COMPUTER BASED TAMIL BRAILLE SYSTEM – A Review

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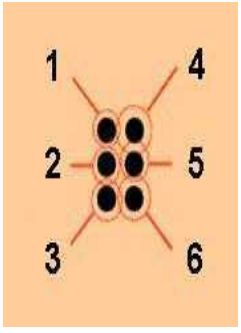
I. INTRODUCTION

Braille is used to represent text by means of tactile symbols. Braille is a system of writing that uses patterns of raised dots to inscribe characters on paper. It therefore allows visually-impaired people to read and write using touch instead of vision. It is a way for visually impaired people to participate in a literate culture. First developed in the nineteenth century, Braille has become the pre-eminent tactile alphabet. Its characters are six-dot cells, two wide by three tall. Any of the dots may be raised, giving 2^6 or 64 possible characters. Although Braille cells are used world-wide, the meaning of each of the 64 cells depends on the language that they are being used to depict. Different languages have their own Braille codes, mapping the alphabets, numbers and punctuation symbols to Braille cells according to need.

Braille provides a crucial means of literacy and independence, for people who are not able to read standard print. Through Braille many visually impaired people enjoy access to educational, professional and leisure materials. The Braille code has become the main system for the majority of those visually impaired people who read and write using tactile means, and can be found in many countries around the world. Thereby fully able to participate in and contribute to society on an equal footing with sighted colleagues. Also, the concept of Braille has been accepted as a universal approach that works across the boundaries of the world. Different countries of the world have adapted the system of Braille to suit their languages.

II. BRIEF INTRODUCTION TO BRAILLE

The Braille system is a method that is widely used by blind people to read and write, and was the first digital form of writing. Braille was devised in 1825 by Louis Braille, a blind Frenchman. Each Braille character, or cell, is made up of six dot positions, arranged in a rectangle containing two columns of three dots each. A dot may be raised at any of the six positions to form sixty-four (2^6), possible subsets, including the arrangement in which no dots are raised. It described by naming the positions where dots are raised, the positions being universally numbered 1 to 3, from top to bottom, on the left, and 4 to 6, from top to bottom, on the right as shown in Figure 1.



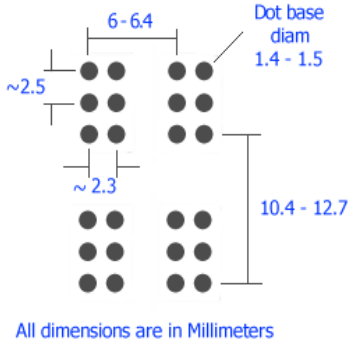


Figure 1: Braille Cell Figure 2: Braille Cell Dimensions

The lines of horizontal Braille text are separated by a space, much like visible printed text, so that the dots of one line can be differentiated from the Braille text above and below. Punctuation is represented by its own unique set of characters. In Braille, Figure 2, a cell dot pattern gives the letter to read. The dot height is about 0.5 mm; the space between dots is about 2.5 mm. A standard page in Braille has about 40 – 43 cells per line and about 25 lines. Larger cells are often used by those who have problems feeling the normal Braille cells.

III. BRAILLE SYSTEM

a. Braille Read

Standard Braille is an approach to creating documents which could be read through touch. This is accomplished through the concept of a Braille cell consisting of raised dots on thick sheet of paper. The protrusion of the dot is achieved through a process of embossing. A visually impaired person is taught Braille by training them in discerning the cells by touch, accomplished through their fingertips. The size of Braille cell is such that only one character at a time can be read by a single finger. The Figure 3 shows how this is done.

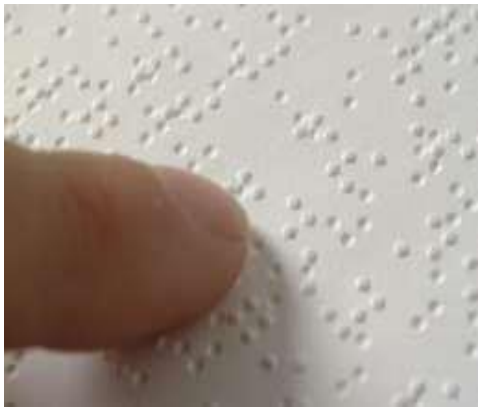


Figure 3: Braille sheet

b. Braille Write

Braille is almost always written with a slate and stylus as shown in Figure 4. Braille is written from right to left so that page can be read from left to right when it is removed from the slate and turned over. Learning to write Braille in this manner is really as the feedback is delayed until the paper is removed and then flipped over and read. Since the act of writing has no discernible and immediate effect, the reading and writing Braille conceptually challenging.

Figure 4: A Braille slate and stylus.Figure 5: A Perkins Brailler.

Braille is usually embossed with a six key typewriter know as Brailler, which is fast and easy to use. The Perkins Brailler Figure 5 is a manual Braille typewriter it has 8 buttons out of them one is used for sliding the paper the other is used for the movement of the 6 pin type head. The remaining 6 buttons are used for typing the Braille script.

IV. COMPUTERISED BRAILLE

Nowadays blind students are taught in mainstream classes, however most teachers of these students are not Braille literate. One method presently used to overcome this difficulty is that the students work is first sent to trained Braille transcribers, where the Braille is translated to literary text and then sent back to the teacher before it can marked. This creates unnecessary delays and cost for the student, teacher and government. Problems also exists to be interpreted by other Braille illiterate persons, needs to be first translated by the Braille user themselves.

Today, Computers, Internet, and information explosion provide an informational structure which has changed the way people interact with the outside world. These rapid changes in this area have the potential to reduce the differences between disabled and normal individuals. In the early days of computers, visually impaired users had little or no access to the information in the computer screen. Since then, software developers of screen readers have been able to cope with the text-based environment of early operating systems. However, most modern operating system environments are now GUI. Hence, the information on the screen is no longer accessible to users who rely on screen readers or Braille displays.

There is a significant need for a system to computerize Braille document in order to preserve them and make them available to more visually impaired people. In order to make the bi-directional communication between the sightless and sightless community feasible, it is required to transliterate the Braille documents to the corresponding text document in the corresponding language.

The Visually impaired person uses a variety of equipments and programs that enable him/her to enter data into computers or control them. Among these input devices are Braille keyboards, Optical Braille/Character scanners. Among the output devices used by the visually impaired are Braille displays, Screen readers, Braille Embossers and Screen magnifiers. There are also other assistive software packages and devices, designed exclusively for visually impaired people. Among these packages are Scientific Braille packages, Braille Note Taker.

The automatic translation process between Braille system and normal text is not a new research field. It started as early as mid 1960's (Kr, 1969) . To the best of our knowledge, the first Braille translation system was DOTSYS III (Sullivan, 1973) . One need for such translation systems is in mainstreaming, in which disabled and non-disabled students study together in the same classroom (Brule, 1985) .

V. TAMIL BRAILLE - A Review

The Ministry of Education established a Unit to deal with education of the visually impaired for developing a Uniform Braille Code and setting up Braille Printing Presses in the Country in 1947 (April) following the recommendations of the "Report of Blindness in India, ". When India gained independence (1947), 11 Braille codes were in use in various parts of the country, Bharati Braille was conceived of as early as 1951.

Bharati Braille: With the advent of computers preparation of Braille documents has been rendered easy and flexible. In the earlier days, Braille had to be printed using special Braille Printing units that worked more like typesetting printing presses. Computers have rendered the process simple where the required text can be typed normally on a computer terminal and automatically transcribed into Braille and printed. Transcription software will be language dependent but the rules of transcription can be programmed for each language. Bharati Braille may also be transcribed using computer programs by typing in the text in the vernacular.

The Bharati Braille software has taken a phonetic approach to representing Indian Language text and so it is quite easy to convert the text prepared using the multilingual editor into Braille codes. Just a simple table look up procedure is all that one would require and the program will convert text in the vernacular into appropriate Braille codes for use with an embosser connected to a computer. Bharati Braille assigns the cells to the basic sounds of the Indian languages (these are called aksharas) in a manner where vowels and consonants that find direct equivalents in English are given the same representation as in English. This way, with minimal effort one would able to read both English text and Indian language text. This arrangement is essential if the visually handicapped are required to communicate with their counterparts in other countries.

The aksharas of Indian languages are divided into vowels and consonants. Across the many different languages of the country, one finds up to sixteen vowels and about forty consonants. The assignment of the cells is therefore applicable across all the languages though it must be stated that a few cells have to interpret based on the language.

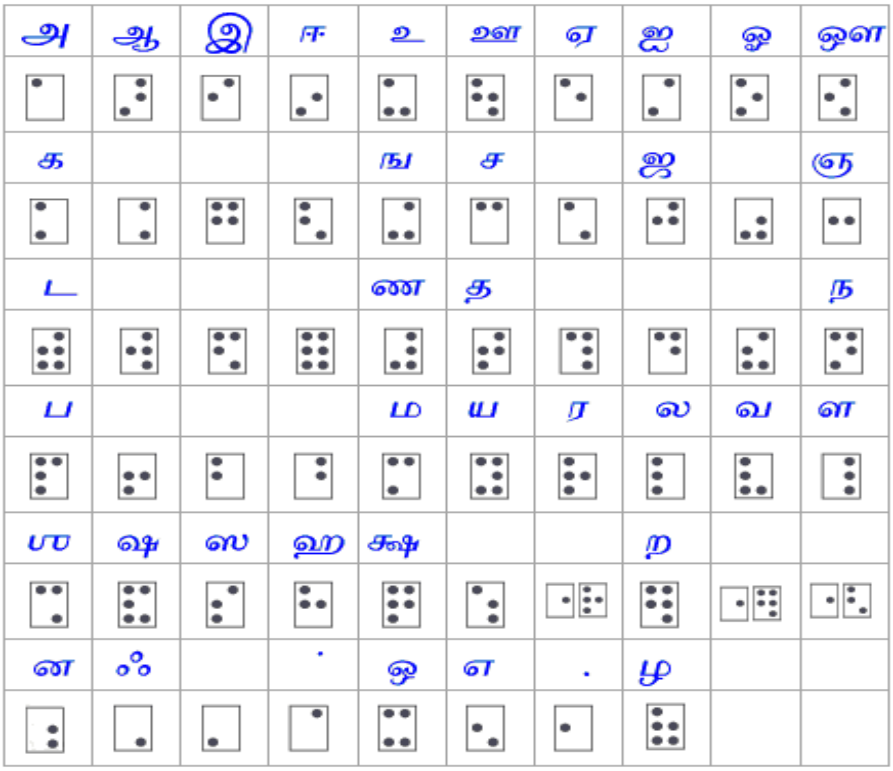


Figure 6: Source: Bharati Braille – IIT Madras

This is a consequence of the fact that we have only sixty three cells available to us and reserving ten cells for punctuation leaves us in a tight situation.

VI. A Review - FINDING

In Bharati Braille, the basic vowels and consonants of the languages have been assigned individual cells. Across the languages of the country, between 13 and 18 vowels are in use and the consonants are between 33 and 37 in number. Thus more than 50 cells have been assigned for the basic vowels and consonants leaving the rest for special marks.

Tamil script consists of 12 vowels, 18 consonants and one special character, the āytam. The vowels and consonants combine to form 216 compound characters. Thus only 38 cells have been assigned.

There are many commercial text OCR products available and much research has been undertaken in text recognition, but little has been done to successfully produce a portable optical Braille recognition system. Some with greatest advantage of conversion from Braille to any of the natural languages depending on the conversion rule.

Although Braille forms exist for many languages including the students' primary languages of Kannada, Tamil etc, they are taught Braille in English first because it is the standard approach and relatively simple. Therefore most Software/ Computerization are limited to English Braille.

VII. CONCLUSION AND FUTURE SCOPE

Braille has been developed as the reading and writing system for the visually impaired. The attention was given on this is very difficult to teach a visually impaired people in the early stage and more training is needed for teaching them and converting documents to Braille, is costly and cumbersome work.

The country's first national Hindi periodical in the Braille script was launched from April 2012. there were 82, 222 newspapers and periodicals registered with Registrar of Newspapers, but Hindi Braille newspaper is the first national initiative for the visually-impaired. Hope to expect in other languages too.

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