

Character Recognition Using Matlab's Neural Network Toolbox

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Abstract

Recognition of Handwritten text has been one of the active and challenging areas of research in the field of image processing and pattern recognition. It has numerous applications which include, reading aid for blind, bank cheques and conversion of any hand written document into structural text form. In this paper we focus on recognition of English alphabet in a given scanned text document with the help of Neural Networks. Using Matlab Neural Network toolbox, we tried to recognize handwritten characters by projecting them on different sized grids. The first step is image acquisition which acquires the scanned image followed by noise filtering, smoothing and normalization of scanned image, rendering image suitable for segmentation where image is decomposed into sub images. Feature Extraction improves recognition rate and misclassification. We use character extraction and edge detection algorithm for training the neural network to classify and recognize the handwritten characters.

Keywords: Character Recognition, Neural Network, Character Extraction algorithm, Edge Detection algorithm, Image acquisition

1. Introduction

Handwriting recognition has been one of the most fascinating and challenging research areas in field of image processing and pattern recognition in the recent years [1]. It contributes immensely to the advancement of automation process and improves the interface between man and machine in numerous applications. In general, handwriting recognition is classified into two types as off-line and on-line handwriting recognition methods. The on-line methods have been shown to be superior to their off-line counter parts in recognizing handwritten characters due to the temporal information available with the former. However, in the off-line systems, comparably high recognition accuracy levels [5].

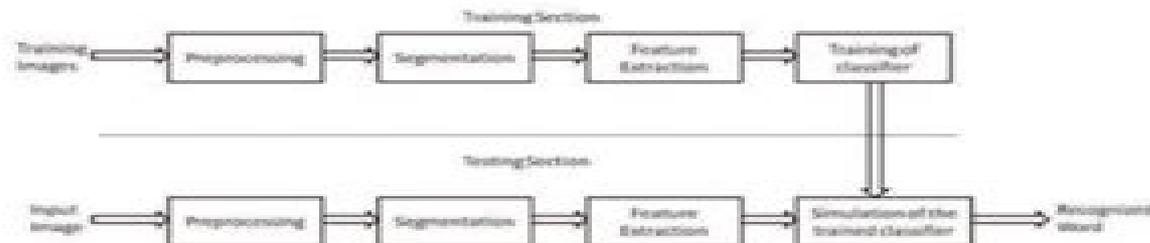


Figure 1. Generic Character Recognition Model

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**Deepak Gupta,Zdzislaw
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Bhattacharyya,Oscar Castillo**

Character Recognition Using Matlab S Neural Network Toolbox:

International Conference on Mobile Computing and Sustainable Informatics Jennifer S. Raj, 2020-11-30 Sustainability and mobile computing embraces a wide range of Information and Communication Technologies ICT in recent times This book focuses more on the recent research and development works in almost all the facets of sustainable ubiquitous computing and communication paradigm The recent research efforts on this evolving paradigm help to advance the technologies for next generation where socio economic growth and sustainability poses significant challenges to the computing and communication infrastructures The main purpose of this book is to promote the technical advances and impacts of sustainability and mobile computing to the informatics research The key strands of this book include green computing predictive models mobility data analytics mobile computing optimization Quality of Service QoS new communicating and computing frameworks human computer interaction Artificial Intelligence AI communication networks risk management Ubiquitous computing robotics smart city and applications The book has also addressed myriad of sustainability challenges in various computing and information processing infrastructures

Advances in System Optimization and Control Sri Niwas Singh, Fushuan Wen, Monika Jain, 2018-06-08 This book comprises select proceedings of the International Conference on Advancement in Energy Drives and Control It covers frontier topics in optimization and control It covers applications of optimization processes in areas such as computer architecture communication systems system optimization signal processing fluid dynamics and process control This book is of use to researchers professionals and students from across engineering disciplines

Soft Computing: Theories and Applications Millie Pant, Kanad Ray, Tarun K. Sharma, Sanyog Rawat, Anirban Bandyopadhyay, 2017-11-23 This book focuses on soft computing and its applications to solve real life problems occurring in different domains ranging from medical and health care supply chain management and image processing to cryptanalysis It presents the proceedings of International Conference on Soft Computing Theories and Applications SoCTA 2016 offering significant insights into soft computing for teachers and researchers and inspiring more and more researchers to work in the field of soft computing The term soft computing represents an umbrella term for computational techniques like fuzzy logic neural networks and nature inspired algorithms In the past few decades there has been an exponential rise in the application of soft computing techniques for solving complex and intricate problems arising in different spheres of life The versatility of these techniques has made them a favorite among scientists and researchers working in diverse areas SoCTA is the first international conference being organized at Amity University Rajasthan AUR Jaipur The objective of SoCTA 2016 is to provide a common platform to researchers academicians scientists and industrialists working in the area of soft computing to share and exchange their views and ideas on the theory and application of soft computing techniques in multi disciplinary areas The aim of the conference is to bring together young and experienced researchers academicians scientists and industrialists for the exchange of knowledge SoCTA especially encourages the young

researchers at the beginning of their career to participate in this conference and present their work on this platform

Optical Character Recognition Systems for Different Languages with Soft Computing Arindam Chaudhuri, Krupa Mandaviya, Pratixa Badelia, Soumya K Ghosh, 2016-12-23 The book offers a comprehensive survey of soft computing models for optical character recognition systems The various techniques including fuzzy and rough sets artificial neural networks and genetic algorithms are tested using real texts written in different languages such as English French German Latin Hindi and Gujrati which have been extracted by publicly available datasets The simulation studies which are reported in details here show that soft computing based modeling of OCR systems performs consistently better than traditional models Mainly intended as state of the art survey for postgraduates and researchers in pattern recognition optical character recognition and soft computing this book will be useful for professionals in computer vision and image processing alike dealing with different issues related to optical character recognition Deep Learning and Neural Networks: Concepts, Methodologies, Tools, and Applications

Management Association, Information Resources, 2019-10-11 Due to the growing use of web applications and communication devices the use of data has increased throughout various industries It is necessary to develop new techniques for managing data in order to ensure adequate usage Deep learning a subset of artificial intelligence and machine learning has been recognized in various real world applications such as computer vision image processing and pattern recognition The deep learning approach has opened new opportunities that can make such real life applications and tasks easier and more efficient Deep Learning and Neural Networks Concepts Methodologies Tools and Applications is a vital reference source that trends in data analytics and potential technologies that will facilitate insight in various domains of science industry business and consumer applications It also explores the latest concepts algorithms and techniques of deep learning and data mining and analysis Highlighting a range of topics such as natural language processing predictive analytics and deep neural networks this multi volume book is ideally designed for computer engineers software developers IT professionals academicians researchers and upper level students seeking current research on the latest trends in the field of deep learning

Handwritten Character Recognition - a Neutral Net Approach Chia-wei Hu, 1995 Proceedings of Data Analytics and Management Deepak Gupta, Zdzislaw Polkowski, Ashish Khanna, Siddhartha Bhattacharyya, Oscar Castillo, 2022-01-04 This book includes original unpublished contributions presented at the International Conference on Data Analytics and Management ICDAM 2021 held at Jan Wyzykowski University Poland during June 2021 The book covers the topics in data analytics data management big data computational intelligence and communication networks The book presents innovative work by leading academics researchers and experts from industry which is useful for young researchers and students

Advanced Computer and Communication Engineering Technology Hamzah Asyrani Sulaiman, Mohd Azlishah Othman, Mohd Fairuz Iskandar Othman, Yahaya Abd Rahim, Naim Che Pee, 2014-11-01 This book covers diverse aspects of advanced computer and communication engineering focusing specifically on industrial and manufacturing theory and

applications of electronics communications computing and information technology Experts in research industry and academia present the latest developments in technology describe applications involving cutting edge communication and computer systems and explore likely future directions In addition access is offered to numerous new algorithms that assist in solving computer and communication engineering problems The book is based on presentations delivered at ICOCOE 2014 the 1st International Conference on Communication and Computer Engineering It will appeal to a wide range of professionals in the field including telecommunication engineers computer engineers and scientists researchers academics and students

HCI International 2017 - Posters' Extended Abstracts Constantine Stephanidis,2017-05-11 The two volume set CCIS 713 and CCIS 714 contains the extended abstracts of the posters presented during the 19th International Conference on Human Computer Interaction HCI International 2017 held in Vancouver BC Canada in July 2017 HCII 2017 received a total of 4340 submissions of which 1228 papers were accepted for publication after a careful reviewing process The 177 papers presented in these two volumes were organized in topical sections as follows Part I Design and evaluation methods tools and practices novel interaction techniques and devices psychophysiological measuring and monitoring perception cognition and emotion in HCI data analysis and data mining in social media and communication ergonomics and models in work and training support Part II Interaction in virtual and augmented reality learning games and gamification health well being and comfort smart environments mobile interaction visual design and visualization social issues and security in HCI

Advanced Research on Electronic Commerce, Web Application, and Communication Gang Shen,Xiong Huang,2011-03-31 The two volume set CCIS 143 and CCIS 144 constitutes the refereed proceedings of the International Conference on Electronic Commerce Web Application and Communication ECWAC 2011 held in Guangzhou China in April 2011 The 148 revised full papers presented in both volumes were carefully reviewed and selected from a large number of submissions Providing a forum for engineers scientists researchers in electronic commerce Web application and communication fields the conference will put special focus also on aspects such as e business e learning and e security intelligent information applications database and system security image and video signal processing pattern recognition information science industrial automation process control user machine systems security integrity and protection as well as mobile and multimedia communications

Web Mining V.S. Kumbhar,K. S. Oza,R.K. Kamat,2022-09-01 Web mining is the application of data mining strategies to excerpt learning from web information i e web content web structure and web usage data With the emergence of the web as the predominant and converging platform for communication business and scholastic information dissemination especially in the last five years there are ever increasing research groups working on different aspects of web mining mainly in three directions These are mining of web content web structure and web usage In this context there are good number of frameworks and benchmarks related to the metrics of the websites which is certainly weighty for B2B B2C and in general in any e commerce paradigm Owing to the popularity of this topic there are few books in

the market dealing more on such performance metrics and other related issues This book however omits all such routine topics and lays more emphasis on the classification and clustering aspects of the websites in order to come out with the true perception of the websites in light of its usability In nutshell Web Mining A Synergic Approach Resorting to Classifications and Clustering showcases an effective methodology for classification and clustering of web sites from their usability point of view While the clustering and classification is accomplished by using an open source tool WEKA the basic dataset for the selected websites has been emanated by using a free tool site analyzer As a case study several commercial websites have been analyzed The dataset preparation using site analyzer and classification through WEKA by embedding different algorithms is one of the unique selling points of this book This text projects a complete spectrum of web mining from its very inception through data mining and takes the reader up to the application level Salient features of the book include Literature review of research work in the area of web mining Business websites domain researched and data collected using site analyzer tool Accessibility design text multimedia and networking are assessed Datasets are filtered further by selecting vital attributes which are Search Engine Optimized for processing using the Weka attributed tool Dataset with labels have been classified using J48 RBF Network Na ve Bayes and SMO techniques using Weka A comparative analysis of all classifiers is reported Commercial applications for improving website performance based on SEO is given **Dr. Dobb's Journal** ,1993

Second-order and Nonsmooth Training Methods for Fuzzy Neural Networks Christian Eitzinger,2001

Automatic object recognition Nicholas George,2002 HERCMA 2001 ,2002 Combining Pattern Classifiers Ludmila

I. Kuncheva,2004-07 Publisher Description **Applied Optics** ,1999 **Electrical & Electronics Abstracts** ,1997

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State Estimation Ferdinand van der Heijden,2004-10-29 Classification Parameter Estimation and State Estimation is a practical guide for data analysts and designers of measurement systems and postgraduates students that are interested in advanced measurement systems using MATLAB Prtools is a powerful MATLAB toolbox for pattern recognition and is written and owned by one of the co authors B Duin of the Delft University of Technology After an introductory chapter the book provides the theoretical construction for classification estimation and state estimation The book also deals with the skills required to bring the theoretical concepts to practical systems and how to evaluate these systems Together with the many examples in the chapters the book is accompanied by a MATLAB toolbox for pattern recognition and classification The appendix provides the necessary documentation for this toolbox as well as an overview of the most useful functions from these toolboxes With its integrated and unified approach to classification parameter estimation and state estimation this book is a suitable practical supplement in existing university courses in pattern classification optimal estimation and data analysis Covers all contemporary main methods for classification and estimation Integrated approach to classification parameter estimation and state estimation Highlights the practical deployment of theoretical issues Provides a concise and practical

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