

Tamil Book Reader for People with Visual Impairment using Lab view

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Abstract- This paper reports on the work carried out so far in an ambitious project of enabling blind people to read Tamil books. It combines optical character recognition of printed text in Tamil and text to speech conversion. Speech signal is a 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 a Tamil book reader using Lab VIEW software and OCR (optical character recognition)

KEYWORDS: Blind aid, OCR, Lab VIEW, Vision and motion .WAV Audio Files.

I. INTRODUCTION

According to WHO, about 285 million people are estimated to be visually impaired worldwide. The challenges faced by blind people in their everyday lives are not well understood. One of the major problems is reading. Reading is very essential in our daily lives. There are many tools for both reading and writing for blind people. But Braille is used among various blind people. The major disadvantage is that the Braille books are often expensive and most of the times their selection of books are not widely available. Apart from that the other technology used is Talking Computer Terminal, Computer Driven Braille Printer, Paperless Braille Machines etc.

Nowadays Computers are designed to interact by reading the books or documents using Java, Raspberry Pi. Synthesized voice is used to read the content by the computers. These are the existing methods for visually impaired people for reading books. These technologies use different techniques and methods allowing the person to read or convert document to Braille. Nowadays number of applications and devices are available to read a digital book or pdf. But it can be accessed by a limited number of people because those e-reader applications are restricted to English language. 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 person to read a tangible book which is written in a Tamil language.

II. TECHNIQUE USED

The technique used here is training each character in OCR (i.e.) one font at a time. During this training process each Tamil letter should be represented by a unique character. The output produced by the OCR is in string format. The trained characters should match the input characters which were captured by the camera.

III. HARDWARE REQUIREMENT

A. Personal Computer with NI Lab VIEW:

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.

B. USB Camera



Figure 3.1 USB Camera.

Technotech ZB-080 Webcam / Technotech ZB-029 Webcam: It has inbuilt sensitive microphone and image sensor high quality CMOS sensor and image resolution 15 mega pixels with 6 light sensors. Image control colour saturation, brightness (adjustable), sharpness Interface: USB 2.0. Frame rate: 30fps.

IV. SOFTWARE REQUIREMENT

A. LabVIEW 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.

Block diagram:

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

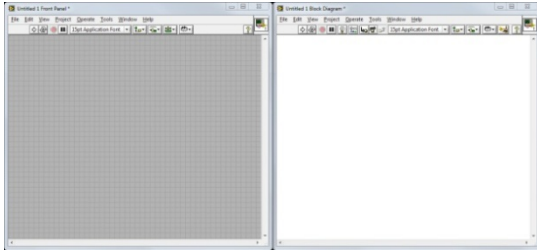


Figure 4.1 Front panels and block diagram.

ii. Functions used in block diagram:

Vision assistant tool:

The vision assistant is to run the algorithm in which OCR has been trained in the form of string output. This tool is available in vision and motion function.

Figure 4.2 Vision Assistant tool.

Vision acquisition tool:

Vision acquisition is used for acquire, save, and display images from thousands of different cameras. The image can be read from the folder or AVR. After the acquisitions, the controls and indicators has been set in lab VIEW. This tool is available in vision and motion functions.

Figure 4.3 Vision Acquisition tool.

B. MP3 to wave file converter:

For each and every tamil letters separate audio files should be provided. All the mp3 files should be converted to wave files as Lab VIEW can accept the audio files in wave format. MP3 to wav converter software is used here to convert the audio files in mp3 format to wave format.

V. BLOCK DIAGRAM:

First the tamil letters are trained using ocr and is represented using a unique code. Then the camera captures the word and the images of the text is acquired by using vision acquisition and then the image is fed into the vision assistant. By OCR algorithm the characters in the word are recognized. The vision assistant tool will compare the acquired image and trained image and if matches it will produce the output in audio format.

VI. IMPLEMENTATION:

First the image of the text is acquired through vision acquisition software and then it is converted into the editable data using Optical Character Recognition (OCR). Lab VIEW is used to implement OCR here. Tamil letter should be represented by unique character. The OCR generates the unique character as a string when it matches the input character with trained character and produces a 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 produce audio output for all the character in a string. Instead of using text to speech synthesis technique for audio output, we are creating audio output for each tamil letter and sequencing it by using labVIEW. The 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 by using 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.

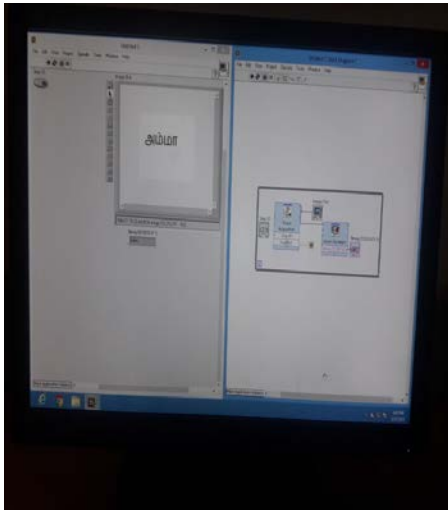


Fig. 6.1 String Output

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 Tamil 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. Build path function is used to produce corresponding audio output. All the audio files are stored in a separate folder and it is necessary to mention the folder name in a path of Build path function. It facilitates Lab VIEW to fetch the audio file correctly from the folder without showing any error pop up window. Numerous projects were proposed to read English book using different platform.

But for regional language only limited projects are available. Therefore, in this project we are trying to read Tamil language. 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 Tamil letter and sequencing it by using Lab VIEW logic

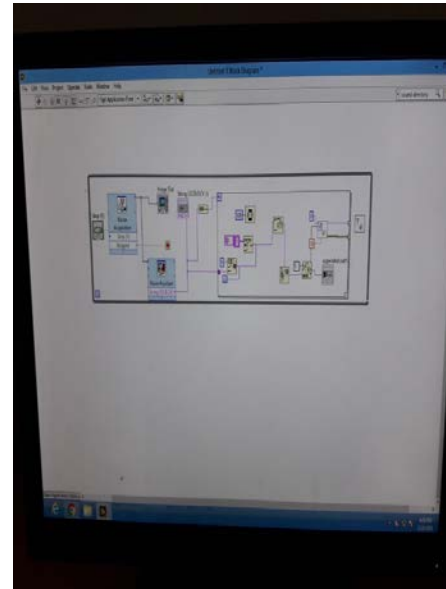


Fig. 7.1 Block diagram.

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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