



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

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بالرسالة صفحات
لم ترد بالأصل



Mansoura University
Faculty of Engineering
Computer and Systems Engineering Department

**Intelligent Expert System
for
Articulate Arabic Text Machine Reader**

A Thesis
Submitted for Partial Fulfillment of the
Degree of Master of Science
in
Computer and Systems Engineering

Submitted By

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Mansoura, 2001

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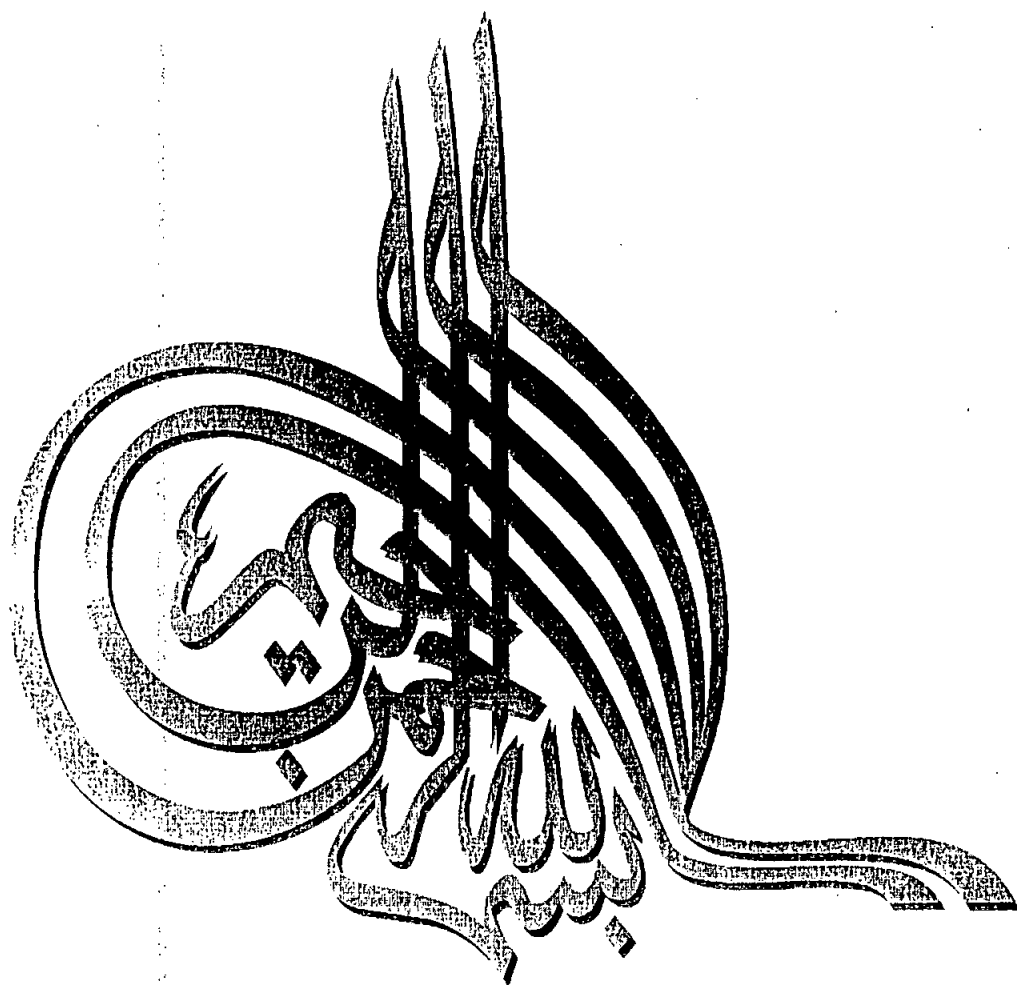
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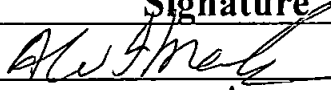
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Abstract

Mohammed Fathi Hamed ALRahmawy
Intelligent-Expert System

for

Articulate Arabic Text Machine Reader

Master of Science Dissertation

Mansoura University, 2001

This thesis aims mainly to build a fast and efficient Arabic OCR system using object-oriented programming technology in order to build an Articulating machine reader for the printed Arabic writing.

Hence, the basic difficulties and the different characteristics of the Arabic text recognition problem are outlined. Then, different stages of OCR systems are reviewed and the basic approaches used in each stage are studied and the previous work in Arabic OCR is reviewed.

Also, basic concepts of Neural Networks and its most general models are reviewed. Then, a summary of back propagation algorithm for learning is presented as the most widely learning algorithm. The virtues and limitations of Back-Propagation Learning are studied.

Next, The details of the algorithms used in implementing the proposed system are studied. Where, novel algorithms for document preprocessing and extracting the chain-coded inner and outer contours of the subwords of the document and representing them as objects are presented. Then, locations of these objects are analyzed in order to segment them in separate lines. Also, a new Arabic text segmentation algorithm is presented for segmenting the chain coded contours of the Arabic subwords into chain coded objects of the primitives of the characters (sub-characters) constituting these subwords. Then, a novel fast and efficient algorithm for extracting the central-moments features out of the chain-coded upper and lower outer contours of the segmented primitives is used in order to improve the feature extraction rate.

For the classification of the primitives, a two-stage hybrid recognition system is implemented for the classification of the segmented primitives. The hybrid system uses two Neural networks in its first stage. The used neural networks are embedded within the system as objects and linked with its objects for clustering the primitives to be recognized into one of the predefined clusters. Then, in the second stage a set of classifiers (one classifier for each cluster) that use statistical, structural and heuristic rules of Arabic writing are implemented for the final classification of the primitives and building the characters.

Also, a novel method for recombining the recognized sub-words into words using in-between spaces and language rules is presented.

Finally, An Arabic word-based articulation sub-system is presented for articulating either the recognized text or simply from a text file.

Keywords: *OCR, Pattern Recognition, Neural networks, Image Processing, Over Segmentation, preprocessing, Chain Coding, Moments, Object Oriented Programming, Contour Processing, Hybrid Recognition System.*

Dedication

I would like to present this simple work to my mother for her great effort and patience in bringing me up and for her moral support in hard times of finishing this work. I'd like also to dedicate this work to the soul of my father who taught me to always put all my dependence on **Allah** and to **Allah**, and how to always keep trust in myself. Finally, I present this work also to my sister and to her two little children Yara and Yousif for their encouragement.

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CONTENTS

CHAPTER 1: Introduction

i

CHAPTER 2: OCR, State of the art

6

2-1	Introduction	7
2-2	Image Acquisition	9
2-2-1	Image Transduction And Digitization	9
2-2-2	Representation Of The Image	10
2-3	Preprocessing	10
2-3-1	Document image enhancement and analysis	10
2-3-2	Segmentation	15
2-4	Feature Extraction	23
2-4-1	Dimensionality reduction	24
2-4-2	Choosing the Features	24
2-4-3	The curse of dimensionality and peaking phenomena	32
2-4-4	Feature selection	32
2-4-5	Invariant Features	33
2-5	Classifiers	34
2-5-1	Template matching	36
2-5-2	Statistical approach	36
2-5-3	Syntactic approach	36
2-5-4	Neural Networks	37
2-5-5	Classifier combination	38
2-6	Language analysis and processing	38
2-7	Literature Review of Arabic OCR	40
2-8	Conclusions	50

CHAPTER 3: Basic Concepts of Neural Networks

51

3-1	Introduction	52
3-2	Benefits of Neural Networks	53
3-3	Models of Neuron	56
3-4	Network Architectures	61
3-4-1	Single-Layer Feed Forward Networks	61
3-4-2	Multilayer Feed Forward Networks	61
3-4-3	Recurrent Networks	63
3-5	Knowledge Representation in Neural Networks	64
3-5-1	Building Prior Information into Neural Network	66
3-5-2	Building Invariance into Neural Networks	67
3-6	Learning in Neural Networks	69
3-6-1	Learning with a teacher (supervised learning)	69

3-6-2	Learning without a teacher	71
3-7	Neural Networks and Pattern Recognition	73
3-8	Back Propagation Learning Algorithm	74
3-8-1	Summary of The Back-Propagation Algorithm	74
3-8-2	Virtues and Limitations of Back-Propagation Learning	78
3-8-3	Accelerated Convergence of Back-Propagation	82
3-9	Conclusions	84

CHAPTER 4: Design and Implementation [Part I] 85

4-1	Introduction	86
4-2	Language of implementation	88
4-3	Document Acquirement	
4-3-1	Text document Acquirement	88
4-3-2	Scanned document Acquirement	88
4-4	Preprocessing Stage	90
4-4-1	Binarization and Edge Elimination	90
4-4-2	Chain-Coded Contour generation	90
4-4-3	Extracted Contour Object Features	100
4-4-4	Basic Contour Processing Operations	104
4-5	Segmentation	105
4-5-1	Segmenting the Text Document Image into lines	105
4-5-2	Ordering Contours of Words within lines	108
4-5-3	Reconstruction of Sub-words out of the contours	109
4-5-4	Segmenting the Outer Contour into Zones of PRIMITIVES	111
4-5-5	Isolating the contours of the zones of primitives	115
4-5-6	Linking the complementary parts to zones	116
4-5-7	Extraction of the basic primitives	119
4-6	Conclusions	123

CHAPTER 5: Design and Implementation [Part II] 124

5-1	Introduction	125
5-2	Feature Extraction	125
5-2-1	Directional, directional length and curvature features	126
5-2-2	Moments Features	129
5-2-3	Modified Fourier Descriptors	132
5-2-4	Results of Comparison	133
5-3	Classification Stage (Theory and Implementation)	134
5-3-1	Examples of useful Statistical features	137
5-3-2	Statistical Classification of complementary parts	151
5-4	Recognition of Words From Recognized subwords	151
5-5	Text Articulator Engine Sub-System	155
5-5-1	TTS Implementation	156

5-6	System Results	158
5-7	Conclusions	161

CHAPTER 6: Conclusions & Future Work		162
6-1	Conclusions	163
6-2	Future Work	164

REFERENCES		166
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APPENDIX A		173
A-1	Rules of Classifiers of Group G1	A-1
A-2	Rules of Classifiers of Group G2	A-6
