Mobile App for SMS to Braille Transcription

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Abstract — This paper addresses the problem that is not covered by the existing techniques while reading SMS messages by visually impaired people also describes an efficient process for transcribing SMS messages into Braille and vice versa for including in the campaigns of reading SMS messages by visually impaired people. Existing techniques transcript the text messages into speech but in case of special symbols and notations, they fail to do so. They also fail to help when a person is blind as well as not have the capability of hearing since they are all speech synthesizer. Since 80 percent of all employed visually impaired read and write Braille fluently, the proposed system gives access to reading and writing of SMS messages efficiently.

Keywords — Braille system, transcription, SMS to Braille.

I. INTRODUCTION

Around the world there are 285 million people are visually impaired due to various reasons. In India there are more than 10 million people are visually impaired in which male accounts to more than 5 Lakh and female accounts to more than 4 Lakh people. Among them 80 percent of all employed people, knows to read and write Braille. A large group of people has also significant sight loss that does not fall in this category. So 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. Irrespective of these changes or modifications, visually disabled persons understand standard Braille for the English language making it possible to exchange information in a consistent fashion across different countries. Standard Braille is an approach for creating documents, which could be sensed through touch. This is accomplished through the concept of a Braille cell consisting of raised dots on thick sheet of paper when printed using an embossed printer.

Since 60% of the communication is done by SMS messaging now a days, this will be an application for android mobile users where it can be used as today’s WhatsApp and Hike. This will convert the message arriving in English text into Braille script and stores them in the database and according to the choices made by the user it prints the Braille script or gives to the Braille display.

II. LITERATURE SURVEY

Braille is a system of reading and writing for visually impaired people where every letter is indicated by patterns of raised dots, which were introduced by Louis Braille in France in 1824. Only six are used universally where each unique combination of raised dots represents each alphabet and numbers for eight cells. As said later it has cells numbered one to six, which is of 2 rows and 3 columns as seen in table 1.

Thus, they are 64 characters totally hence, different encoding rules had to be developed for different applications. There are three Braille grades currently, grade 1, grade 2 and grade 3. In the grade 1 conversion, it is the literal one-to-one conversion where each letter represents only one letter number, punctuation sign, or special Braille composition sign wherein grade2, Braille is used as a space saving alternative to grade1. Here part-word contractions, whole word contractions are commonly used to reduce the space, even single letter are used to represent a whole word with a special symbol to precede either the first or last letter of the word while truncating the rest of the word. These two are the well-established and standardized way used in publications.
A. Braille Transcriptions

Before computers were used for transcriptions of text to Braille script, it was quite tedious process, which involved the person who knows Braille, has to type it in Braille using the Braille writing machine. Such a Braille writing machine will have six keys for embossing a Braille character, each key is for one dot of the Braille cell, additionally few more keys are available for ‘space’, 'backspace’ etc., .This is used in the case of single copy. For large-scale productions, Braille letters are embossed on zinc plates, which are then applied under pressure to the heavy stock paper. Proofreading and corrections also took time and sometimes-needed whole pages had to be redone. Moreover, accesses to less frequently demanded materials are very slow. Hence accessing any scholar's research papers, recent technical reports are only a dream for visually impaired people.

There is much software available for the conversions of ASCII Braille in to any grades of Braille such as DUXBERY, DRISHTI etc. Until now, there is no automatic Braille transcriptions exist for android mobiles with printing facility.

Fig. 1 Electronic Ticketing Machine

The proposed system has the facility of printing the hard copy as well as reading through the refreshable Braille reader, where the printer will be in size of the Electronic ticketing Machine (ETM) as shown in figure 1.

III. Proposed System

The proposed system is used for converting text messages into Braille messages that was earlier done by the computer system. Since now-a-days mobile are of large use and it is portable, this application will help you in great level. This Braille output can thus be given to both the output device refreshable Braille display as well as to the embossed printer. Here we tried a new printer that is of a smaller size as that of the ETM, which is easily connected through USB or Bluetooth.

In the first phase of the proposed system, a software tool for receiving messages is implemented using SMSMessanger, SMSManager and Toast android APIs as shown in the fig.2. It also uses API's for wireless messaging, and JSR80 specifications for USB port to integrate with mobile device. The system listens for the incoming of messages once it has arrived the SBT displays a dialog box, which asks whether to convert it to Braille or not, based on the choice chosen the action is performed. However, by default the system will convert all the messages into Braille and it can be stored in the database for the future purpose if we want to send it to another person who is visually impaired his/her mobile should also have the facility of printing or reading through the refreshable Braille display. On demand, multiple copies of the same message can be provided.
B. Text to Braille Conversion

The received text message should necessarily have only alphabets, symbols and numbers. This message is sent to the server and for verifying that the current message arrival, the server displays the current message. This message is converted into Braille script. At first the message is modified by adding dollar sign to all the blank spaces in the message, once it arrives the server with the ip address, port no. the dollar sign is removed, and the respective file called “Indian sign language” runs, which is responsible for the conversion. This file contains all equivalent hex code for all the alphabets in which each code represents the Braille symbol. For instance, the alphabet ‘A’ is 100000. Every character is encountered and checked with the null character and if it is not null, then the corresponding image will be generated. Layout is created for every word. The length of the Braille word and the corresponding text image will be created during the run time and it is stored in a plain text file called ‘ser’.

C. Braille to Text conversion

Once the text is converted into Braille, the converted Braille images will be stored in the file called ‘text’. Now copy the Braille images which you want to convert into text and paste it in the Braille folder. That is the input is given in the above way for conversion purpose. Now, when you click the “Braille to text” button the Braille script will be matched with the plain text file ‘ser’ and if it matches the same text will be given as the output in the screen.

D. Accessing through USB port

This Braille output can be embossed using the embossed printer through the USB port. For interfacing the application with the printer through the USB port, JSR80 is used which is a Java Specification Request concerned with communication with Universal Serial Bus (USB) devices. For this the javax.usb API should matches the physical device topology. However, the root of the topology is slightly different. First, the entry point of javax.usb is the UsbHostManager class, shown at the top of the tree. This class instantiates the platform-specific instance of the UsbServices interface. From the UsbServices instance, the virtual root UsbHub is available. This hub is created by the implementation and does nothing except manage the actual physical devices. Each hub connected to the virtual root hub represents a physical Host Controller hub that is present in the system. Connected to those hubs are the real externally connected physical devices connected to the system. Using these APIs we have created interface to send data on the devices through USB programmatically.

The next phase is the outputting device, where USB and Bluetooth devices are incorporated according to the support provided by the device.

IV. Results

The below fig. 3 shows the output from an embossed printer, got by connecting through the USB. This is the English Braille output for the sentence “hi how are you thank you for visiting our department we hope that you have got all the information needed for your project”. This is an open Braille, in which each and every letter has an equivalent Braille symbols. The below output is the final one, which is read by the visually impaired people by touching the letters and feeling the embossments.
Below figure 4 shows the various screenshots of the application. In the first image the user is requested to enter the IP address of the server, in order to connect it with the device. The server acts as an intermediate, which receives the message from the sender and displays the current message.

The second screen appears when the device has received no message. That is the server sends the null message since no last message is received.

The third screen shows that when you receive a message and then you connect with the particular IP of the system and click the submit button the server will receive the incoming message along with the IP and port no. of the device and sends the converted Braille script of the message to the android device, which is shown in the fourth screen.

This Braille images are stored with the length of the image with its corresponding text letters in the file called ‘ser’, which is dynamically created.

Finally the last screen gives the output, on clicking the button, “Braille to text” which will convert the Braille in to text by comparing the file ‘ser’ and the current Braille input message, if it matches gives the corresponding text for the Braille letters.

This application on connecting with the embossed printer or through with refreshable Braille reader will give you the output than can be read by the Braille people. This can be incorporated with the speech synthesizer.

V. CONCLUSION AND FUTURE SCOPE

This proposed application converts the SMS messages into Braille and prints it through an embossed printer using USB or Bluetooth. As a result, using this Text to Braille conversion and Braille to Text conversion application, a visually impaired person can send and receive messages like a normal person, in case of failure of speech synthesizer. Since SMS messages are in wide use in today’s world this application will be of great use to visually impaired people. People with both visual and hearing disability can also use this application. This application works well for only text messages.

In future, this can be extended for all regional languages and can even conversion can be of grade2, which will reduce the converted Braille script pages in size. In addition, e-books can be converted to Braille scripts from mobile directly so that they can even access e-books. As this system converts only the text messages in to Braille script for android mobile users, this can also be extended to convert pictures, multi-media messages in the future. This wide leap if achieved it will be of great use to the visually challenged people who can therefore communicate with normal people also through multimedia messages in mobile. Thus, we hope that the future technological improvement will enlighten their life.
REFERENCES


