Research on Intelligent Decision-making Method of Metalworking Practice in Colleges

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Abstract

Metalworking practice for college students is the basic training for many kinds of work, including many non-traditional practices. The large data with the characteristics of large-scale, high-speed, diversification, value and so on can provide comprehensive intelligent analysis for the operation of students'metalworking practice, and provide effective data deduction for the achievement of metalworking practice. Break. The intelligent analysis and decision-making system designed in this paper is based on the establishment of standard data sets for students'metalworking practice results, evaluation and analysis through the modelling form of modern artificial intelligence. The modelling tool adopts the Tensorflow framework, which is now better in performance, so that the training process can be controlled. From the results obtained, its training can be seen. The accuracy of practice and verification is good, so it can be considered that the system can improve teachers'teaching methods and school metalworking practice equipment, so that students' practical ability and students'awareness of learning technical knowledge can be improved.

Keywords

Metalworking practice, Tensorflow, intelligent decision making.

1. Introduction

The current education system in China makes the practical ability of college students who pass the college entrance examination weak. Therefore, in the transitional stage of school and society, universities undertake the task of cultivating students'practical ability. Metalworking practice, as a very popular practice in Chinese universities, is an effective way to cultivate students' practical ability. On the other hand, the Chinese government approved the "Twelfth Five-Year Plan for National Government Informatization Construction Project" after the "Big Data Research and Development Plan" was put forward by the United States. Its investment budget will reach tens of billions of dollars successively. It will focus on population, legal person, space, macro-economy and culture. That is to say, China is open to the outside world. The era of big data sharing and AI is coming. It also puts forward new research directions and topics for colleges and universities to introduce new technologies into existing professional and practical courses[1].

Computational intelligence is a new stage in the development of artificial intelligence. It is a general term for solving complex problems inspired by natural intelligence and human intelligence. Compared with traditional artificial intelligence, computational intelligence does not need to establish the greatest characteristics of precise mathematical or logical model problems, and does not depend on knowledge representation, but directly transfers observation data to input information for processing. This feature is very suitable for solving problems difficult to solve in large data analysis[2]. Artificial intelligence theory and technology

have developed rapidly at home and abroad, and experimental tools have also been widely used. Especially Tensorflow framework has been widely used in image processing, pattern recognition, knowledge acquisition, economic management, biomedicine, intelligent control and other fields, and has achieved a series of encouraging results.

1.1. Foundation and Data Form of Metalworking PracticeSection Headings

1.1.1. Knowledge Background of Metalworking Practice

Generally speaking, the metalworking practice projects in CCP colleges and universities mainly include six aspects,see Fig. 1. Casting mainly uses sand and sand box and sample to manufacture products; welding is divided into electric welding and gas welding; turning is for students to carry out turning threads and other workpieces; milling includes milling screw, keyway and so on; benchmarking is carried out by traditional technology; Making small hammer; CNC machine tools including vehicle and milling control language programming to achieve automatic processing parts.

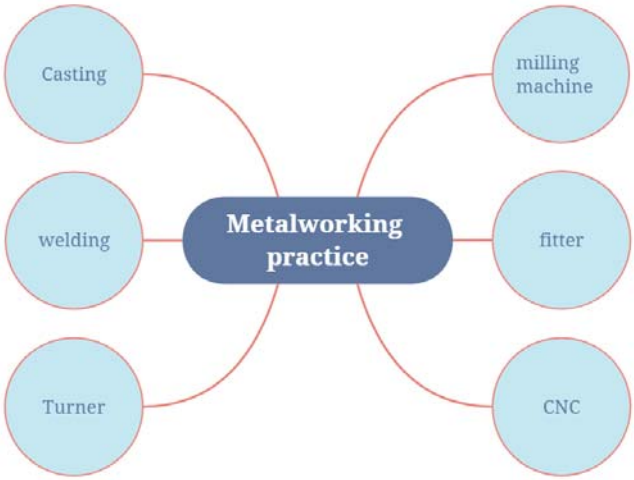

Fig 1. Main processes of metalworking practice

1.1.2. Data Set Form of Metalworking Practice

According to the main characteristics of metalworking practice, the following three principles can be used to collect data. At the same time, the following examples of data sets are given (See Table 1):

(1) to be "complex" enough. If the data selection is too small, there will be a situation of arbitrary conclusion and partial generalization. If there is no complexity in data collection, it will be more than enough to find out the factors and situation analysis that affect students'metalworking practice results[4].

(2) to be "thin" enough. "Detailed" is actually the meaning of granularity. It may not take much time to understand the general situation of all students'metalworking practice, but it is not easy to subdivide the performance of each student's individual metalworking practice, let alone the specific situation of each student's metalworking practice. That's the case. Therefore, in order to achieve "fine", we must try to find different data, carry out qualitative and quantitative screening, it is possible that the data selection span will be relatively large, but it also more tells the question, such as whether students'performance is related to students' gender and personality.

(3) to be feasible. An important thinking dimension of data collection is feasibility. Data collection has many aspects. First of all, we should select valuable data to collect, and which ones are not valuable data, which is the feasibility of data value collection. Secondly, it depends on the feasibility of operation, which data can be collected, and which data is difficult to collect.

Some too specific data during students'metalworking practice, such as the production of fitter blanks and the site wind speed and air dust interference in welding, etc.

Table 1. Data format of welding procedure

Is the arc striking procedure appropriate	Post welding slag	welding a welding rod	Welding current	Learning and practical ability
Is the arc striking device reasonable	Design of reasonable electrode length	Is the welding device stable	Does the power supply meet the requirements	Installation problem (device configuration meets requirement level)
0/1	float	0/1	float	001/010/100

2. Tensorflow Tool Algorithm and Implementation

2.1. Foundation and Data Form of Metalworking PracticeSection Headings

Tensorflow is mainly oriented to the environment where memory is enough to load model parameters, so as to maximize computational efficiency. It supports Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), deep reinforcement learning and computationally intensive scientific computing (PDE solution). After adding XLA, Tensorflow supports convolutional Neural Network (CNN), Recurrent Neural Network (RNN). It can support JIT and AOT. Through Bucketing trick, circular neural network can be realized efficiently,At present, only static graph can be calculated.

The model trained by Tensorflow can be exported through Tendorflow Serving component, and deployed as a RESTful interface to improve forecasting services, thus realizing the framework from research to generation of the whole pipeline:

Training Model - > Debugging Parameters - > Packing Model - > Deployment Service; Tendorflow Serving Component is a high performance machine learning service system designed for production environment. It can run multiple large-scale in-depth learning models at the same time, support model life cycle management, algorithm experiments, and make efficient use of GPU resources.

2.2. Foundation and Data Form of Metalworking Practicesection Headings

TensorFlow updates the model variables. It can operate one data point at a time, or operate large amounts of data at a time. Operations on a training example may lead to a more "weird" learning process, but the use of large quantities of training can result in high computational costs. Which training type to choose is crucial to the convergence of machine learning algorithm. In order for TensorFlow to compute the gradient of variables for back propagation, we must measure the loss of one or more samples. Random training will randomly sample training data and target data to complete training. Another option is to calculate the gradient by taking the average loss from a batch training. The batch training size can be extended to the entire data set at one time. Here we show how to extend the previous examples of regression algorithms using random training and batch training.

In this paper, we construct a CSV format to input the data into the model. After 500 times of training, we form the following results, see Fig. 2.

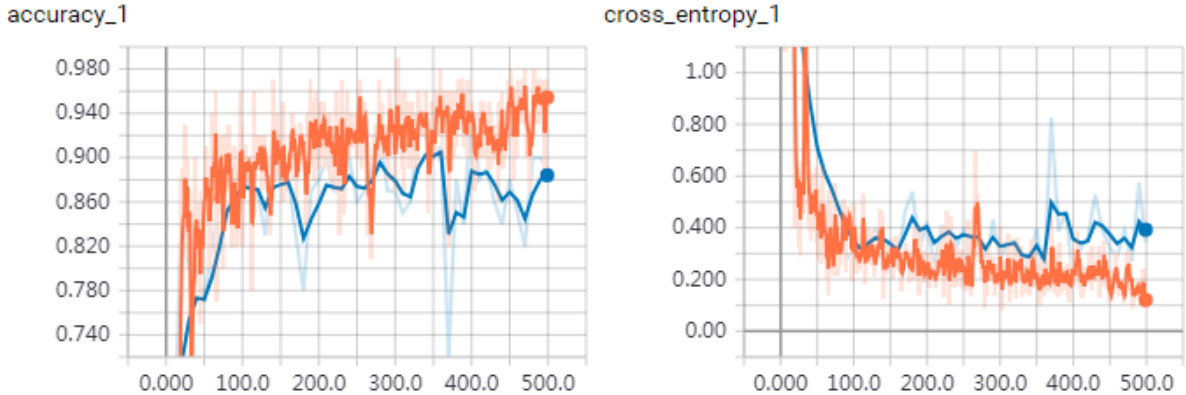

Fig 2. Experimental data results

3. Conclusion

The laboratory in this paper is based on the understanding and analysis of many data. Most of the data are based on the actual situation of metalworking practice in various schools throughout the country. Through model training, we can see that we can better analyze the current level of metalworking practice, and find out what are the most important factors affecting students'performance. These factors determine which aspects need to be improved in the future. For example, nowadays, most of the students in metalworking practice are guided by textbooks and propaganda. What most of the students need is the model hand-held teaching. Especially because of the limited equipment of metalworking practice and the variety of equipment such as metalworking practice, the students can add tens of minutes of micro-class projection before operation. This link, through preschool demonstration, can deepen students'learning impression, broaden students' vision and knowledge, and sometimes appropriate autonomous learning can allow students to have enough imagination and play space.

Acknowledgements

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