### **A Novel Method For Handwritten Digit Recognition System**

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LITERATURE SURVEY

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| TITLE | A Novel Method for Handwritten Digit Recognition System with Neural Networks |
| AUTHORS | M.Nagu, N.Sankar, K. Annapurna |
| YEAR OF PUBLICATION | 2011 |
| ABSTRACT | Character recognition plays an important role in the modern world. Two techniques researched in this paper are Pattern Recognition and Artificial Neural Network (ANN). Bayesian Decision theory, Nearest Neighbor rule, and Linear Classification or Discrimination is types of methods for Pattern Recognition. Shape recognition, Chinese Character and Handwritten Digit recognition uses Neural Network to recognize them. Neural Network is used to train and identify written digits. After training and testing, the accuracy rate reached 95%. Our model reaches the accuracy rate of 97%.The Support Vector machine tool is used to recognize the unidentified patterns.50% of the result is identified by the trained datasets and 50% of the result is identified by linear regression. |
| METHODOLOGY | Neural Networks |
| MERITS | we might have to train 20 times in order to reach 95%  accuracy, but tomorrow we maybe have to train 25 times in order to reach 95% accuracy. |
| DEMERITS | Unnecessary data leads to misleading results and this, in turn, negatively affects classification accuracy. |
| OVERCOME DEMERITS | Our training & testing dataset contains maximum numerical features. |
| LINK | https://www.semanticscholar.org/paper/A-novel-method-for-Handwritten-Digit-Recognition-Nagu-Shankar/0d3e5ebdd4f04a2d1c493c1c988a027f215b31c3 |

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| TITLE | Handwritten Digit Recognition Using Machine Learning |
| AUTHORS | Anchit Shrivastava, Isha Jaggi, Sheifali Gupta, Deepali Gupta |
| YEAR OF PUBLICATION | 18-19 October 2019 |
| ABSTRACT | The task for handwritten digit recognition has been troublesome due to various variations in writing styles. A number of 60,000 images were used as training sets of images with pixel size of 28×28. The images/training sets were matched with original image. It was found out after complete analysis and review that classifier ensemble system has the least error rate of just 0.32%. In this paper, review of different methods++ handwritten digit recognition were observed and analyzed. Our model reaches the accuracy rate of 97%. The Support Vector machine tool is used to recognize the unidentified patterns.50% of the result is identified by the trained datasets and 50% of the result is identified by linear regression. |
| METHODOLOGY | Machine Learning |
| MERITS | Accuracy - 94%  Comparing multiple algorithms. |
| DEMERITS | Due to various variations has some troublesome. |
| OVERCOME DEMERITS | A number of 60,000 images were used as training sets of images with pixel size of 28×28. |
| LINK | https://ieeexplore.ieee.org/document/8976601 |

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| TITLE | Effective Handwritten Digit Recognition Based On Multi-feature Extraction and Deep Analysis. |
| AUTHORS | Caiyum Ma, Hong Zhang |
| YEAR OF PUBLICATION | 1 Aug 2015 |
| ABSTRACT | Handwritten digit recognition is an important research topic in computer vision and pattern recognition. This paper proposes an effective handwritten digit recognition approach based on specific multi-feature extraction and deep analysis. First, we normalize images of various sizes and stroke thickness in preprocessing to eliminate negative information and keep relevant features. Secondly, considering that handwritten digit image recognition is different from traditional image semantics recognition. Moreover, we fuse multiple features into the deep neural networks for semantics recognition. Experiments results on benchmark database of MNIST handwritten digit images show that the performance is remarkable. Our model reaches the accuracy rate of 97%. The Support Vector machine tool is used to recognize the unidentified patterns.50% of the result is identified by the trained datasets and 50% of the result is identified by linear regression. |
| METHODOLOGY | Multi-feature Extraction and Deep Analysis. |
| MERITS | Using Multi-feature Extraction and Deep Analysis Increases the Accuracy and computing time. |
| DEMERITS | This project is not efficient for large datasets. |
| OVERCOME DEMERITS | Compare more models with same data. |
| LINK | https://www.semanticscholar.org/paper/Handwritten-digit-recognition%3A-applications-of-and-LeCun-Jackel/3aa4c691289f56f9af6cf543633cfb3917274281.ieee.org/document/8976601 |

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| TITLE | Handwritten Digit Recognition: Applications Of Neural Network Chips and Automatic Learning. |
| AUTHORS | Yann LeCun, L. jackel, B. Boser, J. Denker, H. Graf, I. Guyon, D.Henderson, R. Howard, W. Hubbard. |
| YEAR OF PUBLICATION | 1 Nov 1986 |
| ABSTRACT | 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. Our model reaches the accuracy rate of 97%. The Support Vector machine tool is used to recognize the unidentified patterns.50% of the result is identified by the trained datasets and 50% of the result is identified by linear regression. |
| METHODOLOGY | Neural Network Chips and Automatic Learning. |
| MERITS | High Accuracy |
| DEMERITS | Difficult datasets are used to for training. |
| OVERCOME DEMERITS | Compare more models with the same data. |
| LINK | https://www.semanticscholar.org/paper/Handwritten-digit-recognition%3A-applications-of-and-LeCun-Jackel/3aa4c691289f56f9af6cf543633cfb3917274281 |