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OCR With Deep Learning Mechanism

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Abstract: *The pre-processing is a series of operations performed on scanned input image. It essentially enhances the image rendering it suitable for segmentation. The role of pre-processing is to segment the interesting pattern from the background. Generally, noise filtering, smoothing and normalization should be done in this step. The pre-processing also defines a compact representation of the pattern. Binarization process converts a gray scale image into a binary image. Dilation of edges in the binarized image is done using sable technique. this system will be suitable for converting character documents into structural text form and recognizing character names.*

Keywords: *Handwritten character recognition, Image processing , Feature extraction, feed forward.*

I. Introduction

The purpose of this project is to take handwritten English characters as input, process the character, train the neural network algorithm, to recognize the pattern and modify the character to a beautified version of the input. This project is aimed at developing software which will be helpful in recognizing characters of English language. This project is restricted to English characters only. It can be further developed to recognize the characters of different languages. It engulfs the concept of neural network. One of the primary means by which computers are endowed with humanlike abilities is through the use of a neural network. Neural networks are particularly useful for solving problems that cannot be expressed as a series of steps, such as recognizing patterns, classifying them into groups, series prediction and data mining.Pattern recognition is perhaps the most common use of neural networks. The neural network is presented with a target vector and also a vector which contains the pattern information, this could be an image and hand written data. The neural network then attempts to determine if the input data matches a pattern that the neural network has memorized. . OCR stands for optical character recognition i.e. it is a method to help computers recognize different textures or characters OCR are some times used in signature recognition which is used in bank And other high security buildings In addition, texture recognition could be used in fingerprint recognition OCR's are known to be used in radar systems for reading speeders license plates and lot other things. Throughout the years, various efficient techniques have been deployed by researchers to recognize various numeric character characters, but still remains a sturdy hurdle with thousands of different shaped character trends.

II. Literature Survey

Wong Yoong Xiang, Patrick Sebastian, "Character Recognition Using Webcam for Data Entry " 2015 IEEE 11th International Colloquium on Signal Processing & its Applications (CSPA2015), 6 -8 Mac. 2015.The main contribution of this paper is algorithm is robust enough to recognize character samples and produce high recognition rate. Neural network has self learning, self-adapt and self-process capabilities which make it robust for character recognition systems . There are three layers in the typical neural network. W. L. Goh, D. P. Mittal, and H. A. Babri, "An artificial neural network approach to character recognition," in Knowledge Based Intelligent Electronic Systems, 1997. KES '97. Proceedings.1997 First International Conference on, 1997, pp. 132-136 vol.1.he neural network is sometimes referred as multilayer perceptron (MLP). One advantage of using neural network is that it can be trained to perform the error-correction learning rule . K. Pyeoung Kee, "Improving character numeral recognition using fuzzy logic," in TENCON '97. IEEE Region 10 Annual Conference. Speech and Image Technologies for Computing and Telecommunications., Proceedings of IEEE, 1997, pp. 539-542 vol.2. Most of the research that is based on neural network have achieved ultimately high recognition accuracy of more than 65%. Even with this high accuracy, the correct learning rate () has to be chosen to ensure the recognition results M. Y. Chen, A. Kundu, and J. Zhou, "Off-line character word recognition (HWR) using a single contextual hidden Markov model," in Computer Vision and Pattern Recognition, 1992. Proceedings CVPR '92., 1992 IEEE Computer Society Conference on, 1992, pp. 669-672.The learning rate is the rate of which the number of training sample sets used to train the neural network. If

a low value of is chosen, the result obtained will be slow and inaccurate. J. Wan, Y. Huang, G. Zhang, and C. Wan, "Offline Character Numeral Recognition Based on Principal Component Analysis," in Electronic Measurement and Instruments, 2007. ICEMI '07. 8th International Conference on, 2007, pp. 1-298-1-302. In this paper we presented the concept of "Character Recognition for Data Entry (Hand Rec)" which in this project, the goal is to achieve a more robust output .pp. 132-136 vol.1.he neural network is sometimes referred as multilayer perceptron (MLP). One advantage of using neural network is that it can be trained to perform the error-correction learning rule . K. Pyeoung Kee, "Improving handwritten numeral recognition using fuzzy logic," in TENCON '97. IEEE Region 10 Annual Conference. Speech and Image Technologies for Computing and Telecommunications. Proceedings of IEEE, 1997, pp. 539-542 vol.2. Most of the research that is based on neural network have achieved ultimately high recognition accuracy of more than 65%. Even with this high accuracy, the correct learning rate () has to be chosen to ensure the recognition results. M. Y. Chen, A. Kudus, and J. Zhou, "Off-line handwritten word recognition (HWR) using a single contextual hidden Markov model," in Computer Vision and Pattern Recognition, 1992. Proceedings CVPR '92., 1992 IEEE Computer Society Conference on, 1992, pp. 669-672.The learning rate is the rate of which the number of training sample sets used to train the neural network. If a low value of is chosen, the result obtained will be slow and inaccurate. J. Wan, Y. Huang, G. Zhang, and C. Wan, "Offline Handwritten Numeral Recognition Based on Principal Component Analysis," in Electronic Measurement and Instruments, 2007. ICEMI '07. 8th International Conference on, 2007, pp. 1-298-1-302. In this paper we presented the concept of "Handwriting Recognition for Data Entry (Handle)" which in this project, the goal is to achieve a more robust output.

I. Existing System

The System takes handwritten English characters as input, process the character, train the neural network algorithm, to recognize the pattern and modify the character to a beautified version of the input. This project is aimed at developing software which will be helpful in recognizing characters of English language. This project is restricted to English characters and numerals only. It is also helpful in recognizing special characters. It can be further developed to recognize the characters of different languages. It engulfs the concept of neural network.

II. Proposed System

In the segmentation stage, an image of sequence of characters is decomposed into sub-images of individual character. The pre-processed input image is segmented into isolated characters by assigning a number to each character using a labelling process. This labelling provides information about number of characters in the image. Each individual character is uniformly resized into pixels. Normalization: Afterextracting the character we need to normalize the size of the characters. There are large variations in the sizes of each Character hence we need a method to normalize the size. Involves several steps including segmentation, feature extraction, and classification. Each of These steps is a field unto itself, and is described briefly here Implementation of OCR.

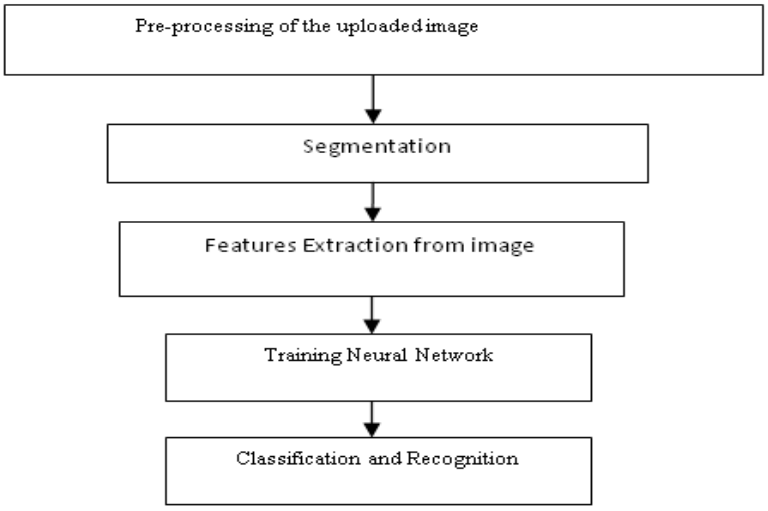

Figure 1. Block diagram of proposed method

I. Character Extraction Algorithm

1. Create a Traverse List: - List of pixels which have been already traversed. This list is initially empty.
2. Scan row Pixel-by-Pixel.
3. Whenever we get a black pixel check whether the pixel is already in the traverse list, if it is simply ignore and move on else apply detection Algorithm.
4. Add the List of Pixels returned by Edge-detection Algorithm to Traverse List.

There are two techniques employed based on the efficiencies obtained, while training the neural network. They are as follows

- Feature Extraction based on Character Geometry.
- Feature Extraction Using Gradient Features.

II. Feature Extraction Based on Character Geometry.

It extracts different line types that form a particular character. It also concentrates on the positional features of the same. The feature extraction technique. explained was tested using a Neural Network which was trained with the feature vectors obtained from the system proposed.

III. Zoning

After the universe of discourse is selected, the image is divided into windows of equal size, and the feature is done on individual windows. For the system implemented, two types of zoning were used. The image was zoned into 9 equal sized windows. Feature extraction was applied to individual zones,rather than the whole image. This gives more information about fine details of character skeleton. Also positions of different line segments in a character skeleton become a feature if zoning is used. This is because, a particular line segment of a character occurs in a particular zone in almost cases. For instance, the horizontal line segment in character 'A' almost occurs in the central zone of the entire character zone. To extract different line segments in a particular zone, the entire skeleton in that zone should be traversed. For this purpose, certain pixels in the character skeleton were defined as starters, intersections and minor starters.

III. Conclusion

The effectiveness of the method that uses feature extraction using character geometry and gradient technique from scanned images containing handwritten characters is presented. the recognition efficiency of the proposed diagonal method of feature extraction, the neural network recognition system is trained using the horizontal and vertical feature extraction methods. The feature extraction method shave 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.

References

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