DEDICATION

To my parents
To my brothers and sisters
To my family
To my friends
To my teachers
To my colleagues

ACKNOWLEDGEMENTS

All greatest acknowledgements to Allah blessing me and guide me to finish this work

My great acknowledge to my supervisor professor/ Saad Daoud for helping and advising me

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Abbreviations

PC	Personal Computer
CBC	Computer Braille Code
UBC	Unified Braille Code
UN	United Nation
USB	Universal Serial Bus
ASCII	American Standard Code for Information Interchange
CPS	Characters per Second
PED	Plate Embossing Device
TED	Text Embossing Device
RBD	Refreshable Braille Display
NIST	National Institute of Standards and Technology
OCR	Optical Character Recognition
TTS	Text To Speech
OBR	Optical Braille recognition system
O.N.C.E.	National Organization of Spanish Blind People
MCR	Magnetic character recognition
CPU	Control Processing Unit
RAM	Random Access Memory
LED	Light Emitting Diode

ABSTRACT

The general aim of this project is to design and implement a fully functional Optical Arabic Braille Recognition system to recognize printed .Braille cells and to transcript it to regular voice and text context

The specific aim of the project was divided into two stages, firstly to recognize Arabic Braille letter and transcript it into equivalent voice and text file. The second stage is to recognize Arabic Braille word and .transcript it to the equivalent voice and text file

The work has been implemented using special method for recognition and developed under MATLAB environment through several stages including image capturing or scanning, image preprocessing, edging and filling the Braille dots using morphological operation on Braille dots, image filtering to remove non Braille dots, Braille cell and dot framing based on pixel coordinates, generating equivalent decimal Braille code based on binary to decimal conversion of activated dots , apply matching algorithm to Braille decimal codes, get equivalent voice and text file of matched .Braille cell

The implemented method has been tested with full four spaced pages of scanned Braille documents written using standard Arabic Braille and it has accredited by Sudanese rehabilitation center for blinds in Sudan. Documents were scanned using a commercially available scanner type (HP Scan jet djf2200) with 200 dpi resolution. The processing was .performed on a PC with an Intel core 2 duo CPU and 2GB RAM

The CPU time was taken for a single spaced page to be processed is averaged at around 32.6s with rate of 100% for letter recognition and .transcription and rate of 100% for word recognition and transcription

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يهدف هذا المشروع الى تصميم و بناء نظام وظيفي كامل للتعرف على الاحرف و الكلمات المكتوبة بلغة باللغة العربية ضوئياً، و تحويل هذه الاحرف و الكلمات الى اصوات و نصوص تقابل النصوص المكتوبة بلغة برايل، حيث قسم العمل بالمشروع الى مرحلتين، المرحلة الاولى هي التعرف والتحويل للحرف بلغة برايل الى صوت و نص، و المرحلة الثانية هي التعرف و التحويل للكلمة بلغة برايل الى نص و صوت.

تم تنفيذ و تطوير هذا النظام باستخدام برنامج الماتلاب (MATLAB) خلال عدة مراحل شملت ادخال صورة النص الممسوحة ضوئياً، اجراء المعالجات على الصورة المدخلة، تحديد و تدوير نقاط برايل باستخدام العمليات الطبقية على الصورة، تنقية و ترشيح الصورة، تقسيم خلايا و نقاط برايل اعتماداً على ابعاد التقسيمات الرقمية للصورة، حساب الشفرات العشرية المكافئة لكل حرف من خلال التحويل من النظام الثنائي للعشري للنقاط المفعلة في خلية برايل، اجراء عملية المقارنة على اساس الشفرة العشرية المقابلة للحرف، و اخيراً تشغيل المكافئ الصوتي و النصي لحرف برايل المعني.

النتائج المتحصل عليها من تطبيق هذه الطريقة تمت باستخدام عدد اربعة صفحات كاملة من الوثائق القياسية المكتوبة بلغة برايل العربية و معتمدة من المركز القومي لتأهيل المكفوفين في السودان، و تمت عملية المسح الضوئي باستخدام ماسحة ضوئية متوفرة نوع (HP Scan jet djf2200) وجهاز حاسوب بالمواصفات (core 2 duo CPU, 2GB RAM) حيث تمت عملية التعرف و التحويل للصفحة الواحدة خلال متوسط زمني قدره 32.6 ثانية. ومعدل التعرف علي الاحرف و الكلمات المكتوبة بلغة برايل بلغ 100 % ، اي ان كل الاحرف و الكلمات تم التعرف عليها و تحويلها باستخدام هذه الطريقة.