

Research on Image Recognition Technology and Its Application Strategies in the Context of Artificial Intelligence

Yuxin Chen

(Hunan Vocational College of Science and Technology, Changsha 410004, China)

Abstract: Under the background of artificial intelligence, the application of image recognition technology shows a development trend of diversification, systematization, and high efficiency. Using the deep learning logic and visual information language of artificial intelligence technology to improve the application system of image recognition technology will be the key to enhancing the effectiveness of image recognition technology application. In the new era and under the background of artificial intelligence, image recognition technology should continuously promote the integrated development of artificial intelligence technology and image recognition technology through the use of multiple basic strategies, such as the construction of deep learning models, the use of large-scale datasets, and the optimization of hardware acceleration technology, so as to strengthen the technical application level of artificial intelligence technology in image recognition.

Keywords: artificial intelligence; image recognition; technology application; deep learning

1 Introduction

The development of artificial intelligence technology has changed the development trends of some information technologies and digital technologies. As an important product of the post-information age, image recognition technology plays a core technical role in many fields such as education, medical care, and manufacturing. In the new era, the application of image recognition technology should take strengthening technical optimization and technical innovation as the carrier, introduce the concept of artificial intelligence technology into the application system of image recognition technology, improve the intelligent level of image recognition technology application, expand the application functions of image recognition technology, and enrich the application system of image recognition technology, so as to provide multi-faceted technical guarantees for image recognition technology to develop technical advantages in more fields.

2 Content and Technical Framework of Image Recognition Technology

2.1 Feature Extraction

Feature extraction is the first step in the application of image recognition technology. Information such as edges, textures, and colors in images is important discriminative information for feature extraction. At present, the commonly used feature extraction methods mainly include convolutional neural networks and feature description. Among them, the convolutional neural network based on CNNs is a deep learning model specially used for image processing. Data information passes through convolutional layers, pooling layers, and fully connected layers to learn different data information features in images. Therefore, CNNs have certain advantages in image object detection, task information segmentation, and other aspects. Feature description is completely different from convolutional neural networks. Feature description is mainly expressed using various methods such as HOG, SIFT, SURF, ORB, LBP, and HAAR. The technical advantages of different expression methods are also different. For example, R-HOG based on HOG has a relatively strong ability to capture image information features in high-density grids; compared with R-HOG, SIFT has good data capture ability for a single image under multiple scales. Therefore, different expression methods have

different application requirements for descriptors, and technical content should be selected scientifically according to the requirements of image recognition [2].

2.2 Image Classification

Image classification is an important part of image recognition. Image classification mainly uses embedded information labels to identify image information content. Compared with the information analogy strategy using a unitized classification mode, image classification does not only analyze image contours, physiological information, dynamic data, etc., but also uses artificial intelligence data algorithms and preset data thresholds as standards to calibrate target information, so that image information of the same type can be sorted according to data sequences. At present, image classification is generally used for the recognition of dynamic image information content. Some image classification also plays a certain role in structural recognition. Therefore, image classification for the analysis of image information data greatly improves the content accuracy of image recognition, ensures that the information content of image recognition can remain consistent with the real environment, and better provides support for image information arrangement and image data integration. In addition, the use of different labels and annotation information in image classification methods provides multi-faceted technical support for the construction of image information databases, simplifies the technical application process of image information databases, improves the deep learning ability of artificial intelligence, and meets the multi-faceted application needs of image recognition technology [3].

2.3 Semantic Segmentation

The semantic information contained in pixels of different images is different. Image semantic segmentation can assign a specific semantic category to each pixel in an image, effectively performing fine-grained segmentation of the image. Different pixel blocks in horizontal and vertical directions can all be marked as belonging to a certain object or category in the image through semantic segmentation. The artificial intelligence system can use the capture of different semantic information in pixels to accurately recognize image information contours. Among them, semantic segmentation requires systematic design from three aspects: semantic categories, semantic labels, and loss functions. First, in terms of semantic categories, semantic segmentation tasks usually involve multiple semantic categories, and different semantic categories need to be marked with unique identifiers. The recognition of identifiers can provide theoretical values for semantic segmentation. Second, in terms of semantic labeling, image information recognition should compare data information according to the image matrix data content of labels of different pixels, ensuring that image recognition can accurately locate pixel information content. Finally, in terms of loss functions, semantic segmentation needs to use cross-entropy loss functions or multi-class segmentation loss functions for model prediction, analyze the gap between data and real scenes, and supplement theoretical data information to avoid image information loss or inaccurate recognition.

3 Advantages of Image Recognition Technology in the Context of Artificial Intelligence

3.1 High Accuracy and Efficiency

Traditional computer image recognition technology mainly integrates image information content based on the theoretical parameter values of program algorithms. Once the image information content does not match the theoretical parameter values, recognition errors or inaccuracy are likely to occur. In addition, the performance loss of image recognition in traditional computer equipment is relatively high, and the image information recognition delay under high load is higher than that of artificial intelligence image recognition. The technical application of artificial intelligence image recognition can use data model training to classify part of the image information content that conforms to data features and has unified data identifiers, greatly improving the efficiency of image recognition. Moreover, because artificial intelligence has relatively rich recognition features based on data operations, it can use multiple different feature data comparisons for information proofreading, effectively meeting the needs of high-precision processing of image recognition. Therefore, the use of data training and large data models can provide

sufficient guarantee for improving the accuracy and efficiency of artificial intelligence image recognition. In addition, artificial intelligence can use edge computing logic to reasonably allocate system performance resources according to the intensity of data information processing, improve image recognition quality under high load, and play a certain role in controlling data delay [4].

3.2 Personalized Design and Automated Management

The application scenarios of image recognition are relatively wide. Technical content can be optimized according to technical application requirements. For example, when image recognition is applied in the education or medical field, the image recognition strategy can be dynamically adjusted by improving image recognition accuracy and optimizing data training models. Therefore, compared with traditional computer image recognition technology applications, artificial intelligence image recognition technology has better scenario applicability, can meet the personalized application needs of image recognition technology, and fully simplifies the technical application process of image recognition. At the same time, the application of artificial intelligence image recognition technology reduces dependence on manual image review, enables image recognition to automatically perform data management and data statistics, and can verify multiple recognition data information according to image recognition requirements, fully improving the automation level of image recognition. Therefore, the application of image recognition technology in the context of artificial intelligence effectively gives play to the advantages of artificial intelligence personalized and automated management services, and lays a solid foundation for image recognition technology to develop core technical advantages in more diversified fields.

4 Application Carriers of Image Recognition Technology in the Context of Artificial Intelligence

4.1 Complete AI Data and Information Management Module

Using data models to strengthen the deep learning of artificial intelligence is the key to improving the effectiveness of image recognition technology application in the context of artificial intelligence. Therefore, in the new era, image recognition technology relying on artificial intelligence should take a complete artificial intelligence data information management module as the basic carrier, continuously optimize the content design of data models, and strengthen the recognition ability of artificial intelligence for image information content in different fields and types through dynamic adjustment of artificial intelligence data algorithms, ensuring that image recognition technology application based on artificial intelligence can provide multi-faceted strong support for image recognition processing. For example, construct an artificial intelligence data model learning platform according to the logic of computer vision language, so that artificial intelligence can perform image recognition processing based on image module information according to the characteristics of image information language expression, fully improving the technical application pertinence of image recognition from the perspective of artificial intelligence. In this way, the effectiveness of image recognition technology application in the context of artificial intelligence is ensured, laying a foundation for better strengthening the integration of artificial intelligence image recognition information resources and improving the information management ability of image recognition [5].

4.2 Support from Sound Hardware Systems and Software Programs

Artificial intelligence technology has a certain dependence on powerful data computing capabilities. In particular, the construction of feedforward neural networks and convolutional neural networks has extremely high requirements for device hardware performance. Ordinary consumer-grade or enterprise-grade computer equipment is difficult to meet the application needs of artificial intelligence technology. Customization of artificial intelligence computer servers is needed to meet this demand. The application of image recognition technology relying on artificial intelligence technology also requires image information processing based on high-performance computing equipment. Therefore, ensuring the performance advantages of hardware systems is an important carrier for the application of image recognition technology in the context of artificial intelligence [6]. In addition, in terms of the use of software

programs, technicians need to use the construction of visual neural networks to design image recognition systems, and provide multi-level technical support for image recognition through artificial intelligence digital signal processing, improving the quality and recognition accuracy of image recognition from the perspective of artificial intelligence, and making sufficient preparations for subsequently better improving the application system of artificial intelligence image recognition technology.

5 Application Strategies of Image Recognition Technology in the Context of Artificial Intelligence

5.1 Construction of Deep Learning Models

Deep learning models are a type of machine learning model. Deep learning models for artificial intelligence image recognition need to be systematically constructed from multiple layers of neural networks. Among them, deep learning models for image recognition relying on artificial intelligence need to gradually extract abstract features from data through multi-level nonlinear transformations, effectively realizing the learning and representation of complex patterns and information. At present, deep learning models for artificial intelligence image recognition mainly include recurrent neural networks, long short-term memory networks, gated recurrent units, autoencoders, generative adversarial networks, and attention models. Different model structures have different effects on the application of artificial intelligence technology. For example, recurrent neural networks are deep learning models for processing sequence data. They mainly provide data information support for recurrent neurons, enabling artificial intelligence systems to perform image recognition management based on natural language processing, speech recognition, and time series analysis. Another example is generative adversarial networks, which train the data analysis and judgment capabilities of artificial intelligence through the structural combination of generator networks and discriminator networks. The generator network is responsible for generating sample data similar to real data, while the discriminator network is responsible for judging data authenticity and application effectiveness. Thus, it provides support for subsequent data analysis and data integration of image recognition [7].

5.2 Use of Large-Scale Datasets

Large-scale datasets refer to datasets containing a large number of data samples. Basic sample information can include text, images, audio, video, and other forms of data information. The use of large-scale datasets enables artificial intelligence to effectively master the basic logic of image recognition through the screening of a large number of data samples, strengthening the information data positioning accuracy of artificial intelligence image recognition. Among them, the number of sample data and the richness of types determine the effectiveness of artificial intelligence data learning. In recent years, with the continuous increase of image information data forms, large-scale datasets have gradually begun to integrate data content for multi-data-source applications. For example, based on data analysis of social media, news media, the Internet, academic materials, and other information materials, the concept of anthropomorphic image information is added to image recognition design, and with the help of the visual feedback effect of computer vision networks, support is provided for artificial intelligence image recognition. Therefore, the use of large-scale datasets should not only ensure the richness of data information content and the fineness of data granularity, but also integrate data information content in a targeted manner according to the operating logic of social environment development, helping artificial intelligence to conduct image recognition information analysis more accurately.

5.3 Optimization of Hardware Acceleration Technology

The application of hardware acceleration technology in the field of artificial intelligence can improve the data information processing capability of artificial intelligence systems. Image recognition usually requires a large amount of data information computation. Therefore, in order to better give play to the technical advantages of artificial intelligence, image recognition technology can provide support for artificial intelligence image recognition analysis and data management based on the optimization of hardware acceleration technology. At present, hardware

acceleration technology is mainly divided into three modes: GPU acceleration, CPU acceleration, and logic acceleration. Among them, GPU acceleration is a hardware system optimization based on graphics rendering, using a highly parallel architecture technical system to provide support for artificial intelligence technology applications. Artificial intelligence image recognition can improve the processing capability of similar image information based on GPU acceleration. The logic of CPU acceleration and GPU acceleration is basically the same, but the technical concepts are completely different. GPU acceleration mainly provides support for single and large amounts of image information processing. CPU acceleration mainly provides support for image information with rich information types and a small amount of data in a single system. Logic acceleration mainly provides hardware acceleration support for artificial intelligence image recognition processing through the use of personalized customization technology or digital coding technology. For example, the application of TPU, FPGA, ASIC, DSP, and other technical contents all belong to the basic category of logic acceleration.

5.4 Design of Object Detection Systems

Object detection systems mainly perform data information processing with the help of data analysis of image recognition. For example, the concept of candidate region generation technology is used to generate candidate regions that may contain objects according to features in the image, and the RPN network is used to provide image recognition support. The application of object detection systems by artificial intelligence can effectively optimize detection methods and detection strategies and improve the comprehensive recognition ability of image information. For example, using the object classification technology of image object detection, information data classification processing is carried out according to the different content elements involved in image information, and classifiers are used to improve the effectiveness and accuracy of image recognition. Therefore, the design of object detection systems can break the traditional image recognition processing logic, allowing artificial intelligence to conduct targeted data information management through the analysis of image information types. In addition, the application of edge detection technology and dynamic tracking technology in object detection systems also greatly improves the efficiency of artificial intelligence image recognition, enabling artificial intelligence systems to process image information based on image position boundaries according to dynamic changes in image information, providing strong technical support for better image information data analysis and image classification.

6 Conclusion

In summary, image recognition technology in the context of artificial intelligence can improve the accuracy, timeliness, and effectiveness of image recognition through deep learning of data models, effectively solving the problems of low accuracy and low recognition efficiency of traditional computer image recognition. In the new era, the application of image recognition technology based on artificial intelligence should, on the basis of further mastering the core technical logic, strengthen the optimization and adjustment of various technical contents, ensure that the application of image recognition technology in the context of artificial intelligence can meet the diversified needs of image recognition processing, and strengthen the overall technical level of image recognition technology from the perspective of artificial intelligence.

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