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BRAILLE LANGUAGE TO ENGLISH CONVERSION AND VICE VERSA

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ABSTRACT

Braille is a method of reading and feeling text through touch, rather than sight. It is mainly used by those with impaired vision; however sighted people can read Braille as well. Due to limited availability of the Braille text books an efficient usage of the books becomes a necessity. This paper proposes a method to convert a scanned Braille document to text which can be read out to many through the computer. The Braille documents are pre processed to enhance the dots and reduce the noise. The Braille cells are segmented and the dots from each cell is extracted and converted in to a number sequence. These are mapped to the appropriate alphabets of the language. The converted text is spoken out through a speech synthesizer. The paper also provides a mechanism to type the Braille characters through the number pad of the keyboard. The typed Braille character is mapped to the alphabet and spoken out. The Braille cell has a standard representation but the mapping differs for each language. In this paper mapping of English, Hindi and Tamil are considered.

1. INTRODUCTION

Braille can be seen as the world's first binary encoding scheme for representing the characters of a writing system. However, very limited numbers of Braille books are available for usage. Printing of Braille books is a time consuming process. The requirement of special printers and software add to their limited availability. Scanned and text converted documents can be used in the meantime to serve the needs of the blind.

This paper mainly focuses on conversion of a Braille document into its corresponding alphabets. The presence of dots in the Braille cells has to be identified to recognize the characters. The edge detection when applied on the scanned document will not produce the dots, hence the approximate intensity range of the dots are identified from the histogram. The image is treated through a sequence of enhancement steps which increases the contrast between the dots and the background. The edge detectors are then applied and the text area is cropped excluding the borders through projection profile method. The document is then segmented into Braille cells using standard Braille measurements and projection profiles. The presence of dots in each cell is identified using a Threshold and converted to Binary sequence which is then mapped to the corresponding language alphabet. This paper also proposes a Number keypad which could be

used for typing the analogous Braille alphabet using six numbers i.e. (7,4,1,8,5,2) corresponding to the six dot cells.

2. RELATED WORK

2.1. Text to Braille converter:

Displays Braille as the user types characters. This convertor is OS independent and language used is java. It concentrates on conversion from English to Braille

2.2. Win Braille:

As referred in [2] Win Braille can be used without prior Braille knowledge. It includes standard Windows image control and the unique feature to convert images to tactile graphic format online.

2.3. Braille Master:

As referred in [5] the Braille Master package comes with both Windows and DOS versions. A large print facility suitable for partially sighted persons is also included in this package.

2.4. Supernova:

As referred in [2] Supernova is a window-based magnifier, screen reader and a Braille system that supports the conversion of text to speech, Braille displays and note-takers. Braille can be converted to text using number keypad and image processing techniques which are feasible for common people.[8] refers to a paper on Braille word segmentation and transformation of Mandarin Braille to Chinese character. [9] discuss the main concepts related to OBR systems; list the work of different researchers with respect to the main areas of an OBR system, such as pre-processing, dot extraction, and classification. [10] describes an Arabic Braille bi-directional and bi-lingual translation/editor system that does not need expensive equipments.

3. PROBLEM STATEMENT

Visually impaired people are an integral part of the society. However, their disabilities have made them to have less access to computers and Internet than the people with clear vision. Over time Braille system has been used by them for written communication. Braille is a system of writing that uses patterns of raised dots to inscribe characters on paper. This allows visually impaired people to read and write using touch instead of vision. Due to limited availability of the Braille text books an efficient usage of the books becomes a necessity. This paper proposes a method to convert a scanned Braille document to text which can be read out to many through the computer.

4. BRAILLE CONVERSION

4.1. Keypad to type Braille document

The six dot cell representation of Braille character could be numbered from 1 to 6 starting from top left to bottom right in the order left to right and top to bottom. The numbers 7,4,1,8,5,2 of keypad are mapped to the dots 1,2,3,4,5,6 respectively.

Fig 5. Mapping of dots to numbers

4.2. Conversion of scanned Braille document

In this method the Braille document is scanned and taken as input, which by a sequence of steps is converted to appropriate text. The scanned document has to be enhanced to identify the dots clearly. The dots are extracted using horizontal and vertical profiling. The Braille cells are identified and converted to binary sequence. The binary sequence is then mapped to the corresponding alphabets or contracted words. These are stored in a text file and given as input to the voice synthesizer.

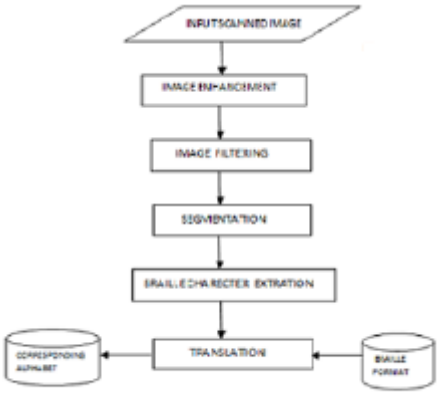


Fig 6.Block Diagram of Proposed Technique

4.2.1. Image enhancement

Due to scanning, the dots in the Braille document cannot be distinguished clearly from the background. Hence various pre processing techniques are applied on the scanned image in order to enhance the dots and to suppress the noise. The dots appear as a darker shade of the back ground color and hence these intensity ranges are identified from the Histogram and enhanced in order to identify the dots. Piece wise enhancement techniques such as contrast stretching, intensity stretching were used for enhancing the dots. These techniques could be represented as

S=T(r), where S is the grey level after modification T is the enhancement function used and r is grey level before enhancement.

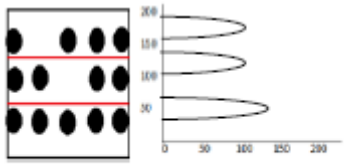
4.2.2. Image filtering

To remove the unwanted noisy dots present in the scanned documents, the image is smoothened using Gaussian filter and then subjected to morphological opening using a disk shaped structure element B as given in the equation

$$A \circ B = (A \ominus B) \oplus B$$

4.2.3. Segmenting the Braille Cells

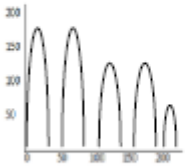
In order to simplify the process of Braille character extraction, the image is first segmented into lines and then into Braille cells. Each cell is further partitioned into binary dot patterns. These are achieved through Projection profiles and standard Braille measurements.



(a) Image (b) Projection profile

Fig9:Horizontal projection profiling

(a)Image



(b): Projection profile

Fig10: Vertical Projection Profile

4.2.4. Extraction of Text from pattern vector

A Binary pattern vector for each Braille cell is generated. A vector has a length of 6 each correspond to a dot in the Braille cell. The presence of dot is identified after counting the number of white pixels in each grid of a cell and checking whether it satisfies the threshold criterion. '1' indicates that dot is present and '0' indicates that dot is absent in that particular position. This string of bits for the sequence of Braille alphabets is written into a file. A sequence of 6 bits are read from the file and converted to the number sequence and subsequently into the alphabet using the trie structure as discussed in 3.1. If the six bits of the string are 0's, it generates a space. These alphabets are stored in a text file for further processing. Natural Reader is called for reading the converted English text.

5.LIMITATIONS AND ADVANTAGES

Since the standard Braille dimensions are used for the segmentation of the Braille cells, the document has to be free from tilt and has to be aligned with the edge of the scanner. This poses a major limitation to the system. The presence of the unnecessary dots or noises whose size is comparable to that of the Braille dots during scanning is difficult to remove during pre processing and hence affects the accuracy of the converted text. It involves very less intervention of the user and helps to serve the need of large number of people using a single document. It helps resource teachers in Inclusive Education, who do not know Braille. Simplifies making of copies of old Braille books for which only one copy is available as it saves the labour of preparing the same again.

6. CONCLUSION

In this paper,after identifying the start of the Braille text, the lines and subsequently the Braille cell are segmented. Grids are drawn based on the standard measurement of the Braille cells and the dots are extracted. Braille has a standard pattern of alphabets and only the mapping differs from language to language. Using appropriate mapping for each language the alphabets are identified and stored as text. These texts are read out by voice synthesizer. The extraction of the dots was affected when they were not confined to the standard measurement and due to the presence of noise during scanning. Mapping errors occurred when the Braille has similar representation for the alphabet and the punctuation. These are eliminated to some extent using simple rules governing the language. The mapping errors are predominant for Grade 2 English documents. The voice synthesizer used for speaking the Native languages had a poor pronunciation.

REFERENCES

[1] Saad D. Al-Shamma and Sami Fathi, "Arabic Braille Recognition and Transcription into Text and Voice", 2010 5th Cairo International Biomedical Engineering Conference Cairo, Egypt, December16-18, 2010, Pages 227-231

[2] AbdulMalik S. Al-Salman, ”A Bi-directional Bi-Lingual Translation Braille-Text System”, J. King Saud University, Vol. 20, Comp. & Info. Sci., pp. 13-29,Riyadh(1428H./2008).

[3] Charanya C, Kalpana S and Nithya R, "Real time Braille recognition with sonic feedback", Intel India Research Challenge 2007

[4] Er.Sheilly Padda, Er. Nidhi, Ms. Rupinderdeep Kaur,"A Step towards Making an Effective Text to speech Conversion System",International. Vol. 2, Issue 2,Mar-Apr 2012, pp.1242-1244

[5] http://www.braillemaster.com

[6] Manzeet Singh ,Parteek Bhatia,"Automated conversion of English and Hindi text to Braille representation",International Journal of Computer Applications, vol. 4, issue 6, pp. 25-29, year 2010

[7] Xuan Zhang, Cesar Ortega-Sanchez and Iain Murray, "A System for Fast Text-to-Braille Translation Based on FPGAs",SPL2007 - III Southern Conference on Programmable Logic, Mar del Plata, Argentina, February 26-28, 2007

[8] Minghu Jiang etal, "Braille to print translations of Chinese",Information and Software Technology 44 (2002) 91-100

[9] Trends And Technologies In Optical Braille Recognition by AbdulMalik S. Al-Salman, Yosef AlOhali, and Layla O. Al-Abdulkarim, 3'rd Int. Conf. on Information Technology,May 2007,Jordan.

[10] AbdulMalik,S. Al-Salman,"A Bi-directional Bi-Lingual Translation Braille-Text System", Journal of King Saud University - Computer and Information Sciences Volume 20, 2008, Pages 13–29