Simple Algorithm Page Layout Analysis Springerlink

Statistical learning and analysis techniques have become extremely important today, given the tremendous growth in the size of heterogeneous data collections and the ability to process it even from physically distant locations. Recent advances made in the field of machine learning provide a strong framework for robust learning from the diverse corpora and continue to impact a variety of research problems across multiple scientific disciplines. The aim of this handbook is to familiarize beginners as well as experts with some of the recent techniques in this field. The Handbook is divided in two sections: Theory and Applications, covering machine learning, data analytics, biometrics, document recognition and security. very relevant to current research challenges faced in various fields self-contained reference to machine learning emphasis on applications-oriented techniques

This book constitutes the thoroughly refereed post conference proceedings of the second edition of the Semantic Web Evaluation Challenge, SemWebEval 2015, co-located with the 12th European Semantic Web conference, held in Portorož, Slovenia, in May/June 2015. This book includes the descriptions of all methods and tools that competed at SemWebEval 2015, together with a detailed description of the tasks, evaluation procedures and datasets. The contributions are grouped in the areas: open knowledge extraction challenge (OKE 2015); semantic publishing challenge (SemPub 2015); schema-agnostic queries over large-schema databases challenge (SAQ 2015); concept-level sentiment analysis challenge (CLSA 2015).

Thisvolumecontainspapersselectedforpresentationatthe6thIAPRWorkshop on Document Analysis Systems (DAS 2004) held during September 8–10, 2004 at the University of Florence, Italy. Several papers represent the state of the art in a broad range of “traditional” topics such as layout analysis, applications to graphics recognition, and handwritten documents. Other contributions address the description of complete working systems, which is one of the strengths of this workshop. Some papers extend the application domains to other media, like the processing of Internet documents. The peculiarity of this 6th workshop was the large number of papers related to digital libraries and to the processing of historical documents, a taste which frequently requires the analysis of color documents. A total of 17 papers are associated with these topics, whereas two yearsago (in DAS 2002) only a couple of papers dealt with these problems. In our view there are three main reasons for this new wave in the DAS community. From the scienti?c point of view, several research ?elds reached a thorough knowledge of techniques and problems that can be e?ectively solved, and this expertise can now be applied to new domains. Another incentive has been provided by several research projects funded by the EC and the NSF on topics related to digital libraries.

The rapidly growing volume of available digital documents of various formats and the possibility to access these through Internet-based technologies, have led to the necessity to develop solid methods to properly organize and structure documents in large digital libraries and repositories. Due to the extremely large volumes of documents and to their unstructured form, most of the research efforts in this direction are dedicated to automatically infer structure and schemas that can help to better organize huge collections of documents and data. This book covers the latest advances in structure inference in heterogeneous collections of documents and data. The book brings a comprehensive view of the state-of-the-art in the area, presents some lessons learned and identifies new research issues, challenges and opportunities for further research agenda and developments. The selected chapters cover a broad range of research issues, from theoretical approaches to case studies and best practices in the field. Researcher, software developers, practitioners and students interested in the field of learning structure and schemas from documents will find the comprehensive coverage of this book useful for their research, academic, development and practice activity.
Comprehensive treatment focuses on creation of efficient data structures and algorithms and selection or design of data structure best suited to specific problems. This edition uses Java as the programming language.
This text reviews the issues involved in handling and processing digital documents. Examining the full range of a document's lifetime, the book covers acquisition, representation, security, pre-processing, layout analysis, understanding, analysis of single components, information extraction, filing, indexing and retrieval. Features: provides a list of acronyms and a glossary of technical terms; contains appendices covering key concepts in machine learning, and providing a case study on building an intelligent system for digital document and library management; discusses issues of security, and legal aspects of digital documents; examines core issues of document image analysis, and image processing techniques of particular relevance to digitized documents; reviews the resources available for natural language processing, in addition to techniques of linguistic analysis for content handling; investigates methods for extracting and retrieving data/information from a document.
ICIAR 2004, the International Conference on Image Analysis and Recognition, was the ?rst ICIAR conference, and was held in Porto, Portugal. ICIAR will be organized annually, and will alternate between Europe and North America. ICIAR 2005 will take place in Toronto, Ontario, Canada. The idea of o?ering these conferences came as a result of discussion between researchers in Portugal and Canada to encourage collaboration and exchange, mainly between these two countries, but also with the open participation of other countries, addressing recent advances in theory, methodology and applications. The response to the call for papers for ICIAR 2004 was very positive. From 316 full papers submitted, 210 were accepted (97 oral presentations, and 113 - sters). The review process was carried out by the Program Committee

members and other reviewers; all are experts in various image analysis and recognition areas. Each paper was reviewed by at least two reviewing parties. The high q- lity of the papers in these proceedings is attributed ?rst to the authors, and second to the quality of the reviews provided by the experts. We would like to thank the authors for responding to our call, and we wholeheartedly thank the reviewers for their excellent work in such a short amount of time. We are espe- ally indebted to the Program Committee for their e?orts that allowed us to set up this publication. We were very pleased to be able to include in the conference, Prof. Murat KuntfromtheSwissFederalInstituteofTechnology,andProf. Mario ? Figueiredo, oftheInstitutoSuperiorT ? ecnico,inPortugal.

ICNC-FSKD is a premier international forum for scientists and researchers to present the state of the art of data mining and intelligent methods inspired from nature, particularly biological, linguistic, and physical systems, with applications to computers, circuits, systems, control, communications, and more. This is an exciting and emerging interdisciplinary area in which a wide range of theory and methodologies are being investigated and developed to tackle complex and challenging problems.

This book constitutes the thoroughly refereed post-conference proceedings of the first International Symposium on Intelligent Informatics (ISI'12) held in Chennai, India during August 4-5, 2012. The 54 revised papers presented were carefully reviewed and selected from 165 initial submissions. The papers are organized in topical sections on data mining, clustering and intelligent information systems, multi agent systems, pattern recognition, signal and image processing and, computer networks and distributed systems. The book is directed to the researchers and scientists engaged in various fields of intelligent informatics.

This book constitutes the refereed proceedings of the 7th International Conference on Document Analysis Systems, DAS 2006, held in Nelson, New Zealand, in February 2006. The 33 revised full papers and 22 poster papers presented were carefully reviewed and selected from 78 submissions. The papers are organized in topical sections on digital libraries, image processing, handwriting, document structure and format, tables, language and script identification, systems and performance evaluation, and retrieval and segmentation.

This Guide to OCR for Arabic Scripts is the first book of its kind, specifically devoted to this emerging field. Topics and features: contains contributions from the leading researchers in the field; with a Foreword by Professor Bente Maegaard of the University of Copenhagen; presents a detailed overview of Arabic character recognition technology, covering a range of different aspects of pre-processing and feature extraction; reviews a broad selection of varying approaches, including HMM-based methods and a recognition system based on multidimensional recurrent neural networks; examines the evaluation of Arabic script recognition systems, discussing data collection and annotation, benchmarking strategies, and handwriting recognition competitions; describes numerous applications of Arabic script recognition technology, from historical Arabic manuscripts to online Arabic recognition. Optical character recognition and document image analysis have become very important areas with a fast growing number of

researchers in the field. This comprehensive handbook with contributions by eminent experts, presents both the theoretical and practical aspects at an introductory level wherever possible. Contents:Pattern Classification Techniques Based on Function Approximation (U Kressel & J Schürmann)Combination of Multiple Classifier Decisions for Optical Character Recognition (L Lam et al.)Segmentation-Based Cursive Handwriting Recognition (M Shridhar & F Kimura)Handwritten Word Recognition Using Hidden Markov Models (A Kundu)Techniques for Improving OCR Results (A Dengel et al.)Multilingual Document Recognition (A L Spitz)Arabic Character Recognition (A Amin)Interpretation of Engineering Drawings (K Tombre & D Dori)Automatic Reading of Music Notation (D Bainbridge & N Carter)Algorithms for Automatic Signature Verification (G Dimauro et al.)Automatic Reading of Braille Documents (A Antonacopoulos)Information Retrieval and OCR (K Taghva et al.)Benchmarking DIA Systems (T A Nartker et al.)and other papers Readership: Computer scientists and engineers. keywords:

The objective of Document Analysis and Recognition (DAR) is to recognize the text and graphicalcomponents of a document and to extract information. With ?rst papers dating back to the 1960's, DAR is a mature but still gr- ing research?eld with consolidated and known techniques. Optical Character Recognition (OCR) engines are some of the most widely recognized pr- ucts of the research in this ?eld, while broader DAR techniques are nowadays studied and applied to other industrial and o?ce automation systems. In the machine learning community, one of the most widely known - search problems addressed in DAR is recognition of unconstrained handwr- ten characters which has been frequently used in the past as a benchmark for evaluating machine learning algorithms, especially supervised classi?ers. However, developing a DAR system is a complex engineering task that involves the integration of multiple techniques into an organic framework. A reader may feel that the use of machine learning algorithms is not approp- ate for other DAR tasks than character recognition. On the contrary, such algorithms have been massively used for nearly all the tasks in DAR. With large emphasis being devoted to character recognition and word recognition, other tasks such as pre-processing, layout analysis, character segmentation, and signature veri?cation have also bene?ted much from machine learning algorithms.

This three-volume set constitutes the refereed proceedings of the International Conference on Computational Science and its Applications. These volumes feature outstanding papers that present a wealth of original research results in the field of computational science, from foundational issues in computer science and mathematics to advanced applications in almost all sciences that use computational techniques.

This book constitutes the refereed proceedings of the 15th International Symposium on Methodologies for Intelligent Systems, ISMIS 2005, held in Saratoga Springs, NY, USA in May 2005. The 69 revised full papers presented together with 2 invited papers were carefully reviewed and selected from close to 200 submissions. The papers are organized in topical sections on knowledge discovery and data mining, intelligent information systems, information and knowledge integration, soft computing, clustering, Web data processing, AI logics, applications, intelligent information retrieval, and knowledge representation.

This volume constitutes the refereed proceedings of the 4th Iberian Conference on Pattern Recognition and Image Analysis,

IbPRIA 2009, held in Póvoa de Varzim, Portugal in June 2009. The 33 revised full papers and 29 revised poster papers presented together with 3 invited talks were carefully reviewed and selected from 106 submissions. The papers are organized in topical sections on computer vision, image analysis and processing, as well as pattern recognition.

"Page layout analysis has been extensively studied since the 1980s, particularly after computers began to be used for document storage or database units. For efficient document storage and retrieval from a database, a paper document would be transformed into its electronic version. Algorithms and methodologies are used for document image analysis in order to segment a scanned document into different regions such as text, image or line regions. To contribute a novel approach in the field of page layout analysis and classification, this algorithm is developed for both RBG space and grey-scale scanned documents without requiring any specific document types, and scanning techniques. In this thesis, a page classification algorithm is proposed which mainly applies wavelet transform, Markov random field (MRF) and Hough transform to segment text, photo and strong-edge/line regions in both color and gray-scale scanned documents. The algorithm is developed to handle both simple and complex page layout structures and contents (text only vs. book cover that includes text, lines and/or photos). The methodology consists of five modules. In the first module, called pre-processing, image enhancements techniques such as image scaling, filtering, color space conversion or gamma correction are applied in order to reduce computation time and enhance the scanned document. The techniques, used to perform the classification, are employed on the one-fourth resolution input image in the CIEL*a*b* color space. In the second module, the text detection module uses wavelet analysis to generate a text-region candidate map which is enhanced by applying a Run Length Encoding (RLE) technique for verification purposes. The third module, photo detection, initially uses block-wise segmentation which is based on basis vector projection technique. Then, MRF with maximum a-posteriori (MAP) optimization framework is utilized to generate photo map. Next, Hough transform is applied to locate lines in the fourth module. Techniques for edge detection, edge linkages, and line-segment fitting are used to detect strong-edges in the module as well. After those three classification maps are obtained, in the last module a final page layout map is generated by using K-Means. Features are extracted to classify the intersection regions and merge into one classification map with K-Means clustering. The proposed technique is tested on several hundred images and its performance is validated by utilizing Confusion Matrix (CM). It shows that the technique achieves an average of ~85% classification accuracy rate in text, photo, and background regions on a variety of scanned documents like articles, magazines, business cards, dictionaries or newsletters etc. More importantly, it performs independently from a scanning process and an input scanned document (RGB or gray-scale) with comparable classification quality."--Abstract.

Comprehensive treatment focuses on creation of efficient data structures and algorithms and selection or design of data

structure best suited to specific problems. This edition uses C++ as the programming language.

This book provides the first comprehensive look at the emerging field of web document analysis. It sets the scene in this new field by combining state-of-the-art reviews of challenges and opportunities with research papers by leading researchers. Readers will find in-depth discussions on the many diverse and interdisciplinary areas within the field, including web image processing, applications of machine learning and graph theories for content extraction and web mining, adaptive web content delivery, multimedia document modeling and human interactive proofs for web security. Contents: Content Extraction and Web Mining; Document Analysis for Adaptive Content Delivery; Table Understanding on the Web; Web Image Analysis and Retrieval; New Opportunities. Readership: Graduate students and researchers in document-analysis and web communities.

The latest trends in Information Technology represent a new intellectual paradigm for scientific exploration and visualization of scientific phenomena. The present treatise covers almost all the emerging technologies in the field. Academicians, engineers, industralists, scientists and researchers engaged in teaching, research and development of Computer Science and Information Technology will find the book useful for their future academic and research work. The present treatise comprising 225 articles broadly covers the following topics exhaustively. 01. Advance Networking and Security/Wireless Networking/Cyber Laws 02. Advance Software Computing 03. Artificial Intelligence/Natural Language Processing/ Neural Networks 04. Bioinformatics/Biometrics 05. Data Mining/E-Commerce/E-Learning 06. Image Processing, Content Based Image Retrieval, Medical and Bio-Medical Imaging, Wavelets 07. Information Processing/Audio and Text Processing/Cryptology, Steganography and Digital Watermarking 08. Pattern Recognition/Machine Vision/Image Motion, Video Processing 09. Signal Processing and Communication/Remote Sensing 10. Speech Processing & Recognition, Human Computer Interaction 11. Information and Communication Technology

The text covers important algorithm design techniques, such as greedy algorithms, dynamic programming, and divide-and-conquer, and gives applications to contemporary problems. Techniques including Fast Fourier transform, KMP algorithm for string matching, CYK algorithm for context free parsing and gradient descent for convex function minimization are discussed in detail. The book's emphasis is on computational models and their effect on algorithm design. It gives insights into algorithm design techniques in parallel, streaming and memory hierarchy computational models. The book also emphasizes the role of randomization in algorithm design, and gives numerous applications ranging from data-structures such as skip-lists to dimensionality reduction methods.

This book presents high-quality research in the field of 3D imaging technology. The second edition of International

Conference on 3D Imaging Technology (3DDIT-MSP&DL) continues the good traditions already established by the first 3DIT conference (IC3DIT2019) to provide a wide scientific forum for researchers, academia and practitioners to exchange newest ideas and recent achievements in all aspects of image processing and analysis, together with their contemporary applications. The conference proceedings are published in 2 volumes. The main topics of the papers comprise famous trends as: 3D image representation, 3D image technology, 3D images and graphics, and computing and 3D information technology. In these proceedings, special attention is paid at the 3D tensor image representation, the 3D content generation technologies, big data analysis, and also deep learning, artificial intelligence, the 3D image analysis and video understanding, the 3D virtual and augmented reality, and many related areas. The first volume contains papers in 3D image processing, transforms and technologies. The second volume is about computing and information technologies, computer images and graphics and related applications. The two volumes of the book cover a wide area of the aspects of the contemporary multidimensional imaging and the related future trends from data acquisition to real-world applications based on various techniques and theoretical approaches.

Numerical Algorithms: Methods for Computer Vision, Machine Learning, and Graphics presents a new approach to numerical analysis for modern computer scientists. Using examples from a broad base of computational tasks, including data processing, computational photography, and animation, the textbook introduces numerical modeling and algorithmic desig

Discrete optimization problems are everywhere, from traditional operations research planning (scheduling, facility location and network design); to computer science databases; to advertising issues in viral marketing. Yet most such problems are NP-hard; unless P = NP, there are no efficient algorithms to find optimal solutions. This book shows how to design approximation algorithms: efficient algorithms that find provably near-optimal solutions. The book is organized around central algorithmic techniques for designing approximation algorithms, including greedy and local search algorithms, dynamic programming, linear and semidefinite programming, and randomization. Each chapter in the first section is devoted to a single algorithmic technique applied to several different problems, with more sophisticated treatment in the second section. The book also covers methods for proving that optimization problems are hard to approximate. Designed as a textbook for graduate-level algorithm courses, it will also serve as a reference for researchers interested in the heuristic solution of discrete optimization problems.

The Handbook of Document Image Processing and Recognition is a comprehensive resource on the latest methods and techniques in document image processing and recognition. Each chapter provides a clear overview of the topic followed by the state of the art of techniques used – including elements of comparison between them – along with supporting references to

archival publications, for those interested in delving deeper into topics addressed. Rather than favor a particular approach, the text enables the reader to make an informed decision for their specific problems.

This book constitutes the refereed proceedings of the 5th International Workshop on Document Analysis Systems, DAS 2002, held in Princeton, NJ, USA in August 2002 with sponsorship from IAPR.The 44 revised full papers presented together with 14 short papers were carefuly reviwed and selected for inclusion in the book. All current issues in document analysis systems are adressed. The papers are organized in topical sections on OCR features and systems, handwriting recognition, layout analysis, classifiers and learning, tables and forms, text extraction, indexing and retrieval, document engineering, and new applications.

This practical text contains fairly "traditional" coverage of data structures with a clear and complete use of algorithm analysis, and some emphasis on file processing techniques as relevant to modern programmers. It fully integrates OO programming with these topics, as part of the detailed presentation of OO programming itself.Chapter topics include lists, stacks, and queues; binary and general trees; graphs; file processing and external sorting; searching; indexing; and limits to computation.For programmers who need a good reference on data structures.

Along with text and graphics, images are fast becoming a generic data type forgeneral-purpose computer systems. This poses new problems for the systems designer, who must be ableto preprocess digital image data for a wide variety of video and hard copy displays. Digitalhalftoning, the method by which the illusion of continuous-tone images are created through thearrangement of binary picture elements, is a key component of any preprocessing.Digital Halftoningaddresses the problem of developing algorithms that best match the specific parameters of any targetdisplay device. It is the first significant study of the process of producing quality images onpractical computer displays.To aid the systems designer, Ulichney devises the concept of blue noise- which has many desirable properties for halftoning - and suggests efficient algorithms for itsuse. He also introduces new metrics for analyzing the frequency content of periodic and aperiodicpatterns for both rectangular and hexagonal grids, and presents a unique "aspect ratio immunity"argument in favor of hexagonal grids. Included are several carefully selected digitally-producedimages.Robert Ulichney is Principle Engineer with the Digital Equipment Corporation.

This book continues first one of the same authors “Adaptive Image Processing Algorithms for Printing” and presents methods and software solutions for copying and scanning various types of documents by conventional office equipment, offering techniques for correction of distortions and enhancement of scanned documents; techniques for automatic cropping and de-skew; approaches for segmentation of text and picture regions; documents classifiers; approach for vectorization of symbols by approximation of their contour by curves; methods for optimal compression of scanned documents, algorithm for stitching parts of large originals; copy-protection methods by microprinting and embedding of hidden information to hardcopy; algorithmic approach for toner saving. In addition, method for integral printing is considered. Described techniques operate in automatic mode thanks to machine learning or ingenious heuristics. Most the techniques presented have a low computational complexity and memory consumption due to they were designed for firmware of embedded systems or software drivers. The book reflects the authors’ practical experience in

algorithm development for industrial R&D.

Until now, no other book examined the gap between the theory of algorithms and the production of software programs. Focusing on practical issues, A Programmer's Companion to Algorithm Analysis carefully details the transition from the design and analysis of an algorithm to the resulting software program. Consisting of two main complementary

This two-volume set LNCS 12131 and LNCS 12132 constitutes the refereed proceedings of the 17th International Conference on Image Analysis and Recognition, ICIAR 2020, held in Póvoa de Varzim, Portugal, in June 2020. The 54 full papers presented together with 15 short papers were carefully reviewed and selected from 123 submissions. The papers are organized in the following topical sections: image processing and analysis; video analysis; computer vision; 3D computer vision; machine learning; medical image and analysis; analysis of histopathology images; diagnosis and screening of ophthalmic diseases; and grand challenge on automatic lung cancer patient management. Due to the corona pandemic, ICIAR 2020 was held virtually only.

This book constitutes the refereed proceedings of the 24th International Conference on Information and Software Technologies, ICIST 2018, held in Vilnius, Lithuania, in October 2018. The 48 papers presented were carefully reviewed and selected from 124 submissions. The papers are organized in topical sections on information systems; business intelligence for information and software systems; software engineering; and information technology applications.

The two-volume set LNCS 12376 and 12377 constitutes the refereed proceedings of the 17th International Conference on Computers Helping People with Special Needs, ICCHP 2020, held in Lecco, Italy, in September 2020. The conference was held virtually due to the COVID-19 pandemic. The 104 papers presented were carefully reviewed and selected from 206 submissions. Included also are 13 introductions. The papers are organized in the following topical sections: Part I: user centred design and user participation in inclusive R&D; artificial intelligence, accessible and assistive technologies; XR accessibility – learning from the past, addressing real user needs and the technical architecture for inclusive immersive environments; serious and fun games; large-scale web accessibility observatories; accessible and inclusive digital publishing; AT and accessibility for blind and low vision users; Art Karshmer lectures in access to mathematics, science and engineering; tactile graphics and models for blind people and recognition of shapes by touch; and environmental sensing technologies for visual impairment Part II: accessibility of non-verbal communication: making spatial information accessible to people with disabilities; cognitive disabilities and accessibility – pushing the boundaries of inclusion using digital technologies and accessible eLearning environments; ICT to support inclusive education – universal learning design (ULD); hearing systems and accessories for people with hearing loss; mobile health and mobile rehabilitation for people with disabilities: current state, challenges and opportunities; innovation and implementation in the area of independent mobility through digital technologies; how to improve interaction with a text input system; human movement analysis for the design and evaluation of interactive systems and assistive devices; and service and care

provision in assistive environments 10 chapters are available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Interest in the automatic processing and analysis of document images has been rapidly increasing during the past few years. This book addresses the different subfields of document image analysis, including preprocessing and segmentation, form processing, handwriting recognition, line drawing and map processing, and contextual processing.

Machine Learning in Document Analysis and RecognitionSpringer Science & Business Media

Optical character recognition and document image analysis have become very important areas with a fast growing number of researchers in the field. This comprehensive handbook with contributions by eminent experts, presents both the theoretical and practical aspects at an introductory level wherever possible.

This two-volume set (CCIS 158 and CCIS 159) constitutes the refereed proceedings of the International Workshop on Computer Science for Environmental Engineering and EcoInformatics, CSEEE 2011, held in Kunming, China, in July 2011. The 150 revised full papers presented in both volumes were carefully reviewed and selected from a large number of submissions. The papers are organized in topical sections on computational intelligence; computer simulation; computing practices and applications; ecoinformatics; image processing information retrieval; pattern recognition; wireless communication and mobile computing; artificial intelligence and pattern classification; computer networks and Web; computer software, data handling and applications; data communications; data mining; data processing and simulation; information systems; knowledge data engineering; multimedia applications.

Planning algorithms are impacting technical disciplines and industries around the world, including robotics, computer-aided design, manufacturing, computer graphics, aerospace applications, drug design, and protein folding. This coherent and comprehensive book unifies material from several sources, including robotics, control theory, artificial intelligence, and algorithms. The treatment is centered on robot motion planning, but integrates material on planning in discrete spaces. A major part of the book is devoted to planning under uncertainty, including decision theory, Markov decision processes, and information spaces, which are the 'configuration spaces' of all sensor-based planning problems. The last part of the book delves into planning under differential constraints that arise when automating the motions of virtually any mechanical system. This text and reference is intended for students, engineers, and researchers in robotics, artificial intelligence, and control theory as well as computer graphics, algorithms, and computational biology.