

Template Matching Based on Optical Character Recognition Aided to Visually Challenged People

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ABSTRACT : An image be defined as a matrix of square pixels arranged in rows and columns. Image processing is a leading technology which enhance raw images received from gadgets such as camera or a mobile phone in normal day-to-day life for various applications. Core idea for image to text and speech conversion is to overcome the challenges faced by a visually challenged people in real life. It formulates the interaction between image segmentation and object recognition in the framework of canny algorithm. The system goes through various phases such as preprocessing, feature extraction, text recognition, edge detection, image segmentation and Text To Speech (TTS) conversion. The system mainly consists of two main modules such as Image To Text (ITT) and Text To Speech. The main aim of this paper is to recognise the text character of an image and convert this text into speech signal.

KEYWORDS: Matrix, Canny algorithm, Text To Speech (TTS) conversion.

I. INTRODUCTION

Braille is one of the most important ways that visually challenged people acquire there information. Reading text (scene text, news paper, sign, banner, etc.) is one of the essential needs of the visually challenged people in daily life. Blind people are incapable of reading books which do not have Braille. It is necessary to help visually challenged people by providing them with technologies and systems to allow them to interact and communicate among people and with each other without the vision problem. Visually challenged people have got good senses for touch feeling and hearing. Hence depending on the sense of the touch of the finger they easily make use of Braille system for communication. The problem is that it is hard to find Braille books due to the high cost involved to published them compared to common books.

To overcome these problems, this paper captures the text and recognises the text using Optical Character Recognition (OCR). It is the process of translating scanned image of typewritten text into machine-editable information. The machine can automatically recognises characters through an optical mechanism and it convert text into speech by means of a TTS system. This paper can be used to convert any words or letters in the system found in our daily life, such as in books, news paper, contracts, mail, etc., into voice information.

The major aim is to eradicate the problem of reading books for visually challenged people and it is used for all aged people. The main advantage is portable, very light weight, easy to use, very cheap compared to other solutions and robust.

II. LITERATURE REVIEW

This section provides a detailed overview of the literature review to convert text into speech for visually challenged people.

In[1] Payal V. Gulhanel and Vrushali G. Raut discussed about strategy to help visually challenged people by reading the product labels. Blind person will only have to show product label in front of the camera, then the camera will

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capture the image. System extracts the text from image by using SIFT (Scale Invariant Feature Transform) features of the image.

In [2] Swati Vikas Kodgirel and G. S.Sable calculated the overall review which is separated into four subsections. The first section presents the idea behind pre processing concept and need of pre processing and post processing. The second section consists of review of isolation of non text and textual regions of an image. The third section focuses on techniques used for image to text conversion. The fourth section covers the brief review on text to speech conversion methods.

In[3] Karan Magiya specifies advanced concepts of Images processing and Neural Networks like pattern recognition to retrieve text from human hand writing. The image file is loaded and converted to a workable format like bitwise or gray scale. Then the region of interest is obtained by using filters.

In[4]Shahbaaz Ahamad.S.A and Harshitha P.K introduced an embedded system on chip (SOC) integrates the integrated protocol (IP) cores for processors, memories, and application-specific hardware to create the SOC. Here SOC includes a intelligent character recognition (ICR) based scanning support. The goal of this work is to help the blind and the old aged people to be able to read books, articles, magazines and newspapers. Using the ICR and TTS technology the written format is converted into the speech.

In[5] R.Shantha Selva Kumari and R.Sangeetha discussed the conversion of english text into speech which is done by using a stored speech signal data. Text to speech conversion module is by the use of MATLAB. By the use of microphones the phonemes (alphabets, numbers and words) are recorded using a goldwave software. The recorded .wav (sounds) files are saved as a database separately. The resulting speech output is assessed by listening test. This implementation will be developed for helping visually challenged people in understanding text they can come across day-to-day life.

In[6]N.Vankata Rao et.al developed a optical character recognition technique algorithms to develop a neural network based method for accurate handwritten character recognition and automatic number recognition. This results in increasing the accuracy of neural network based method which provides 100% accuracy in OCR.

II. EXISTING METHOD

Optical character recognition using MATLAB proposed a Character recognition techniques associate a symbolic identity with the image of character. In a typical OCR systems input characters are digitized by an optical scanner. Each character is then located and segmented, and the resulting character image is fed into a pre-processor for noise reduction and normalization. After pre-processor three steps take place feature extraction, Template-matching and correlation techniques, Post Processing. English handwritten and sample text images OCR algorithm by using MATLAB. The images were then filtered, binarized, clipped and resized. The recognition accuracy was 85% to 90% due to improper hand written characters.

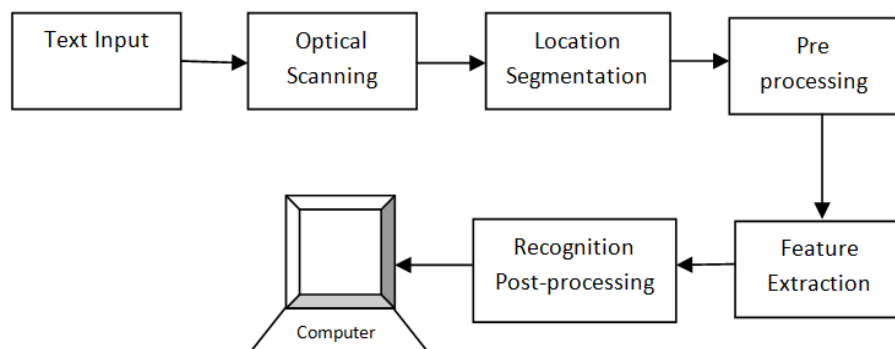


Fig.1

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IV. PROPOSED METHOD

TRAINING PHASE

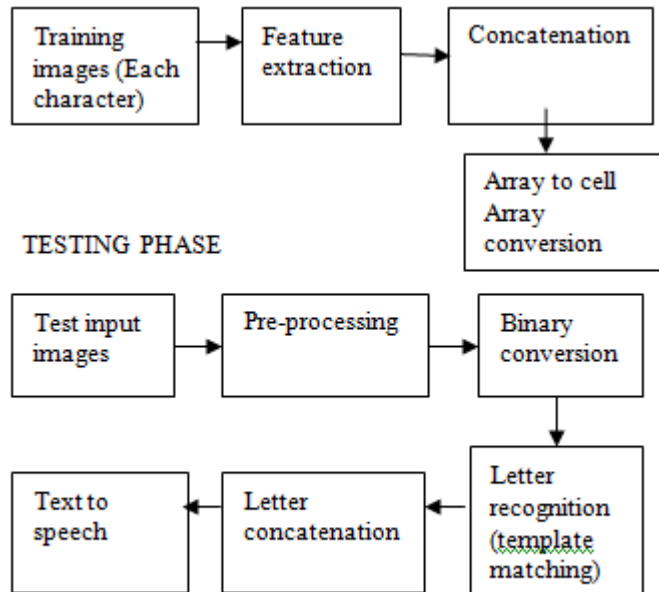


Fig.2

4.1 TRAINING PHASE

Training images

Training images includes all the individual characters.

Feature extraction

Feature extraction involves reducing the amount of resources required to describe a large set of data. When performing analysis of complex data one of the major problems from the number of variables involved. Analysis with a large number of variables generally required a large amount of memory and computation power. Feature extraction is general term for methods of constructing combinations of the variables to get around these problems while still describing the data with sufficient accuracy.

Concatenation

Concatenation is the joining of two numbers by their numerals. In previous process the letter is extracted and it joints together to form a word by concatenation. For example concatenation of c,a,t is cat.

Array to cell array conversion

Break matrix up into a cell array of matrices. The second input to MAT2CELL defines how the rows will be broken up among cells along the row dimensions. This indicates that the resulting cell array will have one row and cells will contain matrices with 42 rows. The third input to MAT2CELL defines how the columns will be broken up among cells along the column dimensions. This indicates that the resulting cell array will have 61 columns and the cell will contain matrices with 24 columns. The net result is that cell array ends up being a 1-by-61 cell array where each cell contains a 42-by-24 submatrix of mat.

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4.2 TESTING PHASE

Test input image

Test input image is the query image for which the text is to be recognized and converted to voice.

Pre-processing

RGB image is a image which is made up of three different colors namely red, green and blue respectively. Gray scale image is an image which is a combination of black and white colours respectively. `rgb2gray` is the command used in MATLAB to convert RGB images to grayscale. `I=rgb2gray` converts the true colour image RGB to the gray scale intensity image I.

Binary conversion

The Gray scale intensity is converted into binary conversion using threshold. `LEVEL=graythresh(I)` computes a global threshold (LEVEL) that can be used to convert an intensity image to a binary image with `IM2BW.LEVEL`. LEVEL is a normalized intensity value that lies in the range [0,1]. The output binary image BW has values of 1(white) for all pixels in the input image with luminance greater than LEVEL and 0(black) for all other pixels.

Template matching

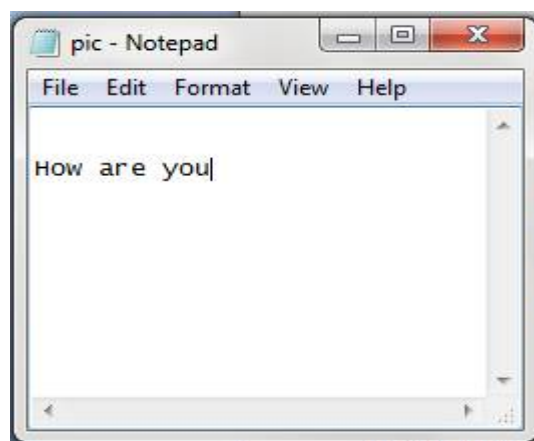
The templates are most often used to identify printed characters, numbers, and other small, simple objects. The matching process moves the template image to all possible positions in a large source image and compute a numerical index that indicates how well the template matches the image in that position. Match is done on a pixel-by-pixel basis. Two variables are the corresponding pixel values in two images, template and source. For templates without strong features, or for when the bulk of the template image constitutes the matching image, a template-based approach may be effective. A basic method of template matching uses a mask(template), tailored to a specific feature of the search image, which we want to detect. This technique can be easily performed on gray images or edge images. The convolution output will be highest at places at the image structure matches the mask structure, where the large images value get multiplied by large mask values.

Letter concatenation

The detected individual letters are concatenated to form word. The most basic operation on strings is concatenation, connecting to strings to form a longer string whose length is the sum of the lengths of the operands: `abcde` is a concatenation of `ab` with `cde`, in symbols `abcde=ab^cde`. Strings and concatenation of strings can be treated as an algebraic system with some properties resembling those of the addition of integers.

V. RESULT

To illustrate the accuracy of proposed English text images OCR algorithm by using MATLAB. The sample input document is shown in figure 3. The images are then filtered, binarized and resized. Lines of text are extracted from the images.



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VI. CONCLUSION

The proposed work gives a algorithm for text to speech conversion. Image to Text and Text to Speech conversion is implemented in this paper using MATLAB. In this paper we can read a paragraph using MATLAB.

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