Application of Deep Learning in Computer Vision

Qiangde Xiang

Nanjing Weijing Vision Technology Co., Ltd, Nanjing 210000, China.

Abstract: Every aspect in society in the process of development towards intelligence, automation, the role of artificial intelligence and the contribution is not allow to ignore, and computer vision technology is the key technology of artificial intelligence, with continuous innovation and development in the field of computer vision, the deep learning approach will be more and more widely applied in the field of computer vision, This paper analyzes and expounds deep learning, computer vision and deep learning framework respectively, and then focuses on image analysis, target detection and attitude estimation to effectively explore the application of deep learning in the field of computer vision, and carries out deep learning classification network research for reference.

Keywords: Deep Learning; Computer Vision; Application

Introduction

Every modern escalating development and practical application of advanced technology, greatly changed people's work and way of life, at the same time, it provides great convenience for people, at present, the computer vision technology, as a kind of typical high and new technology, getting more and more common in the field of medical care and transportation applications, and made outstanding contribution to promote the development of the application field, In the process of deepening the development of computer vision field, the application of deep learning technology gradually began, and the effective application of deep learning method in the field of computer vision is bound to promote the improvement and optimization of computer vision technology, so as to further improve the application effect and application value of artificial intelligence.

1. A brief introduction to deep learning theory

Deep learning was proposed by a Robotics researcher in Canada in a study in the field of robot learning. After the theory of deep learning was proposed, it gained recognition in the scientific field and formed a professional discipline based on this theory. The theory of deep learning is based on the simulation of human brain by artificial neural network, which greatly improves the intelligence of machines. In the process of application of deep learning technology, first of all need to build a model with artificial neural network as the foundation of learning strategies, and applies this strategy in the process of intelligent robot, this process can make the machine for vast amounts of data analysis and processing, in order to realize the intelligent level of the machine, the data contains the common form of data such as video, text, Sound, graphics and so on. Deep learning makes use of the multi-hidden layer learning structure contained in artificial neural network, and its input layer, multi-hidden layer and output layer carry out corresponding data collection, data processing and task execution and other related functions. It can be connected with the deep learning have multiple processing nodes in accordance with the specific algorithm of data processing of a layer results as data input the start of the next layer, through continuous superposition process simulation of the human brain thinking signaling mechanism, through to the depth of the machine learning training, also can realize more complex intelligent function.

2. Application of deep learning in computer vision

Computer vision is to realize the recognition, extraction, measurement and tracking of object features with the help of high-performance processors, with the help of cameras and computers, and then get humanized processing to get more

suitable for human observation or other machine equipment to receive the image information.

In the process of using cameras or other video shooting equipment to obtain images and feature extraction of data collection objects, the process and ability of using processors carried by computers to collect, analyze and process data is called computer vision. Through the relevant functions of computer vision, people can obtain observation methods more suitable for the observation habit of human eyes or image recognition ability suitable for different types of machines. Computer vision technology in the process of continuous development, the first to achieve people's ability to look at the external world to improve, help to strengthen the level of human skills and cognitive ability, at the same time, computer vision technology enables machines to acquire the ability to perceive the surrounding environment. The outstanding research field of computer vision mainly includes image recognition, state detection and scene analysis and other related applications. Image recognition technology based on image feature analysis ability, enables the machine in the image recognition to by filming equipment to capture key characteristics, and then these features contain different degree of processing data information, allowing the computer to use these features to identify objects, corresponding to the target template is used to complete the image matching. Once similar features appear in the process of recognition, the image recognition process can be quickly completed according to these templates.

Prior to the use of deep learning, traditional computer recognition methods separated features and classification as two different units, which were integrated after completing their respective functions. In order to achieve a better recognition level, it is necessary to do a good job in the manual design of the corresponding features, because the rich types of features make the manual design need a lot of work content, as well as the corresponding process of the characteristics and data of a certain field. In addition to the manual design of features, it is also necessary to construct the corresponding classifier algorithm, so that each different feature can correspond to a classifier. Only by doing these two work well at the same time can the computer recognition accuracy be effectively improved. However, the difficulty of this work is affected by the number of features of specific types of items and the classification calculation method. In the framework design process of deep learning, we need to face a huge number of calculations, sometimes some algorithms even need tens of billions of calculations. To build a deep neural network framework often means the superposition and optimization of a large number of computing processes. Theoretically, the forward propagation network can be designed as the starting point and the reverse propagation process can be obtained according to the chain derivative rule, so that the stability of data can be strengthened to a certain extent. But this deep neural network requires a lot of computing power. Although the rapid development of GPU technology enables deep learning to be effectively supported in computing capacity, the emergence of high-performance computers enables more complex and large neural networks to be realized. If the neural network is only built on the basis of CPU computing, its speed and efficiency still cannot achieve effective support for neural network. Therefore, in order to improve the computing capability of neural network, a powerful GPU computing device with high flexibility is needed to carry out the framework construction work of deep learning. In the development of neural networks, researchers have an increasingly strong demand for computing power, so that deep learning can effectively help enterprises. Enterprises with strong financial resources begin to use their own resources to establish internal deep learning frameworks. With the formation of this ethos, the content and cases related to deep learning framework are increasingly rich, which plays a very important role in promoting the development of overall deep learning theory. Open source plays a very important role in resource sharing in this process. With more and more open source in deep learning framework, deep learning technology has developed rapidly on the basis of numerous researchers' improvement and optimization of enterprises.

Deep learning frameworks can be classified into two types: imperative and symbolic according to the programming mode. Imperative programming is realized by using more common programming methods, which can also be called WYSIWYG programming in the programming field. The programming languages commonly used in this programming mode are similar to C and Python. The programming content formed by various loop structures in programming languages not only has good performance but also is concise and convenient in the maintenance process. However, the speed of the system in the execution process is limited because of the nesting of a variety of different loop contents and the increase of a large number of loop parameters. However, symbolic programming is realized by continuous operation of variables. There is no real operation in the specific execution process, but the calculation diagram of variables and their related calculation

relationship is formed. In the specific operation process, it will be executed only after the whole code is called or completed. This mechanism enables the operation flow to be effectively optimized and adjusted. Compared with the imperative programming framework, the symbolic programming framework has a more efficient running speed.

3. Deep learning classification network analysis

Convolutional neural network is the basic model of deep learning classification network, which can realize the classification of digital images. In the early stage, this technology was used to classify images, and feature extractors were used to carry out image classification based on the features displayed in the images. This effectively reduces the complexity of the design process and provides a richer perspective for the development of computer vision field.

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The connection is transformed into a sparse structure, and the distribution of the data set is expressed through the massive sparse structure transformed by the system. Clustering nodes with high correlation are integrated during the operation of the system, which is called googleNET infrastructure. By connecting the pixels around the selected region in the image with the convolution operation, and using the correlation between channel information and spatial position, it can be concluded that with the reduction of the size of the convolution kernel, the higher the correlation of channel information, the richer the changes in perceived field of vision can be generated.

Conclusion

The improvement of science and technology innovation and upgrading, is the core power to promote social development forward, optimization and perfection of computer vision technology, will give a stronger vitality, artificial intelligence and computer vision for the application of deep learning method, can bring a breakthrough in the field of computer vision development, further expand the computer vision.

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