A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION SYSTEM

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Survey 1:

Ali Abdullah Yahya , Jieqing Tan and Min Hu

"A Novel Handwritten Digit Classification System Based on Convolutional Neural Network Approach"

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, this 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 them to select a typical filter size which leads to enhancing the classification accuracy of 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, they propose to add an additive white Gaussian noise with $s = 0.5$ to the MNIST dataset. As a result, the 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.

Survey 2:

Fengjun Guo, Shijie Chen

"Gesture Recognition Techniques in Handwriting Recognition Application"

Handwriting-gesture recognition has been widely implemented in handwriting input application. Usually gestures are used to conduct edit operations or be set as shortcut of an application. In this paper, they compare several handwriting-gesture recognition methods, and address their different user cases. These methods include pixel-matching method, rule based method and discriminant-function based method. For discriminant-function based method, they describe 2 sub-methods. They are prototypes based method and training based method. They not only analyze recognition accuracy of gestures for these methods, but also analyze their distinguished capability when recognizing gestures and alphanumeric in same recognizing mode. Experiments results show that, if the gesture-samples are enough, training based method achieves the highest accuracy. Furthermore, when recognizing mixed input of gestures and other handwriting symbols, training based met.

Survey 3:

MALOTHU NAGU, N VIJAY SHANKAR , K.ANNAPURNA

"A novel method for Handwritten Digit Recognition with Neural Networks"

Character recognition plays an important role in the modern world. It can solve more complex problems and makes humans' job easier. An example is handwritten character recognition. This is a system widely used in the world to recognize zip code or postal code for mail sorting. There are different techniques that can be used to recognize handwritten characters. Two techniques researched in this paper are Pattern Recognition and Artificial Neural Network (ANN). Both techniques are defined and different methods for each technique is also discussed. 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 99%.

Survey 4:

Vladimir I. Pavlovic, Student Member, IEEE Rajeev Sharma, Member, IEEE, and Thomas S. Huang, Fellow, IEEE

"Visual Interpretation of Hand Gestures for Human-Computer Interaction"

The use of hand gestures provides an attractive alternative to cumbersome interface devices for human-computer interaction (HCI). In particular, visual interpretation of hand gestures can help in achieving the ease and naturalness desired for HCI. This has motivated a very active research area concerned with computer vision-based analysis and interpretation of hand gestures. They survey the literature on visual interpretation of hand gestures in the context of its role in HCI. This discussion is organized on the basis of the method used for modeling, analyzing, and recognizing gestures. Important differences in the gesture interpretation approaches arise depending on whether a 3D model of the human hand or an image appearance model of the human hand is used. 3D hand models offer a way of more elaborate modeling of hand gestures but lead to computational hurdles that have not been overcome given the real-time requirements of HCI. Appearance-based models lead to computationally efficient "purposive" approaches that work well under constrained situations but seem to lack the generality desirable for HCI. They also discuss implemented gestural systems as well as other potential applications of vision-based gesture recognition. Although the current progress is encouraging, further theoretical as well as computational advances are needed before gestures can be widely used for HCI. They discuss directions of future research in gesture recognition, including its integration with other natural modes of humancomputer interaction.

Reference:

1. **Ali Abdullah Yahya , Jieqing Tan   and Min Hu**

   "A Novel Handwritten Digit Classification System Based on Convolutional Neural Network Approach"

2. **Fengjun Guo, Shijie Chen**
   "Gesture Recognition Techniques in Handwriting Recognition Application"

3. **Malothu Nagu, N Vijay Shankar , K.Annapurna**

   "A novel method for Handwritten Digit Recognition with Neural Networks"

4. **Vladimir I. Pavlovic, Student Member, IEEE Rajeev Sharma, Member, IEEE and Thomas S. Huang, Fellow, IEEE**

   "Visual Interpretation of Hand Gestures for Human-Computer Interaction"