

Book Reader for Blind People using Labview

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Abstract— Reading plays crucial role in our daily life. But blind people cannot read due to their disability. They depend braille script for reading. Speech signal is more effective means of communication than text because even blind and visually impaired persons can respond to sounds. The visually impaired can understand text if it is converted into a speech signal. This project depicts an idea to design and book reader using LabVIEW software. The Optical Character Recognition system (OCR) is implemented using LabVIEW. OCR usually reads text from paper and translating the images in to a form that the computer can manipulate. At the outset, the OCR should be trained by giving unique character for each letter of a language (Pattern). Hence the OCR can recognize all the trained letters or pattern. The letters from the text book is acquired by the mobile phone camera and it is fed in to OCR wirelessly through droid cam wireless webcam. Then the OCR matches the input pattern (letter) with trained pattern and produces the string output (i.e.,unique character) accordingly. The string output is then processed for producing audio output. Here audio files for all the letters are already defined.

Key words: OCR, LabVIEW, Vision and motion, .WAV Audio Files

I. INTRODUCTION

Reading is very essential in our daily lives. According to WHO, about 285 million people are estimated to be visually impaired worldwide. Mostly, blind people read with the help of Braille script. Braille books are often expensive and most of the times their selection of books are not widely available. With the invention of computers, several approaches to computerized Braille translation have been developed. Many applications have been created for translation from Braille to Speech. Nowadays number of applications and devices are available to read a digital book or pdf. But it can be accessed by limited number of people because those e-reader applications are restricted to certain books. The books and papers available for the blind in digital format are quite less in comparison to the vast pool of books which are printed daily. Hence a device to help the blind in reading is a necessity. So in this paper we are trying to make a visually impaired people to read a tangible book which is written in a English language. First the image of the text is acquired and then it is converted in to the editable data using Optical Character Recognition(OCR). Optical character recognition also optical character reader is the mechanical or electronic conversion of images of typed, handwritten or printed text in to machine encoded text. LabVIEW is used to implement OCR here.

II. TECHNIQUE USED

In OCR, it is need to be trained with each character and worked on one font at a time. Initially the OCR should be trained with English letters which means each English letter

is represented by unique character. Here the output of the OCR is string. The OCR generates the unique character as a string when it matches the input character with trained character. By the same way any pattern can be recognized by OCR if it trained correctly.

III. HARDWARE REQUIREMENT

A. Personal Computer with NI Labview:

LabVIEW 2014(stands for Laboratory Virtual Instrumentation Engineering Workbench 2014) is a platform and development environment for a visual programming language from National Instruments. LabVIEW is an icon based programming platform.

In contrast to text-based programming language, where instruction determine the order of program execution, LabVIEW approaches dataflow programming, where the flow of data through nodes on the block diagram determines the execution order of the VI's (Virtual Instruments) and function.

IV. SOFTWARE REQUIREMENT

A. Lab VIEW:

- 1) Front panel: When a new or existing VI is opened then the front panel window of the VI appears. The front panel window is the user interface for the VI.
- 2) Block diagram:

The block diagram includes wires, icons, function, possibly subVIs and other LabVIEW objects. Every VI displays an icon in the upper right corner of the front panel window and block diagram window.

- 3) Functions used in block diagram:

In this acquisition we can create and edit the acquisitions. The acquisition has been stimulated by reading the image from folder or AVR. After the acquisitions the controls and indicators has been selected and program has been set in LabVIEW.



Fig. 1: Vision Acquisition Tool

The vision assistant is to run the algorithm in which OCR has been trained in the form of string output.

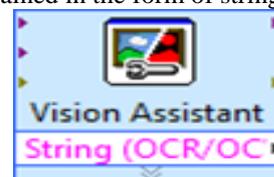


Fig. 2: Vision Assistant tool

B. Droidcam:

Droid cam is a freeware utility that lets to convert an android device in to web camera for windows computer. Droid cam is very useful though simple to use. It is needed to install the Droidcam in the android device as well. Once the PC client and phone app is installed, it is ready to go. Under the Wi-fi mode it is possible to connect the mobile phone with the computer wirelessly and it can be used as webcam. This mode is always recommended as it is easiest to set up. The only requirement is to copy the details as it is from phone and enter them on the PC client. In this mode mobile phone acts as a server and PC acts as client.

C. Total Audio Mp3 Converter:

In this project we provide separate audio files for each and every English letter. LabVIEW can accept the audio files only in wave format. Hence all the mp3 files should be converted in to wave files. Total audio mp3 converter is used here to convert audio files in any format to wav format.

V. BLOCK DIAGRAM

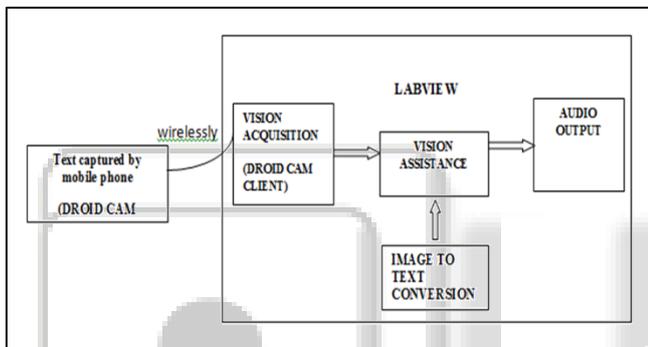


Fig. 3: Overall Block diagram

In LabVIEW platform, initially the OCR is trained with all the letters of a language which means each letter should be represented by unique character. The mobile camera which acts as a sensor will capture the word when it is placed in front of the camera and the image of the text is acquired using droid cam server and it is sent wirelessly in to droid cam client which is enabled in vision acquisition and then the image is fed in to the vision assistant. By using the optical character recognition (OCR) algorithm the characters in the word are recognized. The OCR in vision assistant recognize the letter, compares the letter with already trained letter. If it finds both the pattern of the letter is same then it will provide string output. Then the string output is processed for providing audio output. If the condition is satisfied after processing, the corresponding audio output will be given to the user through audio playback device. All the letters of a particular language are trained so as to satisfy the basic needs to communicate in that language. This is similar to the concept of putting up information in the database of a dictionary or any other translator.

Numerous projects were proposed to read English book using different platform. But for regional language only limited projects are available. Therefore by using this technique, it is possible to read any languages with simple modification. The innovation of this project is that we are not using any text to speech synthesis technique for audio output because text to speech synthesis is only applicable for English

language. Instead we created audio files for each English letter and sequencing it by using LabVIEW logic.

VI. IMPLEMENTATION

In the given block diagram fig 5, the image is continuously acquired by vision acquisition block and it feeds the image in to the vision assistant block where the OCR algorithm is present. The OCR (as we mentioned earlier) recognizes and matches the input letter with trained letter and then produces the string output.

The string output is then given in to the inner loop for further processing. The inner loop has to be executed string length's times. Then only it will produces audio output for all the character in a string.

When the string enter in to the inner loop it is then get separated in to single individual character ie, it produces an array with all individual character. The character in the array is fed in to the element field of the search function. The search function is already given with predefined array. The search function searches the given character (element) in the predefined array and it provides index of that element. Here the index value is checked by using switch selector. Once the condition is satisfied then it produces the corresponding audio output. By the way all the character in a word can be easily recognized and pronounced.

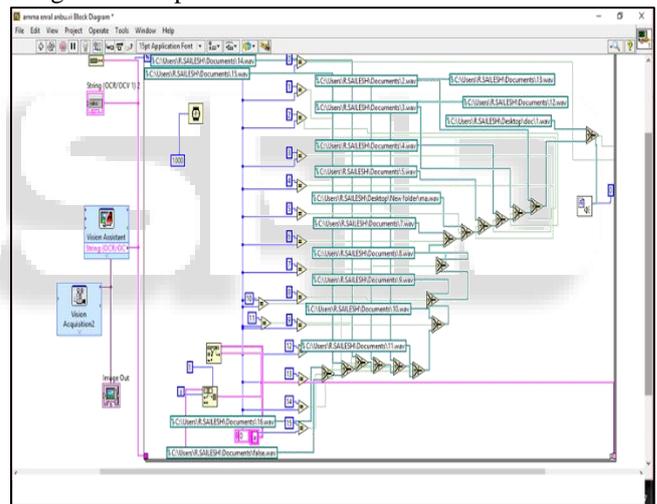


Fig. 4: Block diagram of book reader

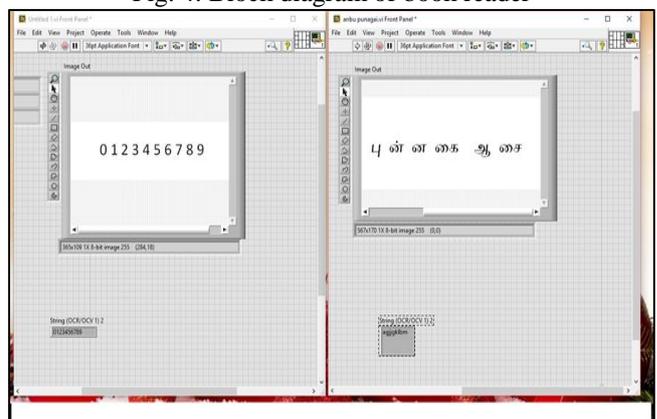


Fig. 5: Front panel of book reader (Tamil)

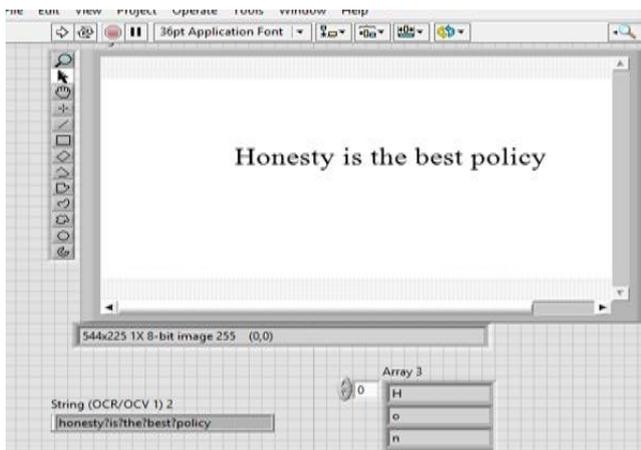


Fig. 6: Front panel of book reader (English)

VII. CONCLUSION

The Reading Assistant for the Visually Impaired is not just a project that empowers the blind to become independent, but is also a resource saver. To solve the common problems of blind people we have proposed this project in which OCR is used to perform word recognition of the localized text and transform into audio output for blind people.

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