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A Survey:Optical Character Recognition for Alphanumeric Image Using Support Vector Machine

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Abstract
Optical Character Recognition (OCR) is a technology that provides a full alphanumeric recognition of images and handwritten characters by Mathematical morphology is the foundation of image processing, which consists of a set of operators that transform images according to the characterization. We use some fundamental morphological operations and sobel filtering of OCR image after that need for canny edge detection of alphanumeric part after that we need to apply for inverse support vector machine such as dilation, erosion, opening and closing for text extraction and OCR technique for character recognition from image.

Keywords
OCR, SVM, ISVM, alphanumeric, Sobel filter , RGB etc.

I. Introduction

The past sixty or so years, with the development of computers ranging from ones capable of becoming the world chess champion to ones capable of understanding speech, it has come to seem as though there is no human mental faculty which is beyond the ability of machines. Many handwriting recognition research works have shown that earlier descriptors which were extensively used for pattern recognition such as geometric moments and generic Fourier descriptors cannot deal with characters ambiguity [7,8]. Thereby, more efficient descriptors were developed to allow invariance with respect to some variations of data. Recently, some features based on curvature or contour information were introduced for characters recognition. Among them, we note the ridge let transform which showed high discrimination ability for printed Chinese characters [9]; curvature features for handwritten digit recognition [10] and wavelet packets for handwritten Arabic word recognition [11].

In fact, a good descriptor should be invariant with respect to some affine transformations such as small deformations, translations and rotations while being variable from a class to other. In this framework, tangent vectors which are based on invariance learning constitute one of the best descriptors for handwritten digit recognition [12,13]. Tangent vectors are computed by performing a set of affine transformations to each pattern. Today, many researchers have developed algorithms to recognize printed as well as handwritten characters. But the problem of interchanging data between human beings and computing machines is a challenging one. In reality, it is very difficult to achieve 100% accuracy. Even humans too will make mistakes when come to pattern recognition.

A. Image and Image Processing in OCR

Image is a two-dimensional function f(x,y), where x and y are spatial coordinates and the amplitude f at any pair of coordinates (x,y) is called the intensity or gray level. When x, y, and f are discrete quantities the image is digital. 'f' can be a vector and can represent a color image, e.g. using the RGB model, or in general a multispectral image. The digital image can be represented in coordinate convention with M rows and N columns as in Figure 1.1. In general, the gray-level of pixels in an image is represented by a matrix with 8-bit integer values.

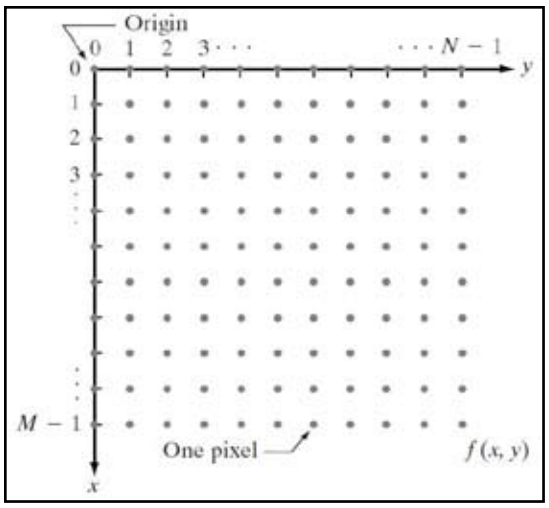

Fig. 1: Pixel showing on Bitmap on different quadrants

Image Processing is all about improvement of pictorial information for human interpretation and processing of image data for storage, transmission and representation for autonomous machine perception.

II. Related Work

In OCR , get various proposal theory in different domains with different languages still we fetching study for alphanumeric mathematical foundation are as:

Akash Ali et al. [8] have proposed handwritten Bangla character recognition using Back propagation Feed-forward neural network. First, Create binary image then, extract the feature and form input vector. Then, apply the input vector in the neural network. The experimental result shows that the proposed recognition method gives 84% accuracy and less computational cost than other method.

Nagabhushan [6] proposed a hybrid method for separating text from color document images. But this method can't extract text from complex graphics. The algorithm of Antani and R.Kasturi [10] works well for text string separation from mixed text/graphics image, but it makes an impractical assumption that character components in a string are aligned straight and does not touch or overlap with graphics. Ming zhao, Shutao, James Kwak[9] in 2010 had implemented a text detection in images using sparce representation with discriminative dictionaries as a result F-score

of 78 is obtained

Nasien et al. [9] have proposed a recognition model for English handwritten (lowercase, uppercase and letter) character recognition that uses Freeman chain code (FCC) as the representation technique of an image character. Support vector machine (SVM) has been chosen for the classification. The proposed recognition model, built from SVM classifiers was efficient enough to show that applying the proposed model, a relatively higher accuracy of 98.7% for the problem of English handwritten recognition was reached [10].

III. Inverse Support Vector Machine for Alphanumeric Images

The study for the SVM classifier get binary classifiers from a set of labeled training samples defined by: (,)∈ ×{±1} N xi yi R , where i =1,K,l (l is the number of training data). SVMs seek the linear separating hyperplane with the largest margin by solving the following optimization problem[3,15]:

$$Minimize \quad \frac{1}{2}w^T \cdot w \qquad (1)$$

$$Subject\ to \quad y_i(x_i \cdot w + b) \geq 1 \quad \forall i \qquad (2)$$

T denotes the transpose, b is a bias while w is the normal to the hyperplane the SVM is non-linearly separable. Then, the margin of separation is said to be soft and non-separable data are handled by introducing a set of nonnegative slack variables {ξ i} into the decision surface[3]

$$Minimize \quad \frac{1}{2}w^T w + C\sum_{i=1}^{l}\xi_i \qquad (3)$$

$$Subject\ to \quad y_i(x_i \cdot w + b) \geq 1 - \xi_i \qquad (4)$$

Commonly, a dual Lagrangian formulation of the problem in which data appear in the form of dot products, is used:

$$Maximize \quad L_D = \sum_i \alpha_i - \frac{1}{2}\sum_{i,j}\alpha_i\alpha_j y_i y_j x_i \cdot x_j \qquad (5)$$

$$Subject\ to \quad \sum_{i=1}^{l}\alpha_i y_i = 0 \qquad (6)$$

where α i are Lagrange multipliers. The dual problem is useful when data are not linearly separable in input space. In such a case, they are mapped into a feature space via a kernelfunction such

$$L_D = \sum_i \alpha_i - \frac{1}{2}\sum_{i,j}\alpha_i\alpha_j y_i y_j K(x_i, x_j) \qquad (7)$$

that:

Thereby, the decision function is expressed in terms of kernel

$$f(x) = \sum_{i=1}^{Ns}\alpha_i y_i K(x_i, x) + b \qquad (8)$$

expansion as:

for alphanumeric classification one must deal with this time complexity. Presently, we adopt a

Inverse-SVM (I-SVM) combination which aims to accelerate the runtime of SVMs. Since this combination was introduced for handwritten digit recognition we try to extend its use for alphanumeric character recognition. The I-SVM is briefly presented in the following section.

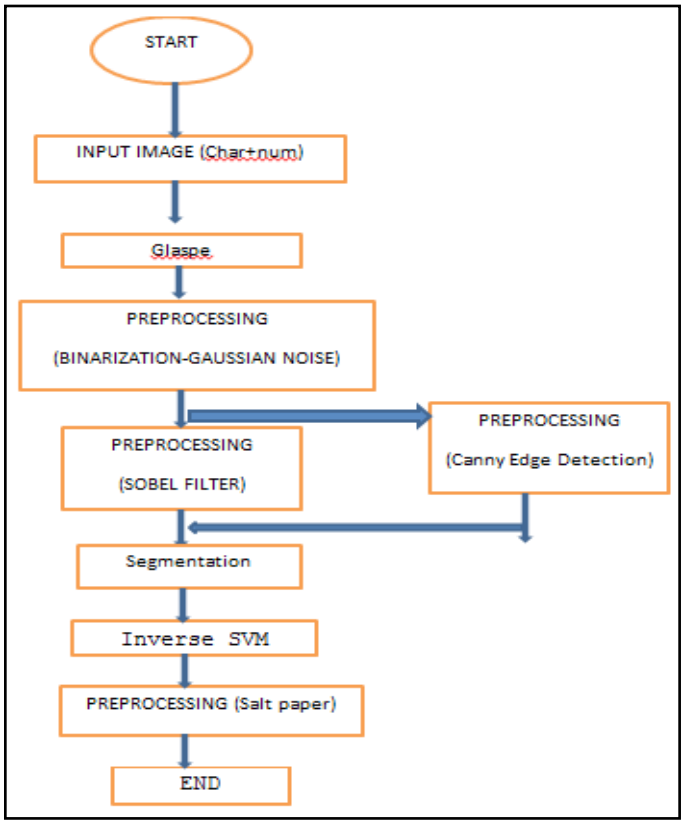

Fig. 2: Flow Diagram structure of OCR study needs to follow below steps to get better performance

IV. Conclusion

The method is verified with many clusters of images, both images with the caption text and the scene text.The aim of Optical Character Recognition (OCR) is to classify optical patterns by using inverse support vector machine before it need to apply canny edge detection to detect the edge of character (often contained in a digital image) corresponding to alphanumeric or other characters. The process of OCR involves several steps including segmentation, feature extraction, and classification. This review use Image Processing Toolbox to get all related methods which are given in references are analyzed and the drawbacks are tried to reduced and thereby getting an improved version of the previous works.

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