Perspectives in Communication, Embedded-Systems and Signal-Processing (PiCES) – An International Journal
ISSN: 2566-932X, Vol. 6, Issue 2, May 2022

Braille To Text Conversion Using Computer Vision

Purva Kamath Mhami
Department of Electronics and Communication, APS College of Engineering, Bangalore, India

Indu V
Department of Electronics and Communication, APS College of Engineering, Bangalore, India

Ashika G
Department of Electronics and Communication, APS College of Engineering, Bangalore, India

Nayana G
Department of Electronics and Communication, APS College of Engineering, Bangalore, India

Vizaya Dipika R H
Department of Electronics and Communication, APS College of Engineering, Bangalore, India

Abstract: The braille system is used by the visually impaired to read and write. Assistive braille technology has existed for many years to aid the blind in performing common tactile converters that help the blind to read text-based literature. On the other contrary, research conducted on a braille to text conversion is very limited. Such technologies help normal people to understand the braille literature, thus providing them their undue credits with this as an aim, the objective of the project would be to develop braille to text converter by applying the concepts of computer vision and image processing.

Keywords: Braille database; Segmented cells; Image pre-processing; FPGA; Speech Recognition.

I. INTRODUCTION

India is the largest country where a large amount of visually impaired people can see. We have 2.2 billion people, among them, 36 million are blind and the rest of 1billion people are having modest to secure vision impairment.

Blindness can be permanent or temporary. If any portion of the eye gets damaged leads to blindness and also if any effects causes in the brain can also lead to blindness. By electronic gadgets like smart-phone, tablets, PC, laptops, where these gadgets will emit light and it has found negative effects on our eyes. Where it has the potential to lead to macular degeneration by passing to the pupil and cornea to beam directly into the retina.

A per researcher, one-third of smartphones are using for educational purposes and their usage has been increasing day by day. And it has a very low presence of humans with viral disabilities

Braille is the language that is used for visually impaired people. Even they can read and write as normal humans do. Where it includes wax tablets, manipulation of wooden letters, etc. The main disadvantage here is that each required material is extremely hard to make, and also, very infeasible for someone to hold and carry them. After the technology is developed, a new method starts introducing and also improving.

Valentin Havy is the founder and inventor of the first blind school in the world, and by on heavy paper using metal pen sounded tip he produced raised letters. Whatever system he produced for raised letters underwent several modifications.

Braille is known as raised dots. Louis Braille in 1824 is the one who the founder of raised dots. By moving the heads from starting left to right braille is read. And he created a set of raised dots, where it is consisting of six dots which is arranged in a group called cells. By this cell, each letter of alphabets, numbers, symbols, etc.., is made up of a different combination, where it is arranged in the form of a 3x2 matrix as shown in the figure below.

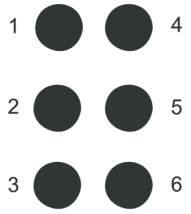

Fig 1. Braille cell

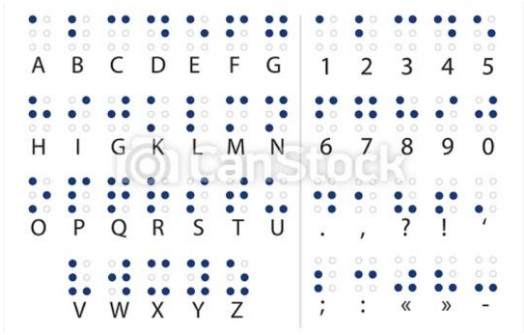

Fig 2. Braille characters

Our main challenge is to understand and gain knowledge of braille. The majority of the people are unable to understand braille and for this reason, we are not able to communicate with them. Our main aim is here to overcome this issue, and our project is designed in such a way that, where we can be able to convert the braille text to words directly.

II. LITERATURE SURVEY

A. *"Braille to Text and Speech for Cecity Persons" by Chitte*

This paper attempts to establish the implementation of the braille to speech converter which will visually impair people to communicate with others.

In this paper first, they have collected in the form of a large number of the message. This type of message contains different slang and different grammar. Initially, the braille sheet is placed under the camera. A scanned braille document is then constructed into the text of different languages that can be read by many people.

The braille sheet undergoes segmentation and image processing. Once the braille cells are segmented, the dots contains in each cell are extracted and then they are converted into a binary sequence. Then obtained binary sequences are mapped to the alphabets and text is obtained. Here a device piezoelectric device is used which creates tactile feedback.

The advantage of this paper is, it is high accuracy and multiple character information can be transmitted.

The disadvantage here is, it supports only for English language and the text-to-speech system does not contain a change in the volume of speech and rate of speech.

B. *"Speech to Braille Converter for Visually Impaired Using Python" by Swathi Subhas*

In this paper, their aim is to converts the speech to Braille script. Initially, they have taken speech as input, where it is converted to text in further process. Mainly here they used a python speech recognition package to achieve this.

They have used a microcontroller, a global system for mobile communication, and a relay. A microcontroller made of six solenoids is used and the relay is used to print dots. Here relay act as a switch. When the switch is off then GSM is connected and it will accept the message given by the user. Then each character is translated and converted to braille. With the help of 16*2 LCD, the printed dots will be appeared by the received commands from the user of solenoids on the condition of on or off.

To achieve this conversion, they first fed an input, then that input is recognized with the help of a speech recognition tool. This input is further converted to the text and then to braille. The text is mapped with a braille database. Then the braille script is saved for further purpose.

The advantage of this paper is, its accuracy is high.

The disadvantage is, By implementing a more specific integral formula the braille image can be improved.

C. *"Braille Language Converter for Visually Impaired People" by Mathivani .A*

This paper aims to help blind people for reading the printed English books. The first process is to detect the braille letter and then the converted letter is raised in the braille pad.

First, they will read the input characters from the text file which is stored in an SD card, then later for a further process, they will scan and store the soft copy of that document. With the help of blank space, they will separate the words, and for the further process, they will separate each word into a character. And later they are going to compare the obtained output with the braille database. The final result is when they touch the braille pad they can easily recognize the characters which are presented.

The advantage of the paper is that system is cost-effective and user satisfaction is enormous.

The disadvantage is Pronunciation of some letters will give an error. And by the fast way of speaking will give wrong information.

D. *"Analysis and Evaluation of Braille to Text Conversion" by Ali Kashif Bashir*

In this paper, they have focused on difficulties faced by visually impaired people while using a computer-based mechanism of input.

In this they have split into two categories, one is scanned input and touchscreen-based. First scanned input from braille sheet they will extract braille dots, with help of that input they will convert text with the help of character identifier. And in the touch screen process, the input is taken directly from the blind people by touching the screen device, and then the input character is converted into an equivalent character.

The advantage of this paper is, the speed and accuracy have been achieved.

The disadvantage here is that due to lack of awareness or by handicapped dare can't able to use the touchscreen.

E. "Conversion of Braille to Text in English, Hindi, and Tamil Languages" by Padmavathi S

In this paper, the author used a braille translator, i.e., software program that translates the braille cells into a text.

Initially, a document is scanned. The scanned document undergoes segmentation, where the dots are extracted from each cell, and it is converted into text. Unwanted noise that has been present in the image is removed and the image is smoothened using a Gaussian filter.

The translator used here is, firstly braille master where here both Windows and DOS versions can be used. Secondly, Supernova where it is a windows version based on a magnifier, screen reader, and braille system that supports conversion of text to speech. Thirdly, Win Braille where it includes standard windows image control.

The advantage of this paper is, it involves very less interaction with the user and a large number of people can serve this.

The disadvantage here is that the accuracy of the noise will affect the system.

III. CONCLUSION

This project is mainly focused on the conversion of captured braille documents to the corresponding text. The main purpose of this project is to implement and demonstrate the use of software and by visually impaired people to convert braille to text. Our main aim here is to help visually impaired people should write their exams on their own and should be equal to normal humans in the latest technology. We will find an algorithm for visually impaired people inefficiently way, with flexibility and low cost.

REFERENCES

[1] Mathivani, "Braille language converts for visually impaired people", International Journal of Intellectual Advancement and Research in Engineering Computations, India. Volume-06, Issue-02.

[2] P.P.Chitte, "Braille to text and speech for cecity persons", International Journal Research in Engineering and Technology, India. Volume-04, Issue-01, 2015.

[3] Swathi Subhash, "Speech to Braille converter for visually impaired using python", International Journal of Advanced Science and Technology, Volume-29, 2005.

[4] S.Padmavathi, "Conversion of braille to text in English, Hindi, Tamil languages, International Journal of Computer science, engineering application, Volume-01, 2013.

[5] Article: makeitortakeit [Online], Available: URL:http://www.makeitortakeit.in/documents/259/30._Text_to_speech_for_blind.pdf)

[6] Article:99 June Volume 2020[Online], Available: (http://www.gjstx-e.com/).

[7] Article: Hindware Volume 2020[Online], Available: :(URL:https://doi.org/10.1155/2020/3461651)