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Progressive Developmental Approach of Neural Network and OCR Based Operative System for Visually Impaired Persons

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ABSTRACT: Reading is apparently essential in today's society. Printed text everywhere in the form of reports, receipts, bank statements, class room handouts, instruction on medicine bottles, etc. And while optical aids, video magnifier and screen readers can help blind users and those with low vision to access, their documents. There are few devices that can provide good common hand-held objects printed with text such as invention packages. Objects printed with text such as prescription on medicine bottles along with manufacturing date, expire date .The most well-known answers for tag restriction in computerized pictures are through the execution of edge extraction Background subtraction, speech recognition. Normal character division procedures depend on histogram investigation and thresholding. Other late methodologies proposed are the utilization of counterfeit neural systems.

KEYWORDS: Connected Components Analysis, Adjacent Character Grouping, Image Partition, Text Line Grouping, Text String Detection.

I. INTRODUCTION

In the running world, there is growing demand for the software systems to recognize characters in computer system when information is scanned through paper documents as we know that we have number of newspapers and books which are in printed format related to different subjects. These days there is huge demand in "Storing the information available in these paper documents in to a computer storage disk and then later reusing this information by searching process". One simple way to store information in these paper documents in to the computer system is to first scan the documents and then store them as IMAGES. But to reuse this information it is very difficult to read the individual contents and searching the contents form these documents line-by-line and word-by- word. The reason for this difficulty is the font characteristics of the character in paper documents or different to font of the characters in computer system. As a result, computer is unable to recognize the characters while reading them. This concept of storing the content of paper document in computer storage place and then reading and searching the content is called DOCUMENT PROCESSING. Sometimes in this document processing we need to process the information that is related to languages other than the English in the world. For this document processing we need the software system called CHARACTER RECOGNITION SYSTEM. This process is also called as DOCUMENT IMAGE ANALYSIS (DIA).

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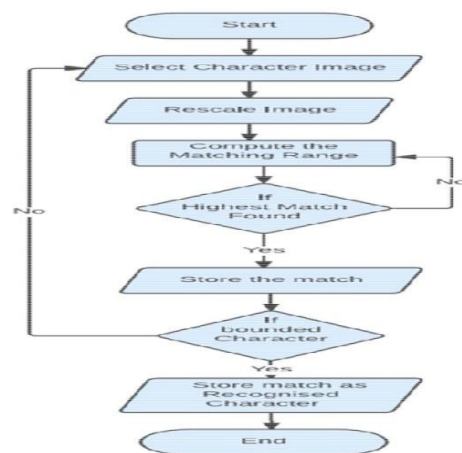
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II. ALGORITHM

TEMPLATE MATCHING ALGORITHM

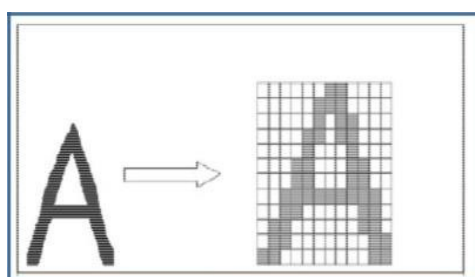
Template matching is a system prototype that is used to recognize the character or alphabet by comparing two images. Template matching is the process of finding the location of sub image called a template inside an image. Once a number of corresponding templates are found their centers are used as corresponding points to determine the registration parameters. Template matching involves determining similarities between a given template and windows of the same size in an image and identifying the window that produces the highest similarity measure. It works by comparing derived image features of the image and template for each possible displacement of the template [3]. In Template matching, the character itself is used as a “feature vector”.

Template matching involves the use of a database of characters or templates. There exists a template for all possible input characters. For recognition to occur, the current input character is compared to each template to find either an exact match or the template with the closest representation of the input character. If $I(x,y)$ is the input character, $T_n(x,y)$ is the template n , then the matching function $S(I,T_n)$ will return a value indicating how well template n matches the input character. Character recognition is achieved by identifying which T_n gives the best value of matching functions, $S(I,T_n)$

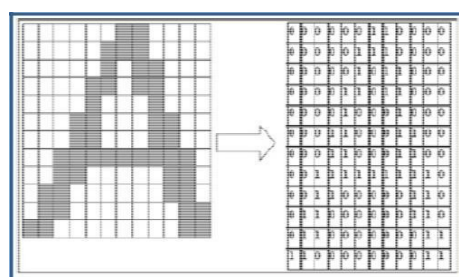


The template matching algorithm implements the following steps:

I. Firstly, the character image from the detected string is selected. II. After that, the image to the size of the first template is rescaled. III. After rescale the image to the size of the first template (original) image, the matching metric is computed. IV. Then the highest match found is stored. If the image is not match repeat again the third step. V. The index of the best match is stored as the recognized character.



Bitmap Image of Character A



12x12 Matrix Representation of Character A

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III. STATISTICAL ALGORITHM

The purpose of the statistical algorithms is to determine to which category the given pattern belongs. By making observations and measurement processes, a set of numbers is prepared, which is used to prepare a measurement vector [11].

Statistical algorithm uses the statistical decision functions and a set of optimality criteria which maximizes the probability of the observed pattern given the model of a certain class. Statistical algorithms are mostly based on three major assumptions:

I. Distribution of the feature set. II. There are sufficient statistics available for each class. III. Collection of images to extract a set of features which represents each distinct class of patterns. The measurements taken from n features of each word unit can be thought to represent an n-dimensional vector space.

There are two approaches of statistical algorithm. I. Non-parametric Recognition in Non-parametric Recognition, a priori data or information is not available. II. Parametric Recognition Since a priori data or information is available about the characters in the training data; it is possible to obtain a parametric model for each character.

IV. SEGMENTATION

Segmentation is the process of dividing an image into multiple segments. This process is to simplify the image for analysis and make feature extraction easier. One important feature that can be exploited from Number plates is the high number of vertical edges. But before that, we need to do some handy pre-processing of the current image namely:

1. **Conversion to Gray Scale:** The Red, Green, and Blue components are separated from the 24-bit color value of each pixel. To convert the image captured into Gray Scale code can be written in Python IDLE:

```
img = cv2.imread('2.jpg',0)
```

An example of image converted to grayscale is shown in Fig3.

2. **Blur the Image:** The result of blurring an image by a Gaussian functions. Using this technique image looks sharper or more detailed if we are able to perceive all the objects and their shapes correctly in it. Using Code:

```
Blur=cv2.GaussianBlur(img,(5,5),0)
```



Fig 3

V. EXISTING SYSTEM

- Today, there are already a few systems that have some promise for portable use, but they cannot handle product labeling. For example, portable bar code readers designed to help blind people to identify different products in an extensive product database. It can enable users who are blind to access information about these products.
- But a big limitation is that it is very hard for blind users to find the position of the bar code and to correctly point the bar code reader at the bar code.

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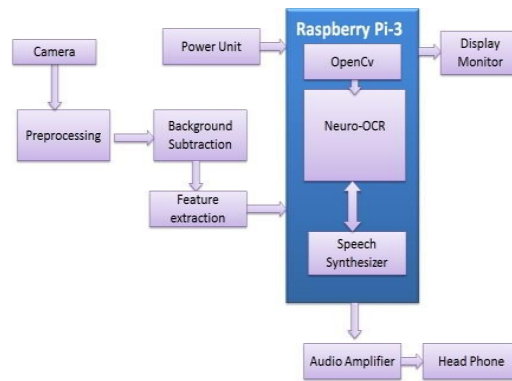
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VI. PROPOSED SYSTEM

Our proposed project provides Text to voice conversion using phonematic concatenation for visually impaired people. It automatically focuses on the text regions of the object. We offer a novel text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels using artificial neural network. Text characters in the localized text regions are then binarized and recognized by off-the-shelf optical character identification software. The renowned text codes are converted into audio output to the blind users. This project works as follows Object distance measure using ultrasonic sensor. Automatically focus the text regions from the object. Text extraction using neural network based OCR.

VII. SYSTEM ARCHITECTURE DIAGRAM

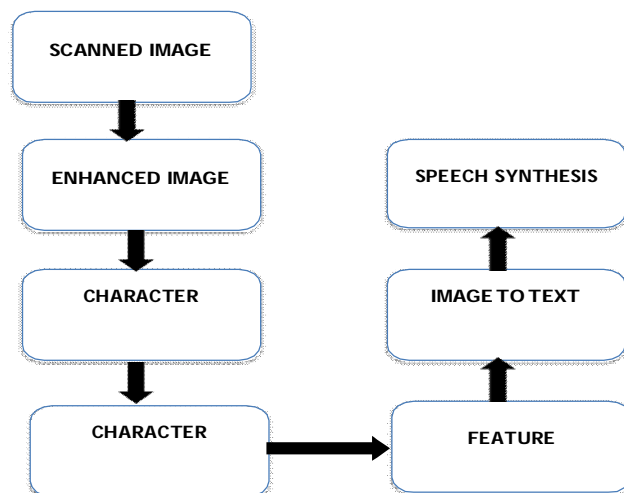


VIII. METHODOLOGY

PRE PROCESSING

Pre-processing stage consists of three steps: Skew Correction, Linearization and Noise removal. The taken image is checked for skewing. There are options of image getting skewed with either left or right coordination. Here the image is first brightened and binarized.

The task for skew detection checks for an angle of orientation between ± 15 degrees and if spotted then a simple image rotation is carried out till the lines match with the true horizontal axis, which produces a skew corrected image. The noise announced during capturing or due to poor quality of the page has to be cleared before more processing.



Flow Diagram

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IX. BACKGROUND SUBTRACTION

Background subtraction, also known as foreground finding, is a technique in the fields of image processing and computer vision wherein an image's foreground is taken out for further treating (object recognition etc.). Generally an image's regions of interest are stuffs (humans, cars, text etc.) in its foreground. After the stage of image preprocessing (which may include image denoising post dispersion like morphology etc.) Object localization is required which may make use of this skill. Background subtraction is a widely used approach for spotting moving objects in videos from standing cameras.

FEATURE EXTRACTION

Feature extraction is the individual image glyph is considered and extracted for features. First a eccentric glyph is defined by the following traits: Height of the character, Width of the character, Numbers of horizontal lines present— short and long, Numbers of vertical lines present—short and long, Numbers of circles present, Numbers of horizontally oriented arcs, Numbers of vertically oriented arcs, Centroid of the image, Position of the various features, Pixels in the various regions

SPEECH RECOGNITION

Speech acknowledgment is the process of translating an acoustic signal, caught by a microphone or a telephone, to a set of words. The predictable words can be an end in themselves, as for tenders such as directions & control, data entry, and article research. Speech acknowledgment is the ability of a machine or program to detect words and phrases in spoken language and convert them to a machine- readable organization. Rudimentary speech recognition software has an inadequate jargon of words and phrases, and it may only detect these if they are pronounced very unmistakably. More chic software has the ability to accept natural dialogue

X. CONCLUSION

The methodology detailed in this paper helps the visually challenged to read the printed text such as bank statements, reports, prescriptions on medicine bottles, grocery items, etc. The present implementation is only for the conversion of printed English text. The device will be held like a image capture camera and capture over a printed page.

The input is taken by a camera in the hand-held device and output is given as speech through microphone. The software implementation and the hardware interfacing were done using Raspbian in Linux.

XI. FUTURE ENHANCEMENT

The Optical Character Recognition software can be enhanced in the future in different kinds such as training and recognition speeds can be increased greater and greater by making it more user-friendly. Many applications exist where it would be desirable to read hand written entries. Reading handwriting is a very difficult task considering the diversities that exist in ordinary penmanship. However, progress is being made.

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