

Introduction

Traditionally, the transmission and storage of information has been done using written, paper documents. In the past 20–30 years in North America, documents have increasingly originated on a computer, to the point that such documents constitute the majority of generated documents today. It is not clear whether the computer has decreased or increased the amount of paper documents, despite this trend. For example, documents are printed out for easier reading. The aim of creating the “paperless” office seems as far away as it ever has been, and a new trend has settled in its place. This new trend or objective is to deal with the flow of electronic and paper documents in an efficient and integrated way. Therefore, the ultimate solution would enable computers to process images of written documents in a way similar to that in which other forms of computer media (e.g., magnetic and optical disks) are being handled.

The goal of document image analysis is to be able to recognize and extract textual and graphical information from within an image of a document. Two document processing categories can be defined: text processing and graphics processing. Text processing deals with the textual contents of the document image. Some tasks associated with this category are optical character recognition (OCR), skew detection, text location, text layout identification, etc. Graphics processing deals with non-textual line and symbol components making up line diagrams, company logos, graphs, etc. Algorithms in this category also include line thinning, line fitting, corner detection, etc.

In this special issue on document analysis, the papers fall into the category of text processing.

The five articles in this special issue span areas such as font detection, skew correction, text region extraction, character recognition and signature verification.

The first article by Ming et al. deals with the problem of text font identification, which can help in improving character recognition and identifying logical structures of documents. The authors propose a morphological representation approach.

The second article in this special issue provides a new coding scheme for compressing binary document images. The scheme permits

performance of connected component extraction, skew detection and skew correction in the compressed domain and thus speeds up such operations.

In the third article by Lashkia et al., the authors propose a method for locating text regions in images which have complex backgrounds, such as outdoor scenes.

The next article addresses handwritten numeral recognition, a challenging problem in text processing. Cheng et al. propose a new multi-stage recognition structure which exploits topological characteristics of numerals such as character contours and their properties to classify numerals into major groups and subgroups. The recognition is then performed within the subgroups based on comparison of Fourier descriptors of the outer contour of the character with those of prototypes of the subgroup.

The final article in the issue reports on a data-fusion approach for verification of handwritten signatures. The application domain is bank cheque images. Basir et al. use a linear-pool fusion method which combines decisions from a selected set of verification algorithms. The decision is further fused with the decision of a neural network classifier. The fusion-based verification is shown to outperform its individual verifiers.

As guest editors of this special issue we would like to sincerely thank Dr. Om Malik, the Editor-in-Chief, for giving us the opportunity to present the issue to the readership of the *Canadian Journal of Electrical and Computer Engineering*. He has been very supportive and prompt with his advice when we needed it. We would also like to thank the authors for responding to our call and sharing their excellent work in this area. We would like to gratefully acknowledge the help of the reviewers who went through the difficult task of evaluating the contributions of the submitted papers in a relatively tight schedule. The help of Ms. Pat Polan of the Pattern Analysis and Machine Intelligence Group at the University of Waterloo in corresponding with authors and organizing the material is much appreciated.

M. Kamel, S. Wesolkowski
Guest Editors

Guest Editors

MOHAMED S. KAMEL received the B.Sc. (Hons) degree in Electrical Engineering from the University of Alexandria, Egypt, M.Sc. degree in Computation from McMaster University, Hamilton, Ontario, Canada, and Ph.D. degree in Computer Science from the University of Toronto, Ontario, Canada.

He joined the Department of Systems Design Engineering, University of Waterloo, Ontario, Canada, in 1985. He is at present a Professor and Associate Director of the Pattern Analysis and Machine Intelligence Laboratory at the same department.

Dr. Kamel's research interests are in Machine Intelligence, Neural Networks and Pattern Recognition with applications in Robotics and Manufacturing. He has authored and co-authored over 130 papers in journals, and conference proceedings, two patents and numerous technical and industrial project reports. Under his supervision, 32 Ph.D. and M.A.Sc. students have completed their degrees.

Dr. Kamel is a member of ACM, AAI, CIPS, APEO and a senior member of IEEE, Associate Editor of three international journals and guest editor for special issues in four journals. He has served as a consultant for General Motors, NCR, IBM, Northern Telecom and Spar Aerospace. He is a member of the board of directors and co-founder of Virtek Vision Corporation in Waterloo.

SLAWO WESOLKOWSKI graduated from the University of Waterloo in 1994 with a B.A.Sc. in Systems Design Engineering (First Class). He has also been pursuing an M.A.Sc. in Systems Design Engineering part-time in colour-image edge detection and segmentation.

In 1994, he joined NCR Canada Ltd. in Waterloo, Ontario, where he is currently a Member of Technical Staff. He has worked on advanced development projects in image processing and pattern recognition for automated cheque processing. He is currently working on image processing software for a cheque fraud detection module.

He has published several conference papers on automated cheque processing and one journal paper in new technology introduction. He has several patents pending in the area of automatic cheque processing.

He is a member of IEEE, as well as several of its societies: IEEE Computer Society, IEEE Signal Processing Society and IEEE Society on Social Implications of Technology. He may be contacted at s.wesolkowski@ieee.org.