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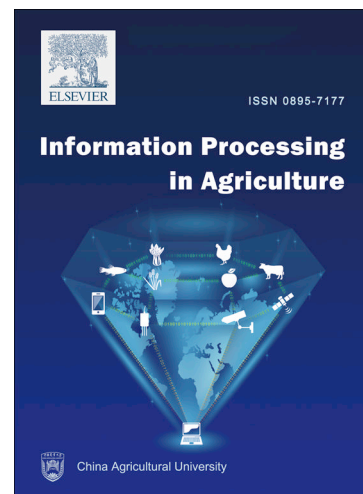
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Down Image Recognition Based on Deep Convolutional Neural Network

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Abstract: Since of the scale and the various shapes of down in the image, it is difficult for traditional image recognition method to correctly recognize the type of down image and get the required recognition accuracy, even for the Traditional Convolutional Neural Network (TCNN). To deal with the above problems, a Deep Convolutional Neural Network (DCNN) for down image classification is constructed, and a new weight initialization method is proposed. Firstly, the salient regions of a down image were cut from the image using the visual saliency model. Then, these salient regions of the image were used to train a sparse autoencoder and get a collection of convolutional filters, which accord with the statistical characteristics of dataset. At last, a DCNN with Inception module and its variants was constructed. To improve the recognition accuracy, the depth of the network is deepened. The experiment results indicate that the constructed DCNN increases the recognition accuracy by 2.7% compared to TCNN, when recognizing the down in the images. The convergence rate of the proposed DCNN with the new weight initialization method is improved by 25.5% compared to TCNN.

Keywords: Deep Convolutional Neural Network; Weight Initialization; Sparse Autoencoder; Visual Saliency Model; Image Recognition

1. Introduction

Down is the valuable by-product of poultry farming. Different type of down has different ability to keep warm when used as fillings of down jacket, and so has different price. Machine vision technology can be used for down sorting. The down image recognition has an important influence on down-sorting technology. The key of down-sorting technology based on machine vision is to correctly identify the type of down in the acquired image. The shapes of the same type of down vary widely in the image. The occlusion problem in the image makes it difficult to get perfect recognition results for the traditional image recognition technology. DCNN [1] is state-of-the-art image recognition method based on feature learning and its generalization capacity has been significantly improved than the traditional image recognition method. So, in recent years, the image recognition systems based on DCNN have made remarkable achievements. DCNN has become a research hotspot in machine vision and artificial intelligence. The image recognition methods based on feature learning do not need to extract the specified features. The appropriate features for classification are found by iterative learning. Compared with other methods, the DCNN-based image recognition can achieve better classification accuracy and can avoid the waste of labor and time caused by artificial feature extraction.

In recent years, image recognition is widely used [2]. Some outstanding DCNN models emerged, such as AlexNet [3], VGGNet [4], GoogleNet [5], ResNet [6] and so on. DCNN has achieved very good results in

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