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Handwritten Text Recognition and Digital Text Conversion

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ABSTRACT

Sometimes it is extremely difficult to secure handwritten documents in the real world. While doing so, we may encounter many problems such as misplacing the documents, unavailability of access from anywhere, physical damage, etc. So, to keep the information secure, we convert that information into digital format to address all the above mentioned problems. The main aim of our application is to recognize hand written text and display it in digital text format. Image processing is very significant process for data analysis these days. In image processing, the visible text from the real world - as input- must be processed precisely in order to produce the same information - as output - with accuracy. To do this, the text present in the image must be recognized by the system accurately. The proposed system aims at achieving these results. The process goes in this way: The image which contains the handwritten text is fed to the system is passed into neural network which recognizes the handwritten text present in the image and displays it in the form of digital text. This can be used for many purposes such as copying the digital text for using it elsewhere, producing formal documents and can also be used as input for data processing. Using this process, we can store the information in a secure way, we can access the information from anywhere or at any time and there is no scope for physical damage as the information is in digital format.

Motivation

Text recognition in images is an active research area which attempts to develop a computer application with the ability to automatically read the text from images. Nowadays there is a huge demand of storing the information available on paper documents in to a computer readable form for later use. One simple way to store information from these paper documents in to computer system is to first scan the documents and then store them as document. The challenges involved are: font characteristics of the characters in paper documents and quality of the images. There is a need of character recognition mechanisms to perform document image analysis which transforms documents in paper format to electronic format. In this paper, we have reviewed and analyzed different methods for text recognition from images. The objective of this review paper is to summarize the well-known methods for better understanding of the reader.

Existing system

Character recognition originated as early as 1870 when Carey invented the retina scanner, which is an image transmission system using photocells. It is used as an aid to the visually handicapped by the Russian scientist Tyurin in 1900. However, the first generation machines appeared in the beginning of the 1960s with the development of the digital computers. It is the first time OCR was realized as a data processing application to the business world [Mantas, 1986] [1]. The first generation machines are characterized by the "constrained" letter shapes which the OCRs can read. These symbols were specially designed for machine reading, and they did not even look natural. The first commercialized OCR of this generation was IBM 1418, which was designed to read a special IBM font, 407. The recognition method was template matching, which compares the character image with a library of prototype images for each character of each font.

Proposed system

Handwritten Text Recognition (HTR) system implemented with Tensor Flow (TF) and trained on the IAM off-line HTR dataset [2]. This Neural Network (NN) model recognizes the text contained in the images of segmented words. As these word-images are smaller than images of complete text-lines, the NN can be kept small and training on the CPU is feasible. 3/4 of the words from the validation-set are correctly recognized and the character error rate is around 10%.

Architecture

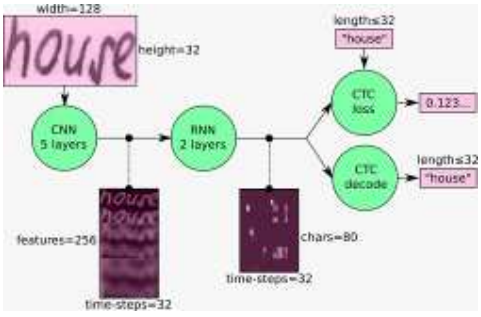

Figure 1: Project Architecture

Flow Chart

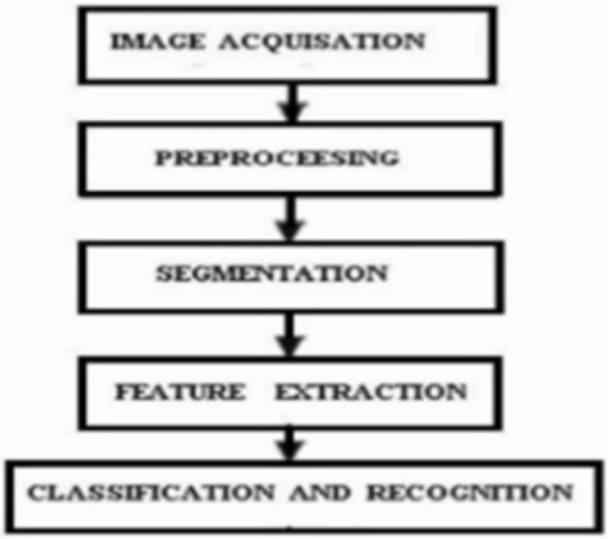

Figure2. Process flow

Methodology

This project is developed using Tesseract tess-2 module software which is a Computer vision API library [3] , the modelis pretrained with the dataset containingthe literals of the language, which are inturn compared to the input image file to produce the required output.

Advantages of System

1. Converting handwritten text to digital text.
2. We can store it in our versatile itself.
3. Copy the converted digital text.
4. Share the converted digital text via mail, whatsapp, etc,.

Improvements

1. It can be trained more to get accurate results.
2. It can be trained on multiple data sets to adapt to different languages.
3. Text to speech feature can be added.

Result and Analysis

We have tested the performance of our proposed system on many samples of handwritten text.

Here are few screenshots of the result

Screenshot 1: output screen

Screenshot 2: Capturing handwritten text

Conclusion

Handwritten Character Recognition from images is very essential these days. Character Recognition from images uses feature extraction using character geometry and gradient technique [4]. The feature extraction methods have performed well in classification when fed to the neural network and preprocessing of image using edge detection and normalization are the ideal choice for degraded noisy images. The method of training neural network with extracted features front sampleimages of each character has detection accuracy to a greater extent. The proposed methodology has produced good results for images containing handwritten text written in different styles, different size and alignment with varying background. The system is developed and evaluated for a set of sample images containing handwritten text [5]. We discussed a NN which is able to recognize text in images. The NN consists of 5 CNN and 2 RNN layers and outputs a character-probability matrix. This matrix is either used for CTC loss calculation or for CTC decoding. An implementation using TF is provided.

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