Processing Of Evaluation Chart Uses Optical Character Recognition

Deepa R, Tamilselvan E

Abstract: In an examination, the assessment of answer sheets and estimation of results are the tedious activity. In our paper, we had supplanted this tedious work by image processing strategies. At the point, the images of the evaluation chart are processed and it gives certain parameters with the goal that it can be investigated to check the implementation of the individual student and furthermore to relate the whole results of all the students. The character components in the evaluation chart are preprocessed and the resultant image is sectioned with edge detection filters like Sobel, Canny or log-Gabor filters and the edge (threshold) level is been discovered by utilizing the discriminant analysis. A potential computer vision instrument is called as Optical Character Recognition (OCR) and it is used for recognizing the characters in the image. The Support Vector Machine (SVM) algorithm is employed in the classification of sporadic digits and the image with the digit contains the actual information. The dataset are taken from MNIST database especially for the handwritten digits and it is trained and tested using SVM Classifier. Thus the entire SVM algorithm provides a simple procedure for the calculation of marks in an evaluation chart.

Index Terms: Image processing, Feature Extraction, Edge Detection Filters, Discriminant Analysis, Optical Character Recognition, Support Vector Machine, MATLAB.

1. INTRODUCTION

Evaluation of answer sheets in the examination is a time-consuming job and it required a lot of professionals. This also involves delays in the publication of results. Traditionally, the marks for each question are enrolled in an evaluation sheet and the total mark is valuated from this sheet. These processes are tedious and the probability of occurrence of an error is high. In case of a paper form, the individual marks of each question are posted on the final evaluation sheets and then the total marks calculated from the individual marks [1]. Computer-aided evaluation of answer sheet is an easy task. In case of the electronic form, it is simply extracting the data that are in the images and storing them in a place where details of the particular student are available. Thus this electronic method paves a way for easy evaluation of hundreds and thousands of answer sheets. In order to simplify this work, image processing and optical character recognition can be used as a productive tool. Character recognition involves the conversion of images from a typed, handwritten or printed text into a machine- encoded text, which can be from a scanned document or a photo of a document. This method has its own advantage that it can be used in wide varieties of applications such as identification or errors in printed documents, identification of handwritten documents, etc.,

Investigation of the image processing analysis can benefit from the procedures, where the area connection between the objects in the images, such as province of answer sheets with multiple choice tests and the simple representation in a matrix [2]. Besides, Mathematical Morphology is a rich shape to take care of the image-processing issues utilizing predictable hypothetical premise that is the hypothesis of sets. The morphological operator in the mathematical morphology helps in indentifying the changes between images and characterized by the organizing capacities. The main challenge faced in the machine recognition method and alternative correction systems is that if the evaluator marks the option on the answer sheet incompletely, it will not be recognized properly. This recognition error effects on the correction accuracy. In paper [3], the author says that this error can be eliminated with the help of a secondary display device which shows the unidentified and gets the correct data from the evaluated again and feeds it into the dataset of the entire mark sheet and is studied by the forthcoming algorithms.

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2 LITERATURE SURVEY

2.1 Review Stage

Lubna.et.al in this work, it states that the edge detection in preprocessing with help of Log-Gabor's filter gives a better a better output accuracy as compared to other filters such as Sobel, Canny, Gabor, and Gaussian filters and also the execution time of this algorithm is much less than other algorithms, the author proposed that the Log-Gabor filter has not been used in optical character recognition (OCR), as per existing knowledge stated in this paper and their result support its case as a suitable candidate [5]. This filter is used for filtering the edges of the answer sheet for the cause of efficiency. Zhai. X et.al proposed in this paper, that an artificial neural networks (ANN) based OCR can be used for numerical detection rather than other tools. OCR is a widely used technology which is used to convert any form of images such as scanned images or handwritten images into understandable machine encoded text. Due to the fact that characters on answer sheets are normally numerical data and rarely text contents, the OCR system for this task is relatively less complex compare to other common image processing systems (e.g. hand writing and text scanning)[6]. Further a feed- forward Artificial Neural Network (ANN) based OCR algorithm is used as an effective tool in the design of a less complex system and also with a higher degree of accuracy.

2.2 Final Stage

In this proposed work, the algorithm has been implemented and tested using MATLAB. The main aim of this research project is to design a less complex in turn a high efficiency answer sheet evaluation model to reduce the risks of miscalculation and also to reduce time consumption.

3 METHODOLOGY

The images are obtained from the answer sheets of an examination that involves more than 300 participants. A data set is formed with these images. Fig.1 shows the various kinds of steps that are involved in classification of an image. A image scanner is used to get the image of the evaluation chart and is given into the algorithm in form of an image file.

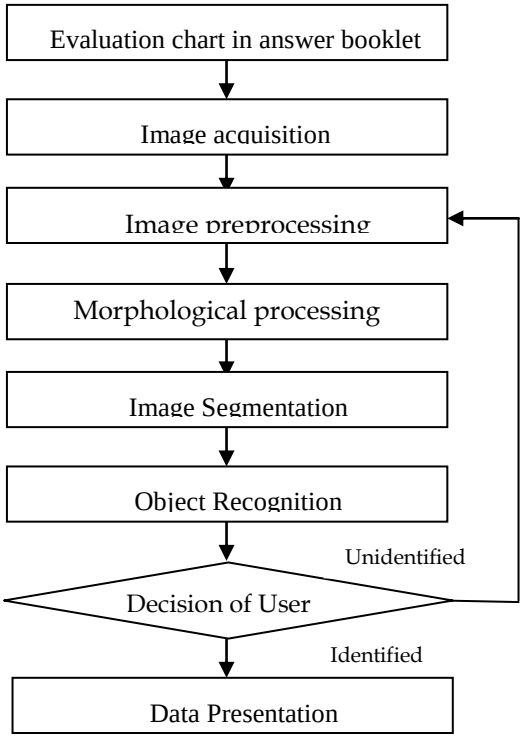

Fig.1 : *Block Diagram*

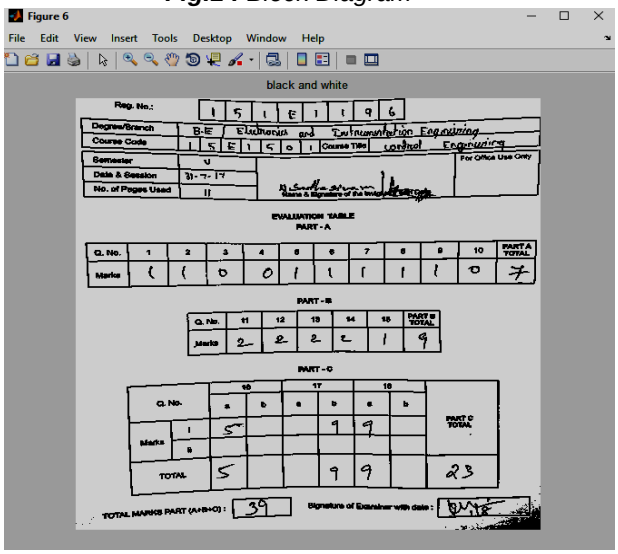

Fig.2*: Image after scanning*

3.1 Data Acquisition

In order to capture the appropriate region of the answer sheet, every booklet must be situated before the scanner. The appropriate answer sheet must be situated in the image in such way that the four external bold square/rectangle fit inside

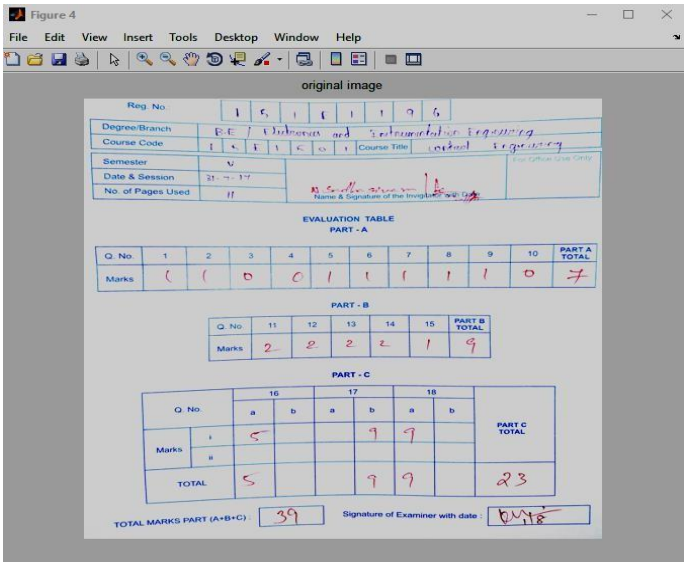

Fig.3: *Preprocessing of image into BW*

the showed guidelines (the bigger external square/rectangle). The alterations must be made to the image so that all the external square/rectangle is at any rate half contained within the square. After this modification is done, the image of the answer sheet is caught by the scanner. Consequently, the objective zone is set apart by four external squares by the scanner to the caught picture and this fills in as a distinguishing proof to show the algorithm with the image position and dimensions [7]. After the data acquisition, the original image of the evaluation chart is obtained as shown in fig.2. There will usually be noise in the image due to several factors such as improper scanning or change in the alignment of the evaluation chart. This noises are removed with the help of several filters and so that the original image is obtained as the output for the preprocessing network.

3.2 Preprocessing

The original image is usually in RGB colors and contains noise. These noises can be removed with the help of thresholding tools. For finding a proper thresholding level, discriminant analysis is used which involves converting images in many scales and finds their hue and saturation points which gives the proper thresholding level [7]. After this the original image is converted into gray scale image which is 8bits in size. As the complexity of gray scale image is less compared to RGB image, it is further converted into black and white (BW) image which is of size 1bit and requires less time for processing. Fig.3 indicates the conversion of image into black and white image.

3.3 Morphological Processing

The Morphological image processing is called as the feature extraction (FE). This feature extraction is a collection of non-linear operations identified with any morphology or parameters of features in an image. The reward of morphological processing depend on the way that the relative arrangement of pixel values is considered, but not their numerical values and consequently it

is more reasonable in processing the binary images [8]. Morphological operations can likewise be connected to grayscale images such that their light exchange capacities are obscure and in this way their absolute pixel esteems are of no or minor interest. Here the numerical characters in the blocks of the evaluation chart are the main feature to be extracted. It is done with the help of ginput tool in MATLAB which identifies the position of blocks by trial and error method. After when the dimensional parameters of the image is obtained it is again given to the MATLAB in form of vectors to spot the exact position of the image. And it is fragmented out from the original BW image as shown in the fig.4.

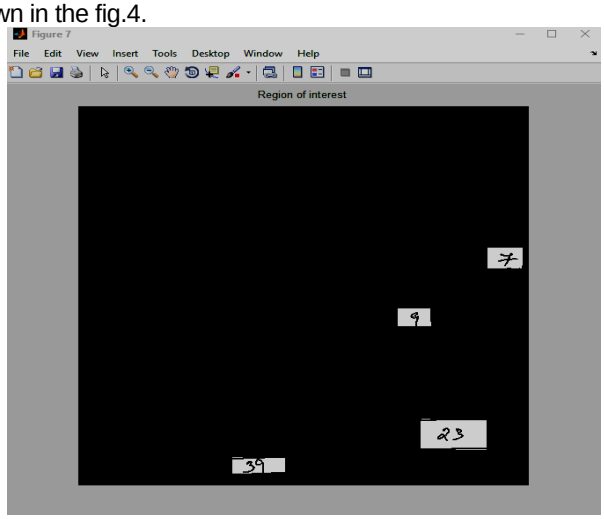

Fig.4: *Segmentation of image*

3.4 Character Recognition

An important part in identifying the number lies on Optical Character Recognition algorithm (OCR). The results of the OCR is given as an input weight to an Feed Forward Artificial Neural network ANN and is used to compare it with the future coming results. Typically, a multi-layer neural network consists of an input vector, several hidden layers, one output layer and an output vector [9]. Each layer consists of a set of neurons and corresponding transfer function as shown in the fig.5.

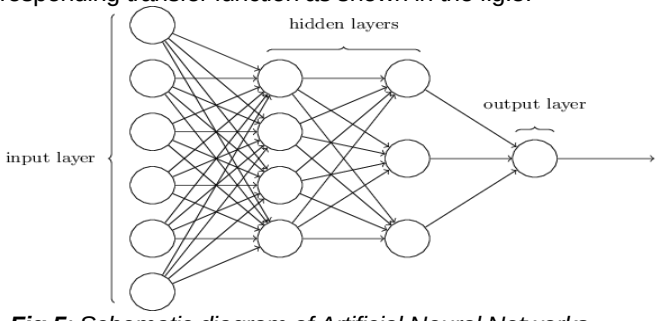

Fig.5*: Schematic diagram of Artificial Neural Networks*

3.5 SVM Classifier

Support Vector Machine (SVM) classifier is a discriminative classifier which is defined by a separating hyperplane that separates the unidentified or more differing contents from the identified or clear contents [10]. The use of SVM classification algorithm paves a ways that it will show less complexity towards the entire algorithm and inputs required of learning process is also minimal [4].

4 RESULTS AND DISCUSSIONS

In this proposed work, we have displayed a framework which utilizes procedures from digital image processing techniques and acquired the images for the evaluation chart from an electronic scanner and performed the automated recognition of characters in the form of encoded text. The output is displayed as a total mark in the command prompt window and also will be saved in an array, so that it can be used for analysis of the results as shown in fig.6.

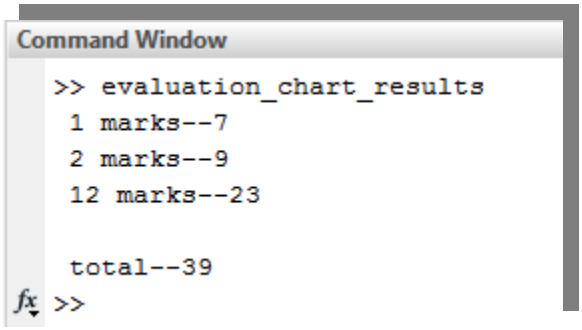

Fig.6: *Output of a SVM classifier*

As compared with other algorithms the proposed method consumes less space and less time to processes the image and to give the required output. So we suggest that this method can be very well used for the digitalization of documents which mentioned here is evaluation charts.

5 FUTURE WORK

Using image processing techniques, such as region growing and with the use of several other filters, image segmentation can be further improved in this algorithm. Further this project can be expanded to a hardware platform where the MATLAB code can be converted into a working embedded code so that it can facilitate the development of a standalone documentation device.

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