief Networks.

Vein-based biological systems are highly useful for identification purposes since they cannot be stolen, duplicated, or washed out. These systems present opportunities in networking and cloud-based and internet of things systems as a more specific and accurate method of identification. However, while the concept is novel, the execution remains imperfect, and the current techniques to drive positive identification must be honed before implementation. *Cloud-Based M-Health Systems for Vein Image Enhancement and Feature Extraction: Emerging Research and Opportunities* is an essential publication that examines the design and development of new digital identification tools. Featuring coverage of a broad range of topics including performance evaluation, algorithms, and design architecture, this book is ideally designed for clinicians, healthcare providers, programmers, software developers, doctors, academicians, researchers, and students.

Sustainable management of natural resources is an urgent need, given the changing climatic conditions of Earth systems. The ability to monitor natural resources precisely and accurately is increasingly important. New and advanced remote sensing tools and techniques are continually being developed to monitor and manage natural resources in an effective way. Remote sensing technology uses electromagnetic sensors to record, measure and monitor even small variations in natural resources. The addition of new remote sensing datasets, processing techniques and software makes remote sensing

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an exact and cost-effective tool and technology for natural resource monitoring and management. *Advances in Remote Sensing for Natural Resources Monitoring* provides a detailed overview of the potential applications of advanced satellite data in natural resource monitoring. The book determines how environmental and - ecological knowledge and satellite-based information can be effectively combined to address a wide array of current natural resource management needs. Each chapter covers different aspects of remote sensing approach to monitor the natural resources effectively, to provide a platform for decision and policy. This important work: Provides comprehensive coverage of advances and applications of remote sensing in natural resources monitoring Includes new and emerging approaches for resource monitoring with case studies Covers different aspects of forest, water, soil- land resources, and agriculture Provides exemplary illustration of themes such as glaciers, surface runoff, ground water potential and soil moisture content with temporal analysis Covers blue carbon, seawater intrusion, playa wetlands, and wetland inundation with case studies Showcases disaster studies such as floods, tsunami, showing where remote sensing technologies have been used This edited book is the first volume of the book series *Advances in Remote Sensing for Earth Observation*.

Medical imaging is one of the heaviest funded biomedical engineering research areas. The second edition of *Pattern Recognition and Signal Analysis in Medical Imaging* brings sharp focus to the development of integrated systems for use in the clinical

sector, enabling both imaging and the automatic assessment of the resultant data. Since the first edition, there has been tremendous development of new, powerful technologies for detecting, storing, transmitting, analyzing, and displaying medical images. Computer-aided analytical techniques, coupled with a continuing need to derive more information from medical images, has led to a growing application of digital processing techniques in cancer detection as well as elsewhere in medicine. This book is an essential tool for students and professionals, compiling and explaining proven and cutting-edge methods in pattern recognition for medical imaging. New edition has been expanded to cover signal analysis, which was only superficially covered in the first edition. New chapters cover Cluster Validity Techniques, Computer-Aided Diagnosis Systems in Breast MRI, Spatio-Temporal Models in Functional, Contrast-Enhanced and Perfusion Cardiovascular MRI. Gives readers an unparalleled insight into the latest pattern recognition and signal analysis technologies, modeling, and applications. Master's Thesis from the year 2012 in the subject Technology, grade: 10, , language: English, abstract: In this research we evaluate the use of GLRLM features in offline handwritten signature verification. For each known writer we take a sample of fifteen genuine signatures and extract their GLRLM descriptors. We also used some forged signatures to test the efficiency of our system. We calculate the simple statistical measures and also inter- and intra-class Euclidean distances (measure of variability within the same author) among GLRLM descriptors of the known signatures. The key

points Euclidean distances, the image distances and the intra class thresholds are stored as templates. We evaluate use of various intra-class distance thresholds like the mean, standard deviation and range. For each signature claimed to be of the known writers, we extract its GLRLM descriptors and calculate the inter-class distances, that is the Euclidean distances between each of its GLRLM descriptors and those of the known template and image distances between the test signature and members of the genuine sample. The intra-class threshold is compared to the inter-class threshold for the claimed signature to be considered a forgery. A database of 525 genuine signatures and 30 forged signatures consisting of a training set and a test set are used.

Abstract : Feature extraction is an important process in automatic off-line signature verification systems. In this process, only the information that helps to identify the authenticity of questioned signatures is extracted and retained. Amongst the numerous feature extraction techniques investigated by researchers, grid segmentation schemes have been employed more favourably due to their encouraging results. The research presented in this dissertation focuses on improving the performance of Support Vector Machines (SVMs) based off-line signature verification systems using novel feature extraction techniques. The research began with an in-depth investigation and comparative performance analysis of the Modified Direction Feature (MDF), a structural feature extraction technique. Since the MDF is known for its relatively high accuracies in the cursive character recognition problem, it has been suggested that the

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performance of the MDF would be as encouraging in verifying Western (English) signatures due to the "cursive appearance" of the signatures. The other features employed for comparative studies were the two grid-based features proposed by Francesco Camastra and Wakabayashi et al. (Gradient feature). The former feature captures the information about the distribution of the foreground pixels in each grid cell whilst the latter utilises the directional information available. The comparisons of these state-of-the-art techniques set the foundation for the development of the novel feature extraction techniques proposed. In total, three novel local features and four global features were proposed and investigated. The local features include Gaussian Grid, Curvature Map, Variance and the local features are New Ratio, Energy, Trajectory Length, Moment. Amongst the local features proposed, the Gaussian Grid feature significantly outperformed all the state-of-the-art features mentioned above. Nevertheless, the combination of another particularly small-dimensional local feature, the Variance feature, with the global features also outperformed the MDF and the Camastra features, and closely approximates the performance of the Gradient feature. The total dimension of this feature set was only 33 compared to 120 of the MDF. This finding emphasizes the capability of small-dimensional global features.

Feature Extraction for Image Processing and Computer Vision is an essential guide to the implementation of image processing and computer vision techniques, with tutorial introductions and sample code in MATLAB and Python. Algorithms are presented and fully explained to

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enable complete understanding of the methods and techniques demonstrated. As one reviewer noted, "The main strength of the proposed book is the link between theory and exemplar code of the algorithms." Essential background theory is carefully explained. This text gives students and researchers in image processing and computer vision a complete introduction to classic and state-of-the-art methods in feature extraction together with practical guidance on their implementation. The only text to concentrate on feature extraction with working implementation and worked through mathematical derivations and algorithmic methods A thorough overview of available feature extraction methods including essential background theory, shape methods, texture and deep learning Up to date coverage of interest point detection, feature extraction and description and image representation (including frequency domain and colour) Good balance between providing a mathematical background and practical implementation Detailed and explanatory of algorithms in MATLAB and Python

Master's Thesis from the year 2015 in the subject Electrotechnology, grade: 1, Technical University of Munich, language: English, abstract: Images of different object surfaces convey important information about haptically perceptible textures. The extraction of tactile information of different materials by making use of inexpensive technologies can have practical and commercial applications in e-commerce or robotics. However, differences in distance, rotation, lighting and focus conditions are hurdles which need to be overcome to extract robust image-based features that will allow a successful surface classification task. In this work, eleven haptically relevant features are introduced, which have a low to invariant dependency on different camera conditions. These are used for a robust machine learning-based approach for surface classification. A database of 690 images, corresponding to 69 different textures, is

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used to extract haptically relevant features. Perceptually-relevant image features such as roughness, softness and regularity are used to correctly classify the textures. The extracted features are perceptually relevant so that they can be also used in future work for the retrieval of the most similar textured surface to a classified one. Experimental results and the evaluation of a cross-validated naive Bayes classifier show that the proposed approach allows for the successful classification of textured surfaces under varying camera conditions, a maximum prediction accuracy of 85.8% being achieved. When a subset of 6 features is selected, a classification accuracy of 82.5% is obtained.

Since the 1950's character recognition has been an active field of research for computer scientists worldwide. The main reason is that character recognition is not only an interesting area of theoretical research with relevance to many pattern recognition sub-fields, but also a very needed and useful real life application. Making computers able to read would allow for substantial savings in terms of the costs for data entry, mail processing, form processing and many other similar situations. Every realistic character recognition system requires a feature extraction step in order to properly operate. This book is a large-scale review of the feature extraction approaches for character recognition based on literature review and experimental results. An original classification system is described, which groups feature extraction methods depending on their theoretical approach. The developed classification system aids in comparison and analysis of the feature extraction methods.

Feature Extraction Based on Wavelet Moments and Moment Invariants in Machine Vision Systems.

The two-volume proceedings LNCS 7087 + LNCS 7088 constitute the proceedings of the 5th

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Pacific Rim Symposium on Image and Video Technology, PSIVT 2011, held in Gwangju, Korea, in November 2011. The total of 71 revised papers was carefully reviewed and selected from 168 submissions. The topics covered are: image/video coding and transmission; image/video processing and analysis; imaging and graphics hardware and visualization; image/video retrieval and scene understanding; biomedical image processing and analysis; biometrics and image forensics; and computer vision applications.

This book emphasizes various image shape feature extraction methods which are necessary for image shape recognition and classification. Focussing on a shape feature extraction technique used in content-based image retrieval (CBIR), it explains different applications of image shape features in the field of content-based image retrieval. Showcasing useful applications and illustrating examples in many interdisciplinary fields, the present book is aimed at researchers and graduate students in electrical engineering, data science, computer science, medicine, and machine learning including medical physics and information technology.

This book is both a reference for engineers and scientists and a teaching resource, featuring tutorial chapters and research papers on feature extraction. Until now there has been insufficient consideration of feature selection algorithms, no unified presentation of leading methods, and no systematic comparisons.

The Special Issue entitled “Remote Sensing in Vessel Detection and Navigation” comprises 15 articles on many topics related to remote sensing with navigational sensors. The sequence of articles included in this Special Issue is in line with the latest scientific trends. The latest developments in science, including artificial intelligence, were used. It can be said that

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navigation and vessel detection remain important and hot topics, and a lot of work will continue to be done worldwide. New techniques and methods for analyzing and extracting information from navigational sensors and data have been proposed and verified. Some of these will spark further research, and some are already mature and can be considered for industrial implementation and development.

Recent advancements and innovations in medical image and data processing have led to a need for robust and secure mechanisms to transfer images and signals over the internet and maintain copyright protection. The Handbook of Research on Information Security in Biomedical Signal Processing provides emerging research on security in biomedical data as well as techniques for accurate reading and further processing. While highlighting topics such as image processing, secure access, and watermarking, this publication explores advanced models and algorithms in information security in the modern healthcare system. This publication is a vital resource for academicians, medical professionals, technology developers, researchers, students, and practitioners seeking current research on intelligent techniques in medical data security.

This book presents the conceptual and mathematical basis and the implementation of both electroencephalogram (EEG) and EEG signal processing in a comprehensive, simple, and easy-to-understand manner. EEG records the electrical activity generated by the firing of neurons within human brain at the scalp. They are widely used in clinical neuroscience, psychology, and neural engineering, and a series of EEG signal-processing techniques have been developed. Intended for cognitive neuroscientists, psychologists and other interested readers, the book discusses a range of current mainstream EEG signal-processing and feature-

extraction techniques in depth, and includes chapters on the principles and implementation strategies.

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This book introduces a range of image color feature extraction techniques. Readers are encouraged to try implementing the techniques discussed here on their own, all of which are presented in a very simple and step-by-step manner. In addition, the book can be used as an introduction to image color feature techniques for those who are new to the research field and software. The techniques are very easy to understand as most of them are described with pictorial examples. Not only the techniques themselves, but also their applications are covered. Accordingly, the book offers a valuable guide to these tools, which are a vital component of content-based image retrieval (CBIR).

This book proposes applications of tensor decomposition to unsupervised feature extraction and feature selection. The author posits that although supervised methods including deep learning have become popular, unsupervised methods have their own advantages. He argues that this is the case because unsupervised methods are easy to learn since tensor decomposition is a conventional linear methodology. This book starts from very basic linear algebra and reaches the cutting edge methodologies applied to difficult situations when there are many features (variables) while only small number of samples are available. The author includes advanced descriptions about tensor decomposition including Tucker decomposition

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using high order singular value decomposition as well as higher order orthogonal iteration, and train tensor decomposition. The author concludes by showing unsupervised methods and their application to a wide range of topics. Allows readers to analyze data sets with small samples and many features; Provides a fast algorithm, based upon linear algebra, to analyze big data; Includes several applications to multi-view data analyses, with a focus on bioinformatics.

Feature extraction is an important task in the overall processing of iris biometric in an iris based biometric authentication system. The existing approaches are using complete iris image to extract iris features. But, it is difficult to get complete iris image for feature extraction because a person's eyes are naturally covered by the eyelids and eyelashes. Thus, the correct recognition rate decreased in the existing approaches due to occluded eyelids and eyelashes classified as an iris region. Therefore, this research proposed an iris image model and a feature extraction method for partial iris recognition. Several issues that are investigated in this research i.e. which parts or regions of the iris are more stable and provide distinctive texture patterns, what is the optimum coverage area of the iris that is required to extract discriminant texture features for partial iris recognition, the existing feature extraction methods and the nature of features whether they can be used for partial iris recognition.

This book provides the new results in wavelet filter banks based feature extraction, and the classifier in the field of iris image recognition. It provides the broad treatment on the design of separable, non-separable wavelets filter banks, and the classifier. The design techniques presented in the book are applied on iris image analysis for person authentication. This book also brings together the three strands of research (wavelets, iris image analysis and classifier). It compares the performance of the presented techniques with state-of-the-art available

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schemes. This book contains the compilation of basic material on the design of wavelets that avoids reading many different books. Therefore, it provides an easier path for the new-comers, researchers to master the contents. In addition, the designed filter banks and classifier can also be effectively used than existing filter-banks in many signal processing applications like pattern classification, data-compression, watermarking, denoising etc. that will give the new directions of the research in the relevant field for the readers.

Well known researchers in all areas related to featured based manufacturing have contributed chapters to this book. Some of the chapters are surveys, while others review a specific technique. All contributions, including those from the editors, were thoroughly refereed. The goal of the book is to provide a comprehensive picture of the present stage of development of Features Technology from the point of view of applications in manufacturing. The book is aimed at several audiences. Firstly, it provides the research community with an overview of the present state-of-the-art features in manufacturing, along with references in the literature. Secondly, the book will be useful as supporting material for a graduate-level course on product modeling and realization. Finally, the book will also be valuable to industrial companies who are assessing the significance of features for their business.

The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Many successful applications of machine learning exist already, including systems that analyze past sales data to predict customer behavior, optimize robot behavior so that a task can be completed using minimum resources, and extract knowledge from bioinformatics data. Introduction to Machine Learning is a comprehensive textbook on the subject, covering a broad array of topics not usually included in introductory machine learning

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texts. Subjects include supervised learning; Bayesian decision theory; parametric, semi-parametric, and nonparametric methods; multivariate analysis; hidden Markov models; reinforcement learning; kernel machines; graphical models; Bayesian estimation; and statistical testing. Machine learning is rapidly becoming a skill that computer science students must master before graduation. The third edition of Introduction to Machine Learning reflects this shift, with added support for beginners, including selected solutions for exercises and additional example data sets (with code available online). Other substantial changes include discussions of outlier detection; ranking algorithms for perceptrons and support vector machines; matrix decomposition and spectral methods; distance estimation; new kernel algorithms; deep learning in multilayered perceptrons; and the nonparametric approach to Bayesian methods. All learning algorithms are explained so that students can easily move from the equations in the book to a computer program. The book can be used by both advanced undergraduates and graduate students. It will also be of interest to professionals who are concerned with the application of machine learning methods.

This book constitutes the refereed proceedings of the 14th Scandinavian Conference on Image Analysis, SCIA 2005, held in Joensuu, Finland in June 2005. The 124 papers presented together with 6 invited papers were carefully reviewed and selected from 236 submissions. The papers are organized in topical sections on image segmentation and understanding, color image processing, applications, theory, medical image processing, image compression, digitalization of cultural heritage, computer vision, machine vision, and pattern recognition.

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