Review on Optical Character Recognition and Signature Recognition and Verification Technique

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ABSTRACT

Currently, many institutes and companies have been using physical attendance for their employees or the students. Since it is time-consuming and even non-genuine form of taking attendance because of proxy signing, Digital Attendance is an alternative through which attendance could be taken easily with the help of scanned Image of the attendance sheet. And finally it reports about the total number of person that are present or absent, which is been working on Optical Character Recognition and Signature Recognition and Verification techniques.

Keywords: Optical Character Recognition (OCR), Signature Recognition and Verification, Template Matching, Image Binarization, Image Processing.

1. INTRODUCTION

In 1978 Kurzweil Computer Products began selling a commercial version of the optical character recognition computer program. LexisNexis was one of the first customers, and bought the program to upload paper legal and news documents onto its nascent online databases. In about 1965 Reader's Digest and RCA collaborated to build an OCR Document reader designed to digitize the serial numbers on Reader's Digest coupons returned from advertisements. Two years later, Kurzweil sold his company to Xerox, which had an interest in further commercializing paper-to-computer text conversion. Kurzweil Computer Products became a subsidiary of Xerox known as Scansoft, now Nuance Communications [1].

Optical Character Recognition also referred to as OCR is a system that provides a full alphanumeric recognition of printed or handwritten characters at simply scanning the document. Documents are scanned using a scanner and are given to the OCR systems which recognizes the characters in the scanned documents and converts them into ASCII data. The verifying is done either randomly or chronologically by human Intervention [1]. The area of OCR is becoming an integral part of document are scanners, and is used in many applications such as postal processing, script recognition, banking, security (i.e. passport authentication) and language identification. The research in this area has been ongoing for over half a century and the outcomes have been astounding with successful recognition rates for printed characters exceeding 99%, with significant improvements in performance for handwritten cursive character recognition where recognition rates have exceeded the 90% mark [2].

In OCR a database is used at the back end for recognition. The process consists of following processing steps: (1) Scanning of Image, (2) Preprocessing of Image (3) Character Extraction (4) Feature Extraction and Recognition (5) Post-Processing. [3]. Optical Character Recognition is classified into two types, Offline recognition and online recognition. In offline recognition the source is either an image or a scanned form of the document whereas in online recognition the successive points are represented as a function of time and the order of strokes are also available [4]. The OCR system provides the following Features:

- No more retyping,
- Quick Digital Searches,
- Edit Text,
- Save Space [5].

Signature verification is an important research area in the field of authentication of a person as well as documents [6] in e-Commerce and banking. The importance of signature
verification arises from the fact that it has long been accepted in government, legal, and commercial transactions as an acceptable method of verification [7]. Recognition is finding the identification of the signature owner. Verification is the decision about whether the signature is genuine or forgery. In this decision phase the forgery images can be classified in three groups: (i) random, (ii) simple, (iii) skilled [8].

Template matching is a technique used in classifying an object by comparing portions of images with another image. One of the important techniques in Digital image processing is template matching. Template matching is widely used for processing images and pictures. In general, a technique includes its unique algorithm or method, which compares the template image with input image and finds similarity between them. Template matching approaches: The choice of matching depends on the nature of the image and the problem to be solved. General classifications of template or image matching approaches are: Template or Area based approaches and Feature-based approaches. [18]

Image binarization is the process of separation of pixel values into dual collections, black as foreground and white as background. Thresholding has created to be a well-known technique used for binarization of document images. Thresholding is further divide into the global and local Thresholding technique [19].

2. LITERATURE REVIEW

The input image is first processed using the Template Matching Technique and then two templates are being matched. The image thus processed was printed and then character recognition is done using OCR. The printed character is easily understood by the machine. If the block is left blank, the student is considered as absent and vice-versa. The next step is signature verification technique. It will check whether the signature is correct or incorrect. Finally it shows the total number of students that are either present or absent.

Pranob K Charles, V.Harish, M.Swathi [1] this paper introduced Handwriting recognition has been one of the most interesting and challenging research areas in field of image processing and pattern recognition in the recent years. This paper describes the techniques for converting textual content from a paper document into machine readable form. The computer actually recognizes the characters in the document through a revolutionizing technique called Optical Character Recognition. Several techniques like OCR using correlation method and OCR using neural networks are reviewed in this paper.

Yasser Alginahi [2] Preprocessing techniques used in document images as an initial step in character recognition systems were presented. The applications such as online character recognition used in mobile devices, extraction of text from video images, extraction of information from security documents and processing of historical documents. The objective of such research is to guarantee the accuracy and security of information extraction in real time applications.

Shalin A. Chopra, Amit A. Ghadge, Onkar A. Padwal, Karan S. Punjabi, and Prof. Gandhali S. Gurjar [11] in paper it converts the images into machine-encoded text that can be used in machine translation, text-to-speech and text mining. This paper presents a simple, efficient, and less costly approach to construct OCR for reading any document that has fix font size and style or handwritten style. This paper talks about OCR system for offline handwritten character recognition. The systems have the ability to yield excellent results. It can be used with existing OCR methods, especially for English text. This system offers an upper edge by having an advantage i.e. its scalability, i.e. although it is configured to read a predefined set of document formats, currently English documents, it can be configured to recognize new types

Gurpreet Singh Chandan Jyoti Kumar Rajneesh Rani Dr. Renu Dhir [12a] paper presents detailed review in the field of Offline Handwritten Character Recognition. The recognition of handwriting can, however, still is considered an open research problem due to its substantial variation in appearance. Paper describes the techniques for converting textual content from a paper document into machine readable form. Offline handwritten character recognition is a process where the computer understands automatically the image of handwritten script.

Emre Özgündüz, Tülin Şentürk and M. Elif Karslıgil [12] offline signature verification and recognition system using the global, directional and grid features of signatures. Support Vector Machine (SVM) was used to verify and classify the signatures and a classification ratio of 0.95 was obtained. As the recognition of signatures represents a multiclass problem SVM's one-against-all method was used. We also compare our
methods performance with Artificial Neural Network’s (ANN) back propagation method
SRVS (Signature Recognition and Verification System) is often categorized in two major classes: on-line SRVS and off-line SRVS. The difference of on-line and off-line lies in how data are obtained. In the on-line SRVS data are obtained using an electronic tablet and other devices. In the off-line SRVS images of the signatures written on a paper are obtained using a scanner or a camera [13].

K. V. Joshi, N. C. Chauhan [14] describes paper the Template matching method is used for enhancement approach presented in ear detection technique. In this method, instead of moving the template over the entire image we first detect the area having maximum probability of the ear. The first step, skin segmentation is performed to eliminate all non-skin pixels from the image. Then Nose point is identified and using distance estimation between nose tip and ear the probable area of ear is found. Second step employs an off-line created template to detect ears. Third step is about to verify the detected ears. In this presented approach, the detected ear is verified using a SVM machine learning tool in addition to Euclidean distance.

Jagroop Kaur, Dr.Rajiv Mahajan [15] in this paper has focused on the degraded document binarization technique. Document binarization is a key application of vision processing. The main objective of this paper is to evaluating the short comings of algorithms for degraded image binarization. It has been found that each technique has its own benefits and limitations; no technique is best for every case. The main limitation of existing work is found to be noisy and low intensity images. In near future we will propose a new algorithm which will use more reliable methodology to enhance the work. We will propose a new algorithm which will use nonlinear enhancement as a pre-processing technique to improve the results further.

3. METHODS

3.1 Template Matching

Template matching is one of the Character Recognition techniques. It is the process of finding the location of a sub image called a template inside an image. 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. This process involves the use of a database of characters or templates. There exists a template for all possible input characters. The current input image is compared to each template to find either an exact match, or the template with the closest representation of the input image.

3.1.1 Template Matching Approaches: The choice of matching depends on the image and the problem to be solved. General classifications of template or image matching approaches are: Template or Area based approaches and Feature-based approaches.

3.1.2 Featured-Based Approach: Featured-based approach is well suited when both reference and template images had more correspondence with respect to features and control points. Features include points, curves, or a surface model that have to be matched. Here, the aim is to locate the pair wise connection between reference and template using their spatial relations or descriptors of features. Subcategory of the above approach is spatial relations, invariant descriptors, pyramids and wavelets and relaxation methods [9].

3.2 OCR (Optical Character Recognition)

In offline recognition the source is either an image or a scanned. And it perform describe this task.

3.2.1 Pre Processing - The image is taken and is converted to gray scale image. The gray scale image is then converted to binary image. This process is called Digitization of image (Binarization) the scanned image may have some noise. This noise may be due to some unnecessary details present in the image. By applying suitable methods the denoised image is produced.

3.2.2 Character Extraction - The pre-processed image serves as the input to this and each single character in the image is found out.

3.2.3 Recognition - The image from the extraction stage is correlated with all the templates which are preloaded into the system. Once the correlation is completed, the template with the maximum correlated value is declared as the character present in the image.
D. Post Processing - After the recognition stage, if there are some unrecognised characters found, those characters are given their meaning in the post-processing stage [11].

3.3 Signature Recognition and Verification

Based on the definitions of signature, it can lead to two different approaches online and offline. We used offline signature verification technique.

3.3.1 Offline Signature Recognition and Verification -

This approach is based on static characteristics of the signature which are invariant. In this sense, signature verification becomes a typical pattern recognition task knowing that variations in signature pattern are inevitable; the task of signature authentication can be narrowed to drawing the threshold of the range of genuine variation. In the offline signature verification techniques, images of the signatures written on a paper are obtained using a scanner or a camera.

3.3.1.1 Scanning

Scanned signature into Image.

3.3.1.2 Background elimination

Data area cropping must be done for extracting features.

3.3.1.3 Noise reduction

A noise reduction filter is applied to the binary image for eliminating single black pixels on white background.

3.3.1.4 Width normalization

Signature dimensions may have intrapersonal and interpersonal differences. So the image width is adjusted to a default value and the height will change without any change on height-to-width ratio.

3.3.1.5 Thinning applied signatures.

The goal of thinning is to eliminate the thickness differences of pen by making the image one pixel thick. In this system Hadith’s Algorithm is used.

Global Features

(a) Pre-processed signature and
(b) Height
(c) Maximum vertical histogram
(d) Maximum horizontal histogram
(e) Horizontal center
(f) Vertical center
(g) Horizontal local maxima numbers
(h) Vertical local maxima numbers
(I) Edge points
(h) Grid features of the signature [12].

4. CONCLUSION

This paper tells about OCR system for offline handwritten and printed character recognition. OCR is a system that provides a full alphanumeric recognition of printed or handwritten characters. This paper we reviewed Preprocessing techniques used in document images as an initial step in character recognition systems were presented.

His paper tells about off-line signature verification and recognition technique which is based on global, mask, grid features of signatures and SVM. This paper we reviewed carefully chosen discriminating features of signatures combined with the use of SVM made the system more
powerful compared to other systems both in terms of success ratio and ease of implementation and optimized run time.

REFERENCES


