The Application of Deep Learning in Image Processing is Studied Based on the Reel Neural Network Model

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Abstract. In recent years, with the deepening of deep learning reform and the rapid development of reeling neural network technology, the model applied by deep learning has been greatly different from the traditional, the original learning program and learning model need to be developed and changed with the progress of the times. Therefore, the purpose of this paper is to rely on the network model derived from the deep learning of reel neural networks to solve the problems in the field of image processing. Based on the technical safety code and data security protection of reticulation neural network, this paper learns in depth the computing power of reel neural network while taking into account the deep learning corresponding to the refragstortic neural network model, and then collects, organizes and analyzes the information related to image processing, uses sandbox simulation operation, modeling, and a variety of intelligent algorithms to get the final result. This paper mainly uses the target detection algorithm to experiment. The experimental results show that the application of co product neural network model deep learning in image processing can be improved more effectively by using suitable algorithms.

Keywords: Reel Neural Networks; Modeling; Deep Learning; Image Processing

1. Introduction
Target detection algorithm based on deep convolution neural network brings new research direction for target detection, and leads the development progress of target detection. In the past, it has been used in large-scale image classification tasks, and used to test the pressure of image classification tasks, and won the image classification competition of that year, so the convolutional neural network has been widely used in computer vision. As one of the three important models of deep learning, convolutional neural network not only has the advantages of automatic feature extraction of deep learning technology, but also reduces the training parameters through weight sharing, and has certain translation invariance, which makes the convolutional neural network can process images quickly and accurately. Therefore, it has made remarkable achievements in the field of image classification.

In recent years, the application of deep learning in character recognition has developed rapidly[1]. End character recognition based on deep learning eliminates the need to explicitly add text cut links [2]. Instead, character recognition is transformed into sequence learning problem, which can recognize the whole text image, and text cutting is integrated into deep learning [3]. Deep neural network is a kind of neural network with at least one hidden layer. When constructing multi-level network model,
we often encounter the problem of fitting [4]. How to prevent over synthesis is one of the key problems in deep learning. Methods to weaken over fitting include L1, L2 and dropout regularization methods. L1 regularization reduces weight by saving space, while L2 regularization reduces over fitting by reducing weight [5]. The dropout regularization method reduces over fitting phenomenon through "model averaging", and reduces the cooperative adaptability between neurons [6].

Image processing technology is also known as computer image processing technology. Images are processed by computer and according to different treatment methods, image processing can be divided into analog image processing technology and quantitative word image processing technology [7]. According to the use of different methods, it can also be used for image enhancement, conversion, recovery, analysis and so on. For the digital image processing technology applied in the industrial field, it requires high precision, and the results are easy to control and post-processing. However, image processing involves a variety of data information [8-9]. In order to obtain accurate image requirements and processing results, more time has to be consumed [10].

2. The Target Detection Algorithm

2.1. Loss Function

The SSD loss function is divided into two parts: position loss and confidence loss. The confidence loss uses the softmax loss function to calculate the probability that the algorithm is classified correctly. Position loss uses the SmoothL1 loss function to calculate the error between the true box and the coordinates of the prediction box. The loss function is expressed as:

$$L(x, c, l, g) = \frac{1}{N} [L_{\text{conf}}(x, c) + \alpha L_{\text{loc}}(x, l, g)]$$ (1)

In the pattern: for the total loss function; for the confidence $L(x, c, l, g)$ level; for the prediction box; for the real box; for the $N$, $x = \{0, 1\}$ weight factor; for the number of matches between the prediction box and the real box; when the cross-over ratio is greater than the threshold (0.5 in this article), the real box matches the prediction box, take, $x = 1$ otherwise. $x = 0$ The position loss function is defined as:

$$L_{\text{loc}}(x, l, g) = \sum_{j \in P} \sum_{m \in L} \sum_{i \in P} \sum_{c \in C} \sum_{w, h} \text{SmoothL1}(l^m_i - \hat{g}^m_i)$$ (2)

$i \in P$, indicates that the first prediction box area is a positive sample, which represents a positive $k$ sample; the offset along and direction between the prediction $x^k_j \in \{0, 1\}$ box or the real box and the center of the default box, the difference between the prediction box or the true box and the width and height of the default box; $i$ and the category, otherwise when $j$, the first prediction box matches the first real $x^j_0 = 1$ box. $x^j_0 = 0$ is $\hat{g}^m_i$ the real box position parameter after encoding; $l^m_i$ The SmoothL1 function is represented as:

$$L_{\text{conf}}(x, c) = -\sum_{j \in P} \sum_{i \in P} x^p_j \log(\hat{c}^p_i)$$ (3)

In formula: $i \in N$, indicates $i$ that the first prediction box area is a negative sample, representing a negative sample, $N$ and for the probability of a correct $\hat{c}^p_i$ and category background prediction box, the probability $\hat{c}^p_i$ value calculated using the Softmax function can be represented as.
\[ \hat{c}_i^p = \exp(c_i^p) / \sum_p \exp(c_i^p) \]  

(4)

3. Experiment

3.1. Selection of Experimental Data
A random sample of 100 people in an image center who studied the reel neural network model in depth was surveyed. Two sets of questionnaires were used, the first set was about using the old sandbox learning model to process image problems, and the second set was about solving image problems based on the study of deep learning reel neural models. For these, 100 staff members, our questionnaire is divided into three parts, namely, the use of reel neural network models to solve image problems, and its impact on the self itself and the perception of the image center.

3.2. Select Other College Teachers and Students in A Sample
Due to the diversity of experiments, we not only surveyed the center's teachers and students, but also used a sample survey to select other online non-use of new course neural network models to solve image problems, but provided their views to professionals for a more comprehensive and objective evaluation.

4. Evaluation Results

4.1. The Results of the Questionnaire are Displayed
The results of the feedback from the questionnaire are shown in Tables 1, Figure 1. Comparing the resulting data from Tables 1 and Figure 1, it is not difficult to see that using the co product neural network model to solve image problems is more popular than using traditional sandbox models.

| Evaluation attitude. | Number of copies / servings | The new model. | Traditional models. | Total number of copies / servings |
|----------------------|-----------------------------|----------------|---------------------|----------------------------------|
| Excellent            | 145                         | 30             | 175                 |
| So so                | 40                          | 132            | 172                 |
| Poor                 | 15                          | 38             | 53                  |
| Total number of      | 200                         | 200            | 400                 |
| copies / servings    |                             |                |                     |

Through the data in Table 1, it can be found that professional staff working in the image center for a long time prefer to solve image problems with new reel networks, it is not difficult to see that more than 70% of professionals have expressed praise for the new model, while the vast majority of people in the traditional model only think that they can solve the current problem but not the best choice, and this data mainly from the professionals who deeply learned and mastered the new reel neural network model, indicating that this new model is indeed more effective than the traditional model in dealing with the image problem.
On the basis of Table 1, we constructed a column chart, which more intuitively shows the professional staff's evaluation of the old and new models through Figure 1, highlighting the advantages of the new model in dealing with image problems.

After this questionnaire we mainly draw the professional staff involved in the further inquiry detailed attitude point of view to make an evaluation, to find a better way to solve the image problem and way out, but found that the results are still too one-sided, so we try to get some attitude from other experts engaged in image processing, the results of the experiment as shown below.

4.2. The Views of Other Experts Engaged in Image Processing

According to Figure 2 data, most of the experts involved in the second survey expressed a high degree of interest and praise when they saw the new course neural network model and said they would try to use it more often when dealing with image problems later. This phenomenon shows that deep learning to study the new reel neural network model is very useful to solve the problem of image processing, so we should strongly support and improve the new model, and promote the new model so that more staff engaged in image processing to understand and learn, so as to promote the development and promotion of china's image processing direction.

4.3. Application of Image Processing
The application of digital image processing technology in aerospace technology, in addition to JPL processing of lunar and Martian photographs, other applications include aircraft remote sensing and satellite remote sensing technology. Many countries and regions send many reconnaissance aircraft every day to take a large number of aerial photographs of areas of interest on Earth. In the past, thousands of people were hired to process and analyze generated photos, but now image processing systems equipped with advanced computers are used to interpret and analyze photos. This not only saves manpower, but also speeds up, and extracts a lot of useful information from photos that can't be found manually. Since the late 1960s, the United States and a number of international organizations have launched remote sensing satellites for resources. Because imaging conditions are influenced by the position, attitude, and environmental conditions of the aircraft, the image quality is not very high. Therefore, it is not cost-effective to obtain images at such a high cost through simple and intuitive interpretations, and digital image processing techniques must be used. For example, landsat series Landsat uses multi-band scanners (MSS) to scan and image every region of the Earth at 18-day intervals of 900 days. Its image resolution is approximately 10 meters or 100 meters above the ground. These images are processed in the air as digital signals and stored on tape. As satellites pass through the ground station, they are transmitted at high speed and then analyzed and interpreted by the processing center. Many digital image processing methods, must be used in imaging, storage, transmission, and interpretation analysis. Today, many countries and regions around the world use Landsat images for resource surveys, resource surveys, and urban planning. China has also carried out some practical applications in the above-mentioned areas and achieved good results. Digital image processing technology has also played an important role in weather forecasting and the study of other planets in space.

4.4. Application of the Reel Neural Network Model
A reticulation neural network is a feed-forward neural network that includes reeling computation and has a deep structure and is constantly used in deep learning. CNN's essential multi-layered percomputation, local connectivity, reduces weight This number makes it easier to optimize the network, reduces the complexity of the model, and reduces the risk of overfit. Better functional robustness can be achieved by building multi-layered networks to extract advanced data with abstract semantic information. CNN is a neural network based on supervised learning that enables feature extraction core modules to have multiple neurons in each feature map located in the hidden layer and pooled layer, and to extract features using remenut filters of different sizes. Among them, the reel layer is the feature extraction layer shared remenut nucleation so that the local area of the upper layer excites each layer of the feature each neuron's input is connected to the upper layer of the local sensing field, activation function is used to form and output feature map. The pool layer is located in a continuous reel layer that compresses data and parameters, removes redundant information, and prevents installation from stopping.

4.5. The Advantages of the Reel Neural Network Model
With the increase of the number of course neural network layers, the model fitting ability is gradually enhanced and the recognition effect is better. However, the deeper the model, the more difficult the training convergence and the less efficient the training. Conversely, model fit and recognition rates decrease when there are, fewer layers of the network model. In addition, for complex models, in addition to training efficiency is very low, the theoretical analysis of models is difficult, training often relies on a wealth of skills and parameter adjustment experience to obtain results. In the task of using consumable neural networks for image classification, the general operation is to preprocess the image, then input the entire image into the conve current neural network model, and then output classification. However, due to regional differences in the category targets of different images, image classification based on global characteristics is not accurate, and different categories may have highly similar feature information. In this paper, a deep co product neural network model based on multi-region characteristics is designed. Different input patterns are designed to ensure the integrity of
feature information. Input mode, i.e., different regions or global regions (for example, top left, top right, top left, bottom left, and bottom right in the central, raw, and sub-regions) support union of pixels representing each pixel to ensure that they are richer and more powerful. The model not only has fewer network layers and fewer parameters, but also has high image classification accuracy.

4.6. Application of Deep Learning
Deep learning is a new research direction for machine learning. It was introduced into machine learning, bringing it closer to the original goal of artificial intelligence. Deep learning is the inherent rule and level of representing the learning sample data. The information obtained during the learning process is of great help to the interpretation of data such as words, images and sounds. Its ultimate goal is to give machines the same analytical and learning capabilities as humans and to recognize data such as text, images, and sounds. Deep learning is a complex machine learning algorithm that works much better in speech and image recognition than previous technologies. Deep learning has made many achievements in search technology, data mining, machine learning, machine translation, natural language processing, multimedia learning, speech, recommendation and personalization, and other related fields. Deep learning enables machines to mimic human activities such as audio-visual and thinking, many complex pattern recognition problems, and make great strides in artificial intelligence-related technologies such as modeling.

5. Conclusion
The above is the author in the study of deep learning reel neural network model in the process of applying this new model to image processing problems to get thinking, and engaged in the same professional staff experience information sharing the final summary. The author thinks that in solving the problem of image processing, the traditional sandbox model can not meet the needs of modern production processing, and the new reel neural network model is impeccable in image processing information, image processing rate, image processing effect and so on, so we recommend the use of new reel neural network model to solve the image processing problem.

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