The Exploration and Research of AI+ Intelligent Machine Vision in Practice Teaching

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Abstract: The rapid development and gradual perfection of artificial intelligence (AI) and intelligent machine vision technology have promoted the expansion of their application fields. And at this stage, AI+ intelligent machine vision has been widely used in practical teaching. Moreover, because artificial intelligence (AI) and intelligent machine vision technology involve many knowledge subjects, it is necessary to explore and study them effectively in order to give full play to their effectiveness in practical teaching.

Keywords: artificial intelligence (AI); machine vision; practical teaching; meaning; exploration

1. Introduction

The "14th Five-Year Plan" and the long-term goal of 2035 require China to gradually realize self-reliance in science and technology and provide strategic support for national development. At the same time, it is required to scientifically lay out the strategic development of relevant cutting-edge technologies, including artificial intelligence technology (AI). At present, artificial intelligence (AI) and intelligent machine vision technology are widely used in practice teaching. Therefore, in order to fully display the value of artificial intelligence, this paper discusses the exploration and research of AI+ intelligent machine vision in practice teaching.

2. Overview of Artificial Intelligence (AI) and Machine Vision

2.1 Overview of artificial intelligence (AI)

Artificial intelligence (AI) is an important technology to simulate the human brain and execute human thinking, mainly through simulating, extending and expanding the scientific and technological forms of human intelligence. Artificial intelligence (AI) involves many disciplines (such as computer, linguistics, psychology, etc.), and its application range is also very wide, such as intelligent robot, intelligent vision, language and image recognition and processing, logical reasoning and professional knowledge base. Artificial intelligence (AI) began in 1950s, and has gone through different stages such as symbolism, connectionism, statistical learning and deep learning. At present, with the continuous maturity of artificial intelligence (AI), it has been widely used in education. For example, the application of artificial intelligence (AI) in teaching practice can effectively monitor students' real-time learning status, thus providing a basis for the rational preparation of teaching plan design.

2.2 Overview of machine vision

Machine vision is an important branch of artificial intelligence (AI), which mainly uses machine vision system to replace human eyes. The technologies involved in machine vision include computer technology, sensor technology, image processing and recognition technology, mechanical engineering technology, optical imaging technology and digital video technology. For example, the image processing and recognition technology in machine vision system can realize classification, segmentation, denoising, feature extraction and recognition.

3. Significance of Practical Teaching of Intelligent Robot Technology under the Background of New Engineering

3.1 Cultivate talents

The purpose of practical teaching is to cultivate talents, and the practical teaching of intelligent robot technology under the background of new engineering is no exception. Based on the current situation of higher education in China and relevant research, the talent training direction of intelligent robot technology practice teaching under the background

of new engineering mainly includes electromechanical system of intelligent robot, kinematics and its control, intelligent machine vision and artificial intelligence (AI) application. Therefore, in order to meet the practical requirements of the new engineering background, it is necessary to scientifically compile relevant courses, such as the operating platform of intelligent robots and the working principles of different components (mainly sensors and actuators), in order to achieve the purpose of cultivating relevant talents of intelligent robots. Among them, the electromechanical system of intelligent robot is generally to train engineering students in the operation of mechanical and electrical systems. The training direction of kinematics and its control is to teach students about dynamics and kinematics of intelligent robots. Intelligent machine vision usually teaches students about visual processing, sensors and visual fusion. For the training direction of artificial intelligence (AI) application, it is generally to teach students to master the relevant algorithms of visual sensor control and machine learning.

3.2 Promote the construction of teaching facilities

Because the practical teaching of intelligent robot technology is a new teaching method, in order to meet the teaching requirements, it is necessary to strengthen the construction of related teaching facilities. For example, combined with the training and teaching practice under the background of new engineering, it is necessary to carry out the construction of related laboratories. Moreover, in order to fully cultivate talents related to intelligent robots, it is necessary to do a good job in the construction of laboratories or related supporting facilities in the fields of dynamics of intelligent robots, wheeled intelligent robots, the integration of intelligent machine vision and sensors, and the application of artificial intelligence (AI). Therefore, it is of great significance to effectively carry out practical teaching of intelligent robot technology to promote the construction of teaching facilities.

3.3 Optimize teaching methods

At present, there are many practical teaching methods of intelligent robot technology, mainly including project guidance, competition to promote learning and case teaching. For example, in the new engineering background, the project-guided teaching method is commonly used in the practice teaching of intelligent robot technology, which mainly combines the teaching requirements, and on the basis of cooperation between schools and related enterprises and full investigation, in order to effectively solve the practical problems existing in enterprises, reasonably set up teaching projects. In addition, it is necessary to set up a project team according to the reality of teaching projects and students' specialties and interests, and carry out project research under the guidance of teachers, including the scheme design, implementation and evaluation of teaching projects. The above fully shows that the practical teaching of intelligent robot technology under the background of new engineering is helpful to the optimization of teaching methods.

3.4 Improve the construction level of teaching staff

Under the background of new engineering, in order to strengthen the personnel training of mechanical engineering related majors, we must attach importance to the construction of teaching staff, including the professional knowledge of academic theory, practical teaching and professional quality. Effectively carrying out the practical teaching of intelligent robot technology is helpful to improve the ability of teachers in engineering practice and solving practical problems. For example, by participating in the project development and production of cooperative enterprises, teachers can find an effective integration point between theory and practice, and also know what talents the enterprises actually need, thus providing a reliable reference for teachers to guide students' learning. In addition, the technical backbone of cooperative enterprises can be invited to the school to carry out practical teaching for students, so as to achieve the goal of full integration of practical teaching and classroom teaching, and it is also of great significance to improve the level of teaching staff.

4. Exploration and Research of AI+ Intelligent Machine Vision in Practice Teaching

The following contents, combined with mechanical engineering specialty, explore the experimental course of AI+ intelligent machine vision practice teaching. Through the reasonable application of relevant teaching methods (such as project guidance, competition to promote learning and case study), the effective integration of theoretical study and practice of mechanical engineering students has been promoted, and obvious teaching results have been achieved and the practical ability of students of this major has been enhanced.

4.1 Design of practical teaching scheme

The teaching scheme design of AI+ intelligent machine vision in practical teaching requires full consideration of students' actual and combined teaching requirements. Under the guidance of teaching projects, the project-related knowledge structure is reasonably decomposed into several teaching modules, and then practical teaching is carried out for students

by reasonably designing relevant cases according to different modules, so as to promote the full integration of students' theoretical knowledge and practical learning, and to enhance students' practical application and innovation ability.

4.2 Practice teaching content

In this paper, the practical teaching of mechanical engineering specialty is explained. Firstly, the teaching content is designed reasonably through project guidance and other teaching methods, and students participate in project teaching in the form of groups, aiming at improving the application and innovation ability of mechanical engineering students. Students majoring in mechanical engineering usually study the knowledge of mechanical structure design in depth, so this paper mainly designs the content of AI+ intelligent machine vision in practical teaching, including hardware and its development, image processing and image deep learning. Specifically, it is manifested as:

4.2.1 Hardware teaching content.

The hardware teaching of intelligent machine vision system includes mastering the hardware composition of intelligent machine vision system (such as camera, lens, light source, etc.), its working principle and matters needing attention in application. In addition, combined with the hardware facilities related to automatic production of mechanical engineering specialty, such as wire bonder and bonding equipment, the application of intelligent machine vision system in automatic production facilities is taught to students, so that students can understand the relevant parameters (such as model, etc.) of hardware facilities and their working conditions, as well as matters needing attention in the selection of hardware facilities. As far as the hardware development of intelligent machine vision system is concerned, it is necessary to create a good development environment for it, and it is required to define the type of development board selected in combination with the actual situation, and its requirements include functions such as image acquisition, receiving and processing, and then realize the recognition of the objects represented by images.

4.2.2 Teaching content of image processing.

The image processing teaching of AI+ intelligent machine vision in practical teaching includes classification, segmentation, denoising, feature extraction and recognition of collected images. For example, the case teaching method is used to classify fruits (oranges and apples). First, students are required to master the relevant knowledge of the case, such as OpenCV programming. Teachers guide students to use OpenCV programming knowledge to classify oranges in fruits through image segmentation, shape and color extraction. Through this interesting case teaching method, it is helpful to stimulate students' interest in learning and deeply understand what they have learned.

4.2.3 Deep learning teaching.

When AI+ intelligent machine vision is used in the deep learning teaching of practical teaching, the deep learning model is established and applied by using the relevant theories of deep learning, so as to promote students' mastery and understanding of deep learning in the process of practical teaching, and use this technology to deal with practical problems. For example, with the help of TensorFlow2 technology, the handwritten numeral recognition model is established. Students can effectively establish the handwritten numeral recognition model by creating deep learning conditions, and combining loss function, activation function and optimizer, which will help students master the working principle of deep learning and realize the different network layer functions in deep learning, thus providing basis for students to solve practical problems.

5. Conclusion

To sum up, the rapid development and gradual perfection of artificial intelligence (AI) and intelligent machine vision technology have promoted the expansion of their application fields. And at this stage, AI+ intelligent machine vision has been widely used in practical teaching. Based on this, starting from the relevant theories, this paper briefly describes the practical teaching significance of intelligent robot technology under the background of new engineering, and explains the exploration and research of AI+ intelligent machine vision in practical teaching.

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