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A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

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Literature Survey :

i . Title   : A Novel Method For Handwritten Digit Recognition System

   Base paper Link   : [http://troindia.in/journal_/ijcesr/vol6iss6part2/32- 36.pdf](http://troindia.in/journal_/ijcesr/vol6iss6part2/32-36.pdf)

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    Abstract   : Handwritten digit recognition has recently been of very interest among the researchers because of the evolution of various Machine Learning, Deep Learning and Computer Vision algorithms. In this report, We compare the results of some of the most widely used Machine Learning Algorithms like CNN- convolution neural networks and with Deep Learning algorithm like multilayer CNN using Keras with Theano and Tensorflow. MNIST is a dataset which is widely used for handwritten digit recognition. The dataset consist of 60,000 training images and 10,000 test images.The artificial neural neworks can all most mimic the human brain and are a key ingredient in image processing field.For example Convolution Neural networks with back propagation for image processing.The applications where these handwritten digit recognition can be used are Banking sector where it can be used to maintain the security pin numbers, it can be also used for blind peoples by using sound output.

ii . Title   : Handwritten Digit Recognition Using Machine Learning Algorithms

    Base paper Link   : [https://www.researchgat e.net_/publication/326408524_ Handwritten_Digit_Recog nition__Using_Machine_Learning__Algorithms](https://www.researchgate.net/publication/326408524_Handwritten_Digit_Recognition_Using_Machine_Learning_Algorithms)

   Authors   : S. M. Shamim, Md Badrul Alam Angona Miah, Angona Sarker, Masud Rana, Abdulla Al Jobair

    Abstract   : Handwritten character recognition is one of the practically important issues in pattern recognition applications. The applications of digit recognition includes in postal mail sorting, bank check processing, form data entry, etc. The heart of the problem lies within the ability to develop an efficient algorithm that can recognize hand written digits and which is submitted by users by the way of a scanner, tablet, and other digital devices. This paper presents an approach to off -line

handwritten digit recognition based on different machine learning technique. The main objective of this paper is to ensure effective and reliable approaches for recognition of handwritten digits. Several machines learning algorithm namely, Multilayer Perceptron, Support Vector Machine, Naïve Bayes, Bayes Net, Random Forest, J48 and Random Tree has been used for the recognition of digits using WEKA.

iii . Title : A Novel Handwritten Digit Classification System Based on Covolutional Neural Network Approach

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Abstract : An enormous number of CNN classification algorithms have been proposed in the literature. Nevertheless, in these algorithms, appropriate filter size selection, data preparation, limitations in datasets, and noise have not been taken into consideration. As a consequence, most of the algorithms have failed to make a noticeable improvement in classification accuracy. To address the shortcomings of these algorithms, our paper presents the following contributions: Firstly, after taking the domain knowledge into consideration, the size of the effective receptive field (ERF) is calculated. Calculating the size of the ERF helps us to select a typical filter size which leads to enhancing the classification accuracy of our CNN. Secondly, unnecessary data leads to misleading results and this, in turn, negatively affects classification accuracy. To guarantee the dataset is free from any redundant or irrelevant variables to the target variable, data preparation is applied before implementing the data classification mission. Thirdly, to decrease the errors of training and validation, and avoid the limitation of datasets, data augmentation has been proposed. Fourthly, to simulate the realworld natural influences that can affect image quality, we propose to add an additive white Gaussian noise with σ = 0.5 to the MNIST dataset. As a result, our CNN algorithm achieves state-of-theart results in handwritten digit recognition, with a recognition accuracy of 99.98%, and 99.40% with 50% noise.

iv . Title : MultiLanguage Handwritten Digits Recognition based on Novel Structural Features

Base paper Link : https://www.google.com /url?sa=t&source=web&r ct=j&url=https://library.i maging.org/admin/apis/p ublic/api/ist/website/do wnloadArticle/jist/63/2/a rt00004&ved=2ahUKEwj 02pvSvYr6AhVVFbcAHWi rCxs4FBAWegQICxAB&us g=AOvVaw3QynwJXDON 6433Ky_5LnTl

Authors : Ali Abdullah Yahya

Abstract : Automated handwritten script recognition is an important task for

several applications. In this article, a multi-language handwritten numeral recognition system is proposed using novel structural features. A total of 65 local structural features are extracted and several classifiers are used for testing numeral recognition. Random Forest was found to achieve the best results with an average recognition of 96.73%. The proposed method is tested on six different popular languages, including Arabic Western, Arabic Eastern, Persian, Urdu, Devanagari, and Bangla. In recent studies, single language digits or multiple languages with digits that resemble each other are targeted. In this study, the digits in the languages chosen do not resemble each other. Yet using the novel feature extraction method a high recognition accuracy rate is achieved. Experiments are performed on well-known available datasets of each language. A dataset for Urdu language is also developed in this study and introduced as PMU-UD. Results indicate that the proposed method gives high recognition accuracy as compared to other methods. Low error rates and low confusion rates were also observed using the novel method proposed in this study. c 2019 Society for Imaging Science and Technology.