

Research on Semantic Extraction of Online Mathematics Guidance Videos in Colleges and Universities Based on Intelligent Information Technology

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Abstract: This article proposes a general solution for multi-granularity semantic analysis and extraction of video data based on the online instructional video of mathematics in colleges and universities of intelligent information technology. In this scheme, multi-level semantic analysis and multi-modal information fusion technology are unified and applied in the same model. This paper first proposes a method for detecting the gradual change of shots based on statistical distribution, and uses a key frame selection strategy with temporal semantic context constraints to represent the temporal content. After basic visual semantic recognition, a hierarchical approach is obtained. The multi-granularity visual semantic analysis extraction framework then uses the sound spectrum obtained by the time-frequency transformation as the observable feature, and constructs a hidden Markov model for semantic recognition of mathematical videos, which improves the efficiency by 7.93%.

Keywords: Semantic Extraction, Mathematics Guidance Videos, Intelligent Information, Big Data

1. INTRODUCTION

There have been some integrations between information technology and teaching, which has promoted the application of information technology in real life. It gives full play to its own characteristics and uses multimedia information technology to process teaching courses, making teaching no longer monotonous, passive and rigid. It becomes more and more vivid, and it has incorporated fresh blood into the mathematics education of modern colleges and universities, and it has become energetic [1-6].

Fuyi mobilized students' interest in mathematics courses, and also brought a different course experience to college students, stimulating their initiative in learning, and improving students' comprehensive level. At the time of play, information technology was still developing continuously, and its integration with modern education was getting closer and closer, creating a good atmosphere for students and promoting the development and progress of mathematics teaching in colleges and universities. In the new era, college education must adapt to the needs of the development of the times, meet the needs of talent training at this stage, and promote the continuous improvement of the quality of talent training. In the actual teaching reform, it is necessary to continuously improve the quality of curriculum teaching and promote teaching reform. Judging from the current teaching of mathematics in colleges and universities, there are still some outstanding problems. For this, in the actual teaching process, necessary reform measures must be taken for the current mathematics teaching in colleges and universities, and innovative ideas of curriculum teaching reform must be introduced to promote Innovative development of curriculum teaching [7-14].

In addition, carrying out the reform of mathematics teaching in colleges and universities can also promote the development of college education, which is of great significance for improving the quality of college education and enhancing the efficiency of talent training. As far as the current college subjects are concerned, it is true that the knowledge learned is rarely applied in practice, but mathematics is indeed a relatively practical subject, and as an important basic subject, it is useful for the learning of other science and engineering knowledge. Important promotion. However, in actual teaching and research, it is often found that students' performance in mathematics classrooms is unsatisfactory. Therefore, how to conduct mathematics education in colleges and universities reasonably and effectively has become the main research topic of current mathematics teaching and research workers. With the introduction and application of the cultural concept of mathematics, it has played a significant role in promoting the development of mathematics education, and has greatly improved the current status of mathematics education. Digitized media information, especially digitized video and audio information, has massive data, which causes great difficulties in the management, storage and transmission of information, and becomes the main bottleneck hindering the effective acquisition and use of information by human beings [15-21].

It takes a lot of manpower to manage video information according to the traditional text data analysis, management, and retrieval methods, and it can't make full use of the rich information content contained in the video. Therefore, traditional text information content description, analysis, management, retrieval and other related technologies are no longer suitable for processing large amounts of video data. Research on related technologies such as data analysis, filtering, summary, and retrieval based on video content has

received widespread attention. Learning with the help of new technologies in Japan is a necessary learning method for students in the new era. It can improve the efficiency of students' learning, learn more efficiently, and also promote the development and progress of information technology. The application of modern information technology in mathematics in colleges and universities is an educational matter, a major innovation and improvement, which promotes educational matters, development and progress, and makes information technology the key to teaching [22-24].

Under the background of "Internet+", relevant colleges and universities are actively exploring relevant mathematics teaching reform paths, and some useful attempts have been made.

2. THE PROPOSED METHODOLOGY

2.1 The Online Instruction Video for College Mathematics

Advanced mathematics courses are not only the main channel for students to master some practical mathematics tools, but also an important carrier for cultivating students' mathematical thinking, mathematical quality, application ability and innovation ability. Professors of advanced mathematics should streamline basic theoretical knowledge, focus on teaching calculations and the application of mathematical methods, and strengthen the practical application of mathematical knowledge. Teachers should grasp the functions of the mathematics information teaching platform system, compare the traditional teaching mode, and emphasize the role of the "one level and three terminals" system in modern teaching by using information technology. Mathematics teachers should master the effective application methods of relevant information-based teaching platforms, effectively help teaching through the in-depth integration of information technology, the Internet and education, and solve the integration of the construction and application of various online courses and the management of teaching resources.

This architecture effectively solves the problem of insufficient front-end processing capabilities, and greatly improves system stability. It is more suitable for large-scale security sites, and the performance requirements of back-end servers are relatively high. This is also a problem we need to solve, so here we mainly discuss the commonly used video analysis system based on the back-end server. That is, the front-end uses a camera to capture images, and then sends them back to the video analysis server through the network. The combination of middle-level features and deep-semantic features to improve the network's detection capabilities and positioning accuracy for small targets. When MS-CNN detects images with a resolution of 1250*375 in the KITTI data set, it will be detected under the acceleration of the Titan X GPU. The speed reaches 10fps; the third type of improvement strategy focuses on improving the performance of the feature extraction network. The representative algorithms are the improved Faster-RCNN and R-FCN of Ren S. Among them, the improved version of Faster-RCNN uses the ResNet network Instead of the VGG network, R-FCN uses ResNet-101 as a pre-training model and uses a convolutional layer instead of a fully connected layer, which is 2.5 times faster than Faster-RCNN.

Before digital calculation and recognition of video images, it is necessary to perform preprocessing such as gray scale transformation, image thresholding and image segmentation to reduce the amount of computer calculations and extract

effective information. Usually, the video image is originally a true color image, that is, an RGB image, and each pixel of it is composed of the three primary colors of R, G, and B. Because of the huge amount of calculation to directly process the true color image, the analysis efficiency is low.

2.2 The Intelligent Information Technology

First, rely on the cloud computing platform to build a teaching platform for big data experiments. Use Hadoop and HDFS to build an experimental teaching platform for big data analysis, management, and storage, and build a network virtual laboratory based on the cloud platform. Install a computer operation record crawler in each student experiment machine, record all the students' operations during the entire experiment process (experimental operations on the virtual platform and all operations outside the platform), and upload them to the cloud platform. The cloud platform uses data mining and machine learning techniques to model historical experimental data and adjust the functions of the existing virtual platform. For example, the data of new students who use the virtual platform, such as providing auxiliary knowledge needed by students during the learning process, are also crawled Send to the cloud platform for processing in real time. The model analyzes the problems according to the current steps of the students' operations, and feeds them back to teachers and students in real time, helping teachers understand the students' experiments and correcting problems in the students' experiments in time. The operating data generated during the use of new users is also recorded, and the intelligent model is constantly revised.

2.3 The Semantic Extraction of Online Instruction Videos for Mathematics in Colleges and Universities

This system is planned to be implemented using a B/S structure based on the Internet. Users use the system through various browsers without installing any plug-ins on the machine, which is convenient for users to use. The server uses Apache or Nginx as the web server, and the Python language and MySQL database are used to implement system functions. The corpus can use the existing corpus, or use a web crawler to obtain the data we need from the Internet to form a corpus. Use Word Net, VerbNet and FrameNet for semantic analysis, and finally use MySQL for data management, including database establishment, query, backup and update.

In order to further promote the process of informatization of college education and promote the integration and application of high-quality digital teaching resources (teaching software) and teaching, it is necessary to strengthen the training of mathematics teachers from different perspectives of teacher growth and development, and actively organize teacher teaching ability competitions to make teachers clear The meaning of information application capabilities. As a teacher of higher mathematics, you must keep up with the development of the times and the industry, update your knowledge, improve your educational technology application and teaching innovation ability, and promote the continuous development of college education and teaching reform. Aiming at the innovative application of advanced mathematics teaching in the background of "Internet +", it is necessary to improve the effectiveness of classroom teaching as the goal, and on the basis of ensuring the scientific and continuity of teaching content, deep integration of modern information technology, and running it through the class. During and after class, the whole teaching process. Teachers

should learn to use vocational education MOOCs, micro-classes, animations, mathematics software and other diversified teaching platforms, teaching software, and effective application of teaching resources to promote online in an observable, sensible, readable, movable, and measurable environment the combination of teaching and learning is more complete, showing advanced teaching concepts and excellent teaching capabilities. At the same time, in the process of informatization teaching, teachers should pay more attention to the presentation of real classroom teaching, try to explore a variety of classroom teaching practices that connect or stack information technologies, and focus on students to improve the practicality of informatization classroom teaching. applicability.

3. CONCLUSION

Research on the method of lens boundary detection for mathematics teaching videos based on statistical distribution: using scalable color descriptors as the feature quantity to represent the discontinuity of visual content, based on the variance distribution characteristics of each gradual type, using the statistical distribution of visual discontinuities and the variance distribution of the image frame to distinguish the shot boundary and perform the gradual type recognition. The existing video motion object segmentation technology is used to extract the moving objects in the video. According to the standard, the main low-level feature classification used for semantic extraction is extracted.

4. REFERENCES

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