Project Title : Extraction Method of Handwritten Digit Recognition Tested on the MNIST Database

Author Name : B. El Kessab1, C. Daoui1, B. Bouikhalene2, M. Fakir2 and K. Moro2

Abstract : This paper deals with an optical character recognition (OCR) system of handwritten digit, with the use of neural networks (MLP multilayer perceptron). And a method of extraction of characteristics based on the digit form, this method is tested on the MNIST handwritten isolated digit database (60000 images in learning and 10000 images in test). This work has achieved approximately 80% of success rate for MNIST database identification.

Project Title : A Novel Handwritten Digit Classification System Based on Convolutional Neural Network Approach

Author Name : Ali Abdullah Yahya 1,\*, Jieqing Tan

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 real-world natural influences that can affect image quality, we propose to add an additive white Gaussian noise

with s = 0.5 to the MNIST dataset. As a result, our CNN algorithm achieves state-of-the-art results in handwritten digit recognition, with a recognition accuracy of 99.98%, and 99.40% with 50% noise.

Project Title : A Statistical Approach of Keyword Extraction for Efficient Retrieval

Author Name : Shruti Luthra Dinkar Arora

Abstract :

Large number of techniques for keyword extraction have been proposed for better matching of documents with the user’s query but most of them deal with tf-idf to find the weight age of query terms in the entire document but this can result in improper result as if a term has a low term frequency in overall document but high frequency in a certain part of the document then that term can be ignored by traditional tf-idf method. Through this paper, the keyword extraction is improved using a hybrid technique in which the entire document is split into multiple domains using a master keyword and the frequency of all unique words is found in every domain . The words having high frequency are selected as candidate keywords and the final selection is made on the basis of a graph which is constructed between the keywords using Word Net. The experiments, conducted on various documents show that proposed approach outperforms other keyword extraction methodologies by enhancing document retrieval.

Project Title : Acoustic Modeling Based on Deep Learning for Low-Resource Speech Recognition: An Overview

Author Name : CHONGCHONG YU MENG KANG

Abstract : The polarization of world languages is becoming more and more obvious. Many languages, mainly endangered languages, are of low-resource attribute due to lack of information. Both language conservation and cultural heritage face important challenges. Therefore, speech recognition for low- resource scenario has become a hot topic in the field of speech. Based on the complex network structures and huge model parameters, deep learning has become a powerful science in the process of speech recognition, which has a broad and far-reaching significance for the study of low-resource speech recognition. Aiming at the characteristic of low resource, this paper reviews the history and research status of two kinds of acoustic models of deep learning neural networks and acoustic end-to-end structures. We further elaborate on several key techniques for improving performance in the two aspects of data and model training. There are two projects for low-resource languages introduced in this paper. The possible future developments are finally pointed out. These works provide some reference for computer speech and language processing.

Project Title : Deep Convolutional Self-organizing Map

Network for Robust Handwritten Digit Recognition

Author Name : SALEH ALY

Abstract :

Deep Convolutional Neural Networks (DCNN) are currently the predominant technique commonly used to learn visual features from images. However, the complex structure of most recent DCNNs impose two major requirements namely, huge labeled dataset and high computational resources. In this paper, we develop a new efficient deep unsupervised network to learn invariant image representation from unlabeled visual data. The proposed Deep Convolutional Self-organizing Maps (DCSOM) network comprises a cascade of convolutional SOM layers trained sequentially to represent multiple levels of

features. The 2D SOM grid is commonly used for either data visualization or feature extraction. However, this work employs high dimensional map size to create a new deep network. The N-Dimensional SOM (NDSOM) grid is trained to extract abstract visual features using its classical competitive learning algorithm. The topological order of the features learned from ND-SOM helps to absorb local transformation and deformation variations exhibited in the visual data. The input image is divided into an overlapped local patches where each local patch is represented by the N-coordinates of thwinner neuron in the NDSOM

grid. Each dimension of the ND-SOM can be considered as a non-linear principal component and hence it can be exploited to represent the input image using N-Feature Index Image (FII) bank. Multiple convolutional SOM layers can be cascaded to create a deep network structure. The output layer of the

DCSOM network computes local histograms of each FII bank in the final convolutional SOM layer. A set of experiments using MNIST handwritten digit database and all its variants are conducted to evaluate the robust representation of the proposed DCSOM network. Experimental results reveal that the performance of DCSOM outperforms state-of-the-art methods for noisy digits and achieve a comparable performance with other complex deep learning architecture for other image variations

Project Title : Image Classification using SVM and CNN

Author Name : Sai Yeshwanth Chaganti

Abstract : On the surface, teaching a computer to do something like image classification seemed very intriguing to us. Moreover, there are countless real-world applications of this concept. It is in light of these reasons that we decided to work on Image Classification. Thankfully though, thistopic has been well-researched by the scientific community and we didn’t break a sweat finding resources to learn from. So naturally, we perused a bunch of research papers that dealt with imag classification, each from a different perspective. We then decided to implement image classification on a small-scale with the limited hardware we were in possession of. Asdifficult as it was, we started with SVM and a very small dataset to achieve an accuracy of 93%. Although SVM is a very strong technique, achieving such a high accuracy is still an anomaly. We realized that our results boasted such a high accuracy due to the lack of a large enough dataset. So, using data augmentation, we more than tripled the size of our dataset. On performing SVM now, we achieved an accuracy of 82%, a significant decrease. Unsatisfied with the results, we decided to move to other deep learning techniques. This quest led us to Neural Networks and, CNN. On successfully implementing CNN, we achieved an accuracy of a staggering 93.57% on the very same dataset. This stands as a testimony to the increased potential of deep learning techniques over the more traditional machine learning techniques.

Project Title : Design and Implementation of Face Recognition System Based on Raspberry

Author Name : Yuhao Hua

Abstract : A complete face recognition system needs toinclude at least image acquisition, face detection, face comparison, and verification. This paper proposes a face recognition system based on Raspberry Pie 3B + and Ali cloud platform. The image is collected by an external HD camera, and the Haar-like algorithm provided by OpenCV is used for face detection. The face comparison function is realized through the Ali cloud interface, and the data storage is completed through the database MySQL. To facilitate information management, a web application management system based on Java SpringBoot is implemented. Through testing, the system can basically achieve the expected function, and the confidence performance of the same face images is in line with expectations.

Project Title : Intelligent Handwritten Digit Recognition using Artificial Neural Network

Author Name : Saeed AL-Mansoori

Abstract : The aim of this paper is to implement a Multilayer Perceptron (MLP) Neural Network to recognize and predict handwritten digits from 0 to 9. A dataset of 5000 samples were obtained from MNIST. The dataset was trained using gradient descent back-propagation algorithm and further tested using the feed-forward algorithm. The system performance is observed by varying the number of hidden units and the number of iterations. The performance was thereafter compared to obtain the network with the optimal parameters. The proposed system predicts the handwritten digits with an overall accuracy of 99.32%.