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BRAILLE TO TEXT/VOICE CONVERTER

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ABSTRACT: Communication between people is a crucial thing in life. Sighted people use the script provided by languages such as English or other languages to write on paper. However, in the case of visually impaired people, they use a different type of script known as “Braille” named after its founder “Louis Braille” which is the system of reading and writing used by people who are visually impaired where they feel raised dots on Braille page with tips of their fingers. Each language can be represented using Braille script, which differs from one language to another.

The Braille to Text/Voice converter (BTVC) is a tool designed to help sighted people to be able to understand Braille script without having any knowledge of the Braille language.

The purpose of this project is to design a tool that can translate a Braille script into a multilingual script and represents the converted script as text or voice to the user, the system was developed to translate Braille papers into the English language.

KEYWORDS: Keras, pytesseract, gTTS, Machine Learning

I. INTRODUCTION

Interacting with people is an essential thing. People use language as a way of communication to talk with others, one of these communication methods is writing, and sighted people use language scripts to write on paper. However, visually impaired people use a type of language called Braille. Braille language relies on the sense of touching, it is difficult for sighted people to interact with blind people using such language. The loss of vision causes a great impact on the individual’s learning and performance because one cannot perceive and use visual information to interpret various learning situations taking place within the environment.



A Braille Cell

Braille is a material framework to speak to content. A book in braille comprises a few Braille cells where every cell speaks to a letter set or image. Six individual pins/dots together represent a single cell. A blend of raising high and raising low of these pins forms a letter set. There is a standard Braille code for every letter set of many dialects. By and large, outwardly debilitated people move fingers over the braille messages that are embellished on paper to peruse the content. Digits and numbers are preceded. by, the braille equivalent of the # symbol.



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. It is a way for blind 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 as shown in figure 1. Each dot may exist or may not exist giving two possibilities for each dot cell. Any of the six dots may or may not be raised; giving 64 possible characters. In English, it includes 26 English alphabets, punctuations, numbers, etc. Figure 2 shows the Braille representation of the English alphabet. Braille representation for numerals is shown in figure 3.

Although Braille cells are used worldwide, the meaning of each cell depends on the language that they are being used to depict. In English Braille there are three levels of encoding: Grade 1, a letter-by-letter transcription used for basic literacy; Grade 2, an addition of abbreviations and contractions; and Grade 3, contains over 300 abbreviations and contractions that reduce the amount of Braille codes needed to represent written text. Some of the contracted words are represented in figure 4 in its Braille format.

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 Braille books is a time-consuming process. The requirement for special printers and software adds to their limited availability. Scanned and text-converted documents can be used in the meantime to serve the needs of the blind.

According to a report by the National Programmed for Control of Blindness (NPCB), around 12 million people in India are visually impaired. Of the total, only 29.6% are a part of the education system. In India, just 6.86% of schools have access to Braille books and audio content, says the report, highlighting the significant gulf between those who need support and those who have access to it.

This paper mainly focuses on converting a Braille document into its corresponding alphabet of language, namely English, using various image processing concepts. 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 is 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 the 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 a Binary sequence which is then mapped to the corresponding language alphabet.

II.LITERATURE SURVEY

This paper The Methods used in Text to Braille Conversion And Vice versa has a proficient and cost-helpful method. In this paper, they proposed a segmentation method for printed text images. This method can be applied without any modifications for the segmentation of characters in any text document. The proposed method takes the content from the images. It blends the idea of Text to Speech Synthesizer (TTS) and Optical Character Recognition (OCR).

In this, they used Raspberry pi, Microcontroller PIC16F877A, and FPGA equipment to convert braille to text. The LCD is fused to display the English text that is converted from the Braille code. In the future, they can make use of Digital Signal Processing and can provide speech-to-Braille conversion and vice versa methods. This converter is also used to convert braille to text only

Low-cost portable communication device for the Deaf-Blind - The objective of this model is to provide the deaf-blind person with a communication device that is easy to use and affordable. The Braille display is designed using servo motors of raised dots. This arrangement ensures that the cost of the device is kept low. The word entered d by a non-disabled person on a QWERTY keyboard are converted to Braille and it is read through servo motors and the disabled person will give input through the Braille keyboard.



[K. D. P.G.ANURADHALOW-COST COST PORTABLE COMMUNICATION DEVICE FOR THE DEAFBLIND, This paper operates the cell pins so that when the users rest their fingers over the cell, it can feel like moving fingers on the cell. This paper also shows the development and design Braille book system that is low-cost and portable and has one Braille cell. The disadvantage of this paper is that when the cell moves over the fingers it's difficult to recognize the characters.

Here the proposed model BRAILLEBAND: BLIND SUPPORT HAPTIC WEARABLE BAND FOR COMMUNICATION USING BRAILLE LANGUAGE, uses the sense of touch of the arm to transfer the information to the blind person with 6 vibrating motors in a wearable band which corresponds to the Standard Braille code and is named as 'Braille Band'. This wearable band is very similar to the wristwatch, a portable assistive solution that helps disabled people work independently. Mobility and navigation information is transferred through touch, and feedback regarding travel information is also provided.

BRAILLE TO TEXT AND SPEECH FOR CECITY PERSONS, here a Braille keypad is used to give the input to FPGA SPARTAN 3 which acts as a conversion kit. The input is mapped to numbers that are assigned for the particular alphabets using lookup tables and after decoding it will display the text on an LCD screen and audio output is also produced for the text simultaneously. MATLAB software is used to perform the tasks. It also supports other languages such as VDHL. The drawback is that volume and speech rate cannot be modified, resumed, or paused.

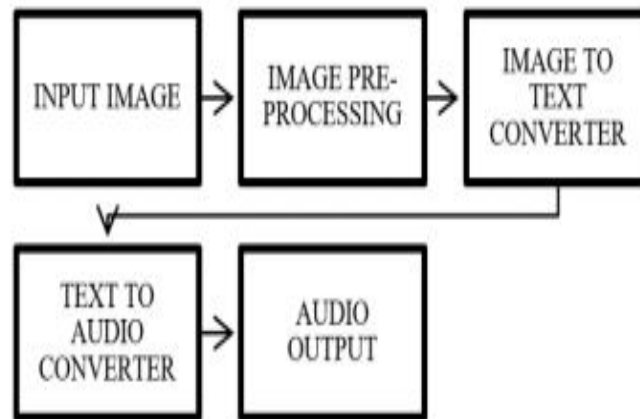
A PORTABLE DEVICE FOR THE TRANSLATION OF BRAILLE TO LITERARY TEXT - This article is about the development of portable devices for the translation of embossed Braille to text. Here the Braille text is captured by the camera which consists of illuminating source, focusing lens, and CCD photodiode array. The SELFOC microlens consists of 2x12 arrays of microlenses, which are used to focus the image and the scanner scans it. The algorithm used here is the DSP control algorithm which performs a task like code wheel interrupt, and camera interrupts pulses and it is repeated. Braille dots are recognized by the shadow and compared with reference magnitude by using Binary Code Braille Cell (BCBC). Paul Blenkhorn's algorithm is used for Braille-to-text conversion and it ensures real-time conversion using an optical scanner prototype.

DESIGN AND IMPLEMENTATION OF MESSAGING SYSTEM USING BRAILLE CODE FOR VIRTUALLY IMPAIRED PERSON - In this article SMS feature is used to provide long-distance communication using microcontroller IC AT89S52 used to convert the typed braille code to English alphabets using lookup tables. The lookup table consists of a pattern that relates to the corresponding Braille character. The data from a non-disabled person is sent through the GSM module and converted into Braille code using AT commands, 6 relay vibrating motors are used to vibrate according to the Braille code fashion and the Braille code is converted using lookup tables. Speakers are used for voice announcements for the system process.

III. PROPOSED METHODOLOGY

A. METHODOLOGY

The proposed braille-to-text/audio system overcomes some limitations of existing conversation systems. The proposed system takes input either given manually or detecting the texts from any book, document, or magazine through the images captured by using a camera. The text detection is achieved using an OCR tool from python's rich libraries for Natural Language Processing. The OCR algorithm plays a vital role in our project. Python also helps in the conversion of detected texts into audio files by providing the GTTS (Google Text-to-Speech) library.



Optical Character Recognition

OCR stands for Optical Character Recognition. It is a widespread technology to recognize text inside images, such as scanned documents and photos. OCR technology is used to convert virtually any kind of image containing written text (typed, handwritten, or printed) into machine-readable text data.

The most well-known use case for OCR is converting printed paper documents into machine-readable text documents. Once a scanned paper document goes through OCR processing, the text of the document can be edited with word processors like-Microsoft Word, and Google Docs.

Natural Language Processing

Natural language processing strives to build machines that understand and respond to text or voice data—and respond with text or speech of their own—in much the same way humans do. Natural language processing (NLP) refers to the branch of computer science—and more specifically, the branch of artificial intelligence or AI—concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.

NLP combines computational linguistics—rule-based modeling of human language—with statistical, machine learning, and deep learning models. Together, these technologies enable computers to process human language in the form of text or voice data and to ‘understand’ its full meaning, complete with the speaker or writer’s intent and sentiment.

Keras

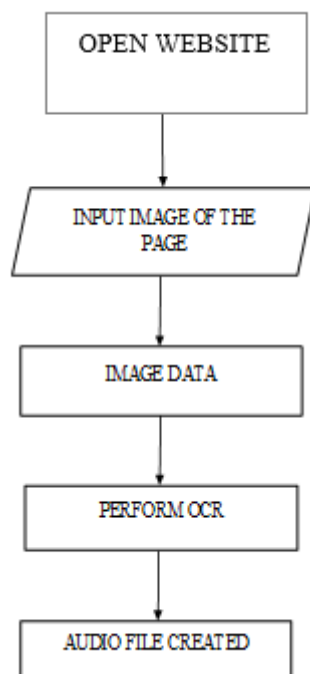
Keras is an open-source high-level Neural Network library, which is written in Python and is capable enough to run on Theano, TensorFlow, or CNTK. It was developed by one of the Google engineers, Francois Chollet. It is made user-friendly, extensible, and modular for facilitating faster experimentation with deep neural networks. It not only supports Convolutional Networks and Recurrent Networks individually but also their combination. It cannot handle low-level computations, so it makes use of the Backend library to resolve them. The backend library act as a high-level API wrapper for the low-level API, which lets it run on TensorFlow, CNTK, or Theano.

GTTS (Google Text-to-Speech)

There are several APIs available to convert text to speech in Python. One such API is the Google Text-to-Speech API commonly known as the gTTS API. gTTS is a very easy-to-use tool that converts the text entered, into audio which can be saved as an mp3 file. The gTTS API supports several languages including English, Hindi, Tamil, French, German, and many more.



ARCHITECTURE



IV. COMPARISON WITH EXISTING SYSTEMS

1. The existing systems use some hardware tools like the raspberry pi but the proposed system does not use any hardware tools.
2. The Scanned braille input and braille dots are extracted through a scanner and then the conversion mechanism happened using OCR but we are not using any scanner to perform character extraction.
3. In the traditional system, there is no interaction between the user and the computing device but in the proposed system the user can easily interact with the system.

V. CONCLUSION

The present paper proposes a flexible and real-time Braille-to-text and audio conversion system. This is a project that converts braille images to text. This project uses the Keras library to build a Sequential model by Convolutional Neural Network so that it recognizes letters. This project also includes the conversion of normal braille text to original languages. This system support multilingualism.

REFERENCES

- [1] Archana A, Shinde D. Text pre-processing and text segmentation for OCR. International Journal of Computer Science Engineering and Technology. 2012:810–12.
- [2] G. Devi Priya, N. Indumathi, N. Kalaimagal, A. Suriya, J.T. Vasuki, Hardware-Based Braille Pad on Mobile Phone, vol. 3, 2015.BrailleWikipedia.[online].Available: <https://en.wikipedia.org/wiki/Braille>
- [3] K. D. P.G.ANURADHALOW-COST COST PORTABLE COMMUNICATION DEVICE FOR THE DEAFBLIND,” Int. J. Ind. Electron. Electr. Eng., pp. 22–25, 2016.
- [4] P. P. C., “Braille To Text and Speech for Cecity Persons,” Int. J. Res. Eng. Technol., vol. 04, no. 01, pp. 263–268, 2015, doi: 10.15623/ijret.2015.0401039..[doi: 10.1109/SMC.2017.8122806.]



- [5] P. Smithmaitrie, J. Kanjantoe, P. Tandayya, "Touching force response of the piezoelectric braille cell", Disability and Rehabilitation: Assistive Technology, vol. 3, no. 6, pp. 360-365, 2008. [p. 1154–1158, 2016, DOI: 10.9717/kmms.2016.19.7.1154.]
- [6] R. Gonzalez and R. Woods, Digital Image Processing, Addison-Wesley Publishing Company, 1992.
- [7] E. Rex, A. Koenig, R. Baker, "Foundations of braille literacy", American Foundation for the Blind, 1994.



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