

AN EASY TO USE VERSATILE READER FOR BLIND PEOPLE AND PARTIALLY BLIND PEOPLE

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Abstract- There are 285 million (2850 lakh) visually impaired people in the world, out of which 39 million are completely blind. Moreover, there are more than 2 billion people in the world who are illiterate, as they cannot read or write. Project is aimed to develop a low cost assistive technology for all such people, to help them read any type of literature. This would be a scanner based device directly connected to our computer, which basically runs a software developed in MATLAB to directly read the scanned images of any printed documents, and then to simultaneously speak the read content. The basic foundation of this system will be a combination of Optical Character Recognition (OCR) and Text to Speech (TTS). OCR is translating handwritten or typed text images printed in a format understandable to machines for editing, indexing / searching, and reduced storage size. With more we introduce prediction algorithm that is used to predict the next character in particular, the word for error detection and automatic correction

Index Terms- Reader for blind, OCR, Neural networks, MATLAB

I. INTRODUCTION

Visually impaired people have many difficulties in accessing documents in many Situations like reading text in non- ideal conditions like low light, unique page orientation, columned text etc. paper aimed to work towards creating a portable device that could overcome some problems current technologies to blind and partially blind people. The basic foundation of this system will be a combination of Optical Character Recognition (OCR) and Text to Speech (TTS)

Optical Character Recognition, or OCR, is the process of translating the images of handwritten text, typed or printed in a format understandable to machines for editing, indexing / searching, and reduced storage size. OCR uses an artificial neural network as a background process to solve the classification problem.

OPTICAL CHARACTER RECOGNITION-OCR

OCR is an area of research in pattern recognition, artificial intelligence and computer vision. Although academic research in the field continues, the OCR application emphasis on proven techniques changed. The input for the problem is OCR scanning pages of text. To perform character recognition, our application has to go through three main stages. The first is the segmentation, that is, given an input binary image, identification of individual glyphs (blocks representing one or more characters, generally congruent). The second step is feature extraction, which is calculated each glyph from a vector of numbers that serve as input features for ANN. This is the hardest step in which there is no obvious way to get these features. The last task is the classification. In our approach, there are two parts to this. The first is the training phase, manually identify the correct class several glyphs.

One of the most common applications of artificial neural network is the character recognition system. This system is the basis for many types of applications in various fields, many of which we use in our daily lives. Businesses, post offices, banks, security systems, and even robotics use this system as a base of operations. It is very cost effective and less time consuming system

OBJECTIVE

Objective is to create portable reading device for blind people which automatically finding faults and correct them. The main objective is to develop a recognition system that recognizes characters using time efficiently minimum processor using prediction and auto correction algorithm.

II. STEPS OF OPTICAL CHARACTER RECOGNITION SYSTEM

The purpose of the optical character recognition (OCR) is to recognize optical patterns (often in digital image) corresponding to alphanumeric or other characters. The process of optical character recognition have several steps like segmentation, feature extraction and classification.

Classification process:

Any type of general classifier used for character recognition system as per the application. Mainly there are two steps in building a classifier: testing and training. Training and testing further divided in to sub steps.

1. Training

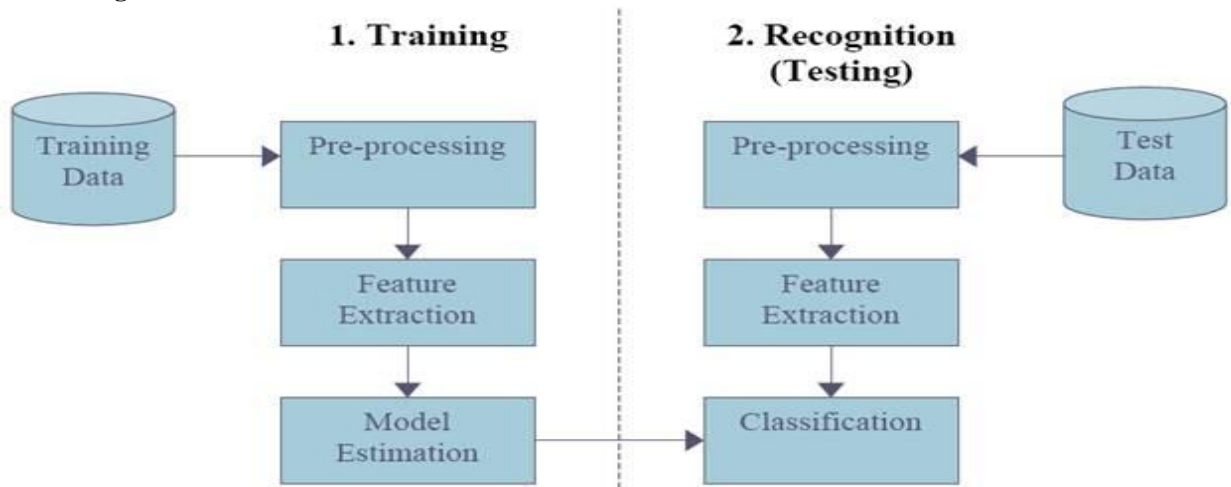


Figure 2: The pattern classification process

OCR pre processing

Binarization: This is the first stage of pretreatment.

Color or gray image is taken as input for converting binary image on the basis of threshold. The resultant output image replaces all the pixels of the input image with a higher luminance threshold value 1 (white) and supersedes all other pixels with value 0 (black)

Morphological operation: Binary image has little noise to be eliminated for other segmentation operations and extractability. Different morphological operations are required to reduce noise.

Pre-processing: to make image more suitable for OCR, some processes are done on image.

Feature extraction: for highlighting relevant information, reduce the irrelevant information.

Model estimation: The finite set of feature vectors, the need to estimate a model for each class of the training data.

2. Training

Pre-processing: to make image more suitable for OCR, some processes are done on image.

Feature extraction: for highlighting relevant information, reduce the irrelevant information.

Classification: Compare different features to find the nearest match.

Segmentation: segment paragraph in to line. Line segmented in to word and word segmented in to character

OCR feature extraction:

Feature extracted like area, height, width, centroid, eccentricity, filled area, number of pixels etc.

OCR Classification:

The main function of a system of pattern recognition is to make decisions on models of class composition with which it is confronted. In the context of an OCR system, recognition is facing a reasonable sequence of function for which it must determine the character classes.

III. DIFICUTIES IN CHARACTER RECOGNITION

Misclassifications characters come from two main sources: the recognition unit poor quality (dot) pictures and inadequate discriminatory ability of the classification. Many factors contribute to the image of the hard drive support or recognize noisy image character:

- Poor quality of the original document
- Low- resolution, multi -generation exploration noisy image
- Incorrect or without image preprocessing
- bad segmentation in recognition items

Moreover, the method of character recognition may lack adequate response over given character (point), resulting in errors of classification. This type of error can be difficult to treat due to limited training or learning process and the limited capacity of the classification.

A common example of a "difficult" character is the letter "O" easily confused with the "0" digit .Another good example might be the letter "I" confused with the number "1" or confused with a loud image of the letter "I"

The highest level of taxonomy is error causes:

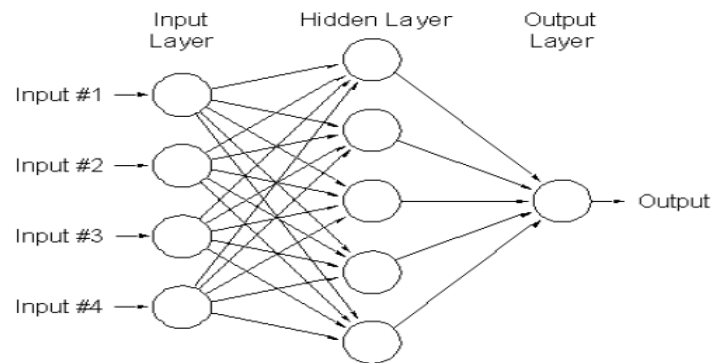
- Image: defect formation due to staining of heavy / light footprints, curved lines base, etc.
- Similar symbols As mentioned above
- Punctuation: because of the semicolons, quotation marks, special symbols, etc.
- Typography: due to spacing between character and italic, underlined, shaded backgrounds, fonts unusual characters , large / Smallprint etc.

The potential sources of OCR improvement:

- better image processing: based on the most accurate model of the process of printing, copying and scanning
- Adaptive nature of classification process: by fine-establish the classifier to the current document type.
- recognition of multiple characters: exploiting the consistent style in the typeset text
- increased use of context :it depends on the document properties can vary from language to language

IV. ARTIFICIAL NEURAL NETWORK

An artificial neural network (ANN), commonly known as the neural network (NN) , or a mathematical model is a computational model inspired by the structure and / or functional aspects of biological neural networks . A neural network consists of an interconnected group of artificial neurons and processes information using a connectionist approach to computation. In most cases an ANN is an adaptive system that changes its structure based on external or internal information that flows through the network during the learning phase. Neural networks are modern statistical tools for modeling nonlinear data. They are typically used to model complex relationships between inputs and outputs or to find patterns in data .



V. AUTOMTICALLY FINDING FAULTS AND CORRECTING ALGORITHM

As required today, all documents and data must be connected online to a single server user interaction, there is a huge need for OCR. But there is always a problem is not well written and misspelled words, ink spread when printing characters, etc. so automatically prediction and correcting algorithm is needed in OCR system. In this system, next word predicted automatically from the different available choices. Probability of finding nearest match is increased due to this algorithm.

VI. ADVANTAGE

1. Faster: The system becomes more faster. As there is a prediction of the next character if the system does not pass through the usual method compared with A -

Z. So many options reduced and the system will be faster.

2. More reliable: lost character, miss-spelled words are corrected. So it is more reliable.

VII. CONCLUSION

At the present stage of development, the available technologies for visually impaired people are under-utilized due to their slow processing speed or poor accuracy. Automatically finding faults and correcting algorithm helps to predict the next character so the system become less time consuming and blind people can get continuous feedback in less time. Artificial neural networks used to character recognition due to their ability to perform complex task. Set of feature will be choose wisely for better result by neural network.

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