A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION

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Paper 1: Handwritten digit recognition by combined classifiers

Author : M. Breukelen; Robert P. W. Duin; David M. J. Tax; J. E. den Hartog

Summary:

Classifiers can be combined to reduce classification errors. We did experiments on a data set consisting of different sets of features of handwritten digits. Different types of classifiers were trained on these feature sets. The performances of these classifiers and combination rules were tested. The best results were acquired with the mean, median and product combination rules. The product was best for combining linear classifiers, the median for k-NN classifiers. Training a classifier on all features did not result in less errors.

Paper 2 : A trainable feature extractor for handwritten digit recognition

Author : Fabien Lauer,Ching Y. Suen,Gérard Bloch

Published year : 1997

Summary:

This article focuses on the problems of feature extraction and the recognition of handwritten digits. A trainable feature extractor based on the LeNet5 convolutional neural network architecture is introduced to solve the first problem in a black box scheme without prior knowledge on the data. The classification task is performed by support vector machines to enhance the generalization ability of LeNet5. In order to increase the recognition rate, new training samples are generated by affine transformations and elastic distortions. Experiments are performed on the well-known MNIST database

to validate the method and the results show that the system can outperform both SVMs and LeNet5 while providing performances comparable to the best performance on this database. Moreover, an analysis of the errors is conducted to discuss possible means of enhancement and their limitations.

Paper 3 : Handwritten digit recognition by neural networks with single- layer training

Author : S. Knerr; L. Personnaz; G. Dreyfus

Summary:

It is shown that neural network classifiers with single-layer training can be applied efficiently to complex real-world classification problems such as the recognition of handwritten digits. The STEPNET procedure, which decomposes the problem into simpler subproblems which can be solved by linear separators, is introduced. Provided appropriate data representations and learning rules are used, performance comparable to that obtained by more complex networks can be achieved. Results from two different databases are presented: an European database comprising 8700 isolated digits and a zip code database from the US Postal Service comprising 9000 segmented digits. A hardware implementation of the classifier is briefly described

Paper 4 : Handwritten digit recognition: applications of neural network chips and automatic learning.

Author : Y. Le Cun; L.D. Jackel; B. Boser; J.S. Denker; H.P. Graf; I. Guyon; D. Henderson; R.E. Howard; W. Hubbard

Summary:

Two novel methods for achieving handwritten digit recognition are described. The first method is based on a neural network chip that performs line thinning and feature extraction using local template matching. The second method is implemented on a digital signal processor and makes extensive use of constrained automatic learning. Experimental results obtained using isolated handwritten digits taken from postal zip codes, a rather difficult data set, are reported and discussed

Paper 5 : Hand Written Digit Recognition using Machine Learning
Author : Rohan Sethi; Ila Kaushik

Summary:

Hand-written character and digit recognition have been one of the most exigent and engrossing field of pattern recognition and image processing. The main aim of this paper is to demonstrate and represent the work which is related to hand-written digit recognition. The hand-written digit recognition is a very exigent task. In this recognition task, the numbers are not accurately written or scripted as they differ in shape or size; due to which the feature extraction and segmentation of hand-written numerical script is arduous. The vertical and horizontal projections methods are used for the purpose of segmentation in the proposed work. SVM is applied for recognition and classification, while Convex hull algorithm is applied for feature extraction.