School and Enterprise Cooperation Based on Artificial Intelligence Technology

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Abstract. To solve the problem of "weak engineering teaching ability". This paper discusses the new concept of higher engineering education reform based on the deep integration of schools and enterprises. The concept is government-led and promotes the personnel training mode of cooperation between universities and enterprises.We proposed establish a supporting system by leading role of the government, a fruitful attempt by colleges and universities, measures for collaborative talent training of enterprises and other solutions. To improve the video quality of online meetings during the school-enterprise collaboration, we designed a Channel and Spatial Stretch Image Denoiser (CSSD). Finally, we come to the conclusion that our method is good for solving problem of "weak engineering teaching ability" and CSSD has also provided strong help for the development of our school-enterprise cooperation.

Keywords: Education reform · Training mode · Talent traini · Image denoiser

1 Introduction

The joint training of enterprises and universities will help improve the training system of innovative high-quality talents and provide a strong impetus for the rapid development of the new economy. To strengthen school-enterprise cooperation, we designed CSSD based on artificial intelligence technology to improve the quality of video communication in school-enterprise cooperation. Specifically, CSSD mainly contains a channel stretch module (CSM) and spatial stretch module (SSM) for image denoising. CSM filters redundant features of the channel dimension by transforming the channel dimension. SSM embeds pooling operations and up-sampling operations into discriminative learning to eliminate the influence of invalid information. They refine the features in the space dimension and the channel dimension respectively and balance the contradiction between performance and complexity.

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2 Problems in the Existing Teaching Mode of Engineering Major

2.1 Insufficient Experience of Engineering Instructors

At present, the problem of "weak engineering teaching ability" exists in engineering education in general. Although universities have consciously introduced teachers with engineering practice backgrounds to strengthen engineering education, most of the technical experts with rich engineering experience will choose to stay in enterprises because of the relaxed environment and high salaries of enterprises. And highly educated talents who are starting their careers in enterprises have a weak accumulation of engineering project experience, they rely on existing educational materials for learning to a considerable extent [1]. However, the relatively delayed updating of textbooks leads to the lack of predictability and practicability of teaching content, and students often feel confused because of learning without using it.

2.2 The Mechanism of Joint Construction Between Schools and Enterprises is not Perfect

The development of new engineering is faced with the problems of insufficient integration of industry-university-research and unsound joint mechanism, which makes the university-enterprise cooperation still limited to a loose, shallow and simple mode. A practical project is the most common form of division of labor in school-enterprise cooperation. However, there is less communication between them, and they inevitably fall into the dilemma of "each one does his thing". In addition, many enterprises consider that the investment cost of school-enterprise collaborative education and professional co-construction is high and the reward income is low, so the motivation to participate is insufficient [2].

Therefore, we should further deepen the concept of universities to conduct applied scientific research oriented by market demand and form a long-term mechanism of deep integration between universities and enterprises, as shown in Fig. 1. It is urgent to improve the higher engineering education system that integrates industry, academia, and research, and to continuously follow up the emerging industries.

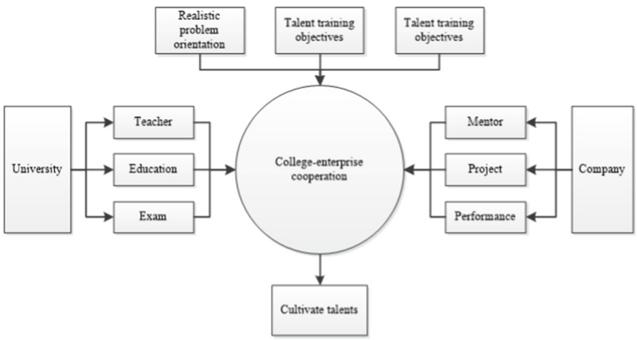

Fig. 1. Outline of School-enterprise cooperation

3 Promote Integration of Schools and Enterprise for Deeply Sharing

3.1 Establish a Supporting System by Leading Role of the Government

The leading role of the government is an important guarantee to promote the reform of talent training mode. First of all, the government should issue relevant special support policies, and gradually improve the market demand-oriented support system. Secondly, we should formulate an overall coordination mechanism, encourage enterprises to provide students with a practice platform and ensure that both parties share intellectual property rights and share interests, and risks. Finally, set up special guiding funds, improve the input system of the government, enterprises, and society, and ensure the virtuous circle of in-depth integration of universities and enterprises to cultivate talents.

3.2 A Fruitful Attempt by Colleges and Universities

The NETD highlight the diversification of ability training objectives, which requires students not only to master the necessary professional skills but information ability, intellectual ability, comprehensive ability, etc. [3]. So, it is urgent to explore a multi-dimensional training system of "both engineering practice ability and innovation ability".

1) Innovative curriculum planning system.

The talent training system of colleges and universities should be centered on the lifelong development of students, and the curriculum should be designed in a top-level way. Referring to the process of engineering education accreditation, determine the learning objectives and contents according to the technical competence requirements for the employed personnel. For example, the innovative practice education module is added to the curriculum and corresponding credits are set.

2) Implement flexible and diversified teaching modes.

The goal of teaching in higher education is to enable students to master basic theoretical knowledge and develop their sense of innovation and practical engineering skills. The traditional classroom is teacher-centered and tends to disseminate more knowledge to students more effectively, which does not exercise students' ability of discernment and exploration well. The development of "Internet plus education" technology has shaken the traditional one-way indoctrination teaching method and added various teaching methods such as online teaching, private classroom, and flipped classroom [4] to encourage students to integrate the idea of dual creation into the classroom and achieve the goal of cultivating students' innovation and practical ability.

3) Reform the course assessment method.

The traditional assessment method focuses on test scores and usual grades, which cannot objectively reflect the teaching quality of teachers and is not conducive to the formation of good closed-loop feedback of teaching. Under the new engineering background, enterprises pay more attention to students' comprehensive qualities such as thinking and analyzing ability, practical and hands-on ability, and teamwork spirit. Therefore, the comprehensive projects of enterprises can be part of the assessment results, to reduce the proportion of test grades, give full play to students' subjective initiative, and activate the endogenous motivation of students to investigate.

4) Reshaping the incentive mechanism of teachers.

Universities and enterprises are deeply integrated into the acquisition and utilization of information resources, research and development and application of new technologies, personnel training, and skills training, etc. Improving the achievement evaluation system and encouraging teachers to participate in the development and upgrading of enterprise [5] engineering projects will help realize the complementary advantages and effective docking of university scientific research resources and enterprise market resources. In addition, colleges and universities can issue salary allowances and performance rewards according to the assessment and evaluation of teachers' part-time jobs in enterprises, and tilt the scientific research resources to excellent teachers moderately, to encourage teachers to actively explore their potential and guide students' growth.

3.3 Measures for Collaborative Talent Training of Enterprises

The advanced technical support and high-quality talent resources of universities promote and support the upgrading of local industries, while the reform and development of university education cannot be separated from the strong support of local industries. Enterprises are encouraged to select middle and senior engineers to participate in the talent training of universities. They establish role models for students with their own research experiences and help students reconstruct their knowledge systems [4].

According to the principle of "balance between industry and education", the university and enterprises jointly set up a comprehensive laboratory. The laboratory research equipment is expanded according to the needs of the subjects jointly carried out by both parties, thus achieving the purpose of resource sharing and internal and external complementarity. Teachers and students participate in enterprise skills training, which not only deepens the integration of theoretical knowledge but also strengthens their business level. At the same time, enterprises can make use of the scientific research strength of universities to carry out in-depth development and research of new products, realizing mutually beneficial cooperation between schools and enterprises.

An internship is the beginning of an individual's career, but internship opportunities are rare and are usually only available to senior students in practice. Therefore, companies collaborate with universities to develop training plans and arrange suitable practical sessions according to students' learning progress. At the same time, engineering projects are regularly opened for students to apply and complete independently. The mentor of the enterprise is responsible for technical questions and answers, progress supervision, and assessment evaluation.

4 Experiments

In the context of COVID-19, a large number of online meetings are bound to appear in the process of our school-enterprise cooperation. So, in view of the image denoising problem inevitably encountered in an online meeting, we propose a Channel and Spatial Stretch Image Denoiser (CSSD) to improve the efficiency of communication between universities and enterprises. The framework is shown in Fig. 2.

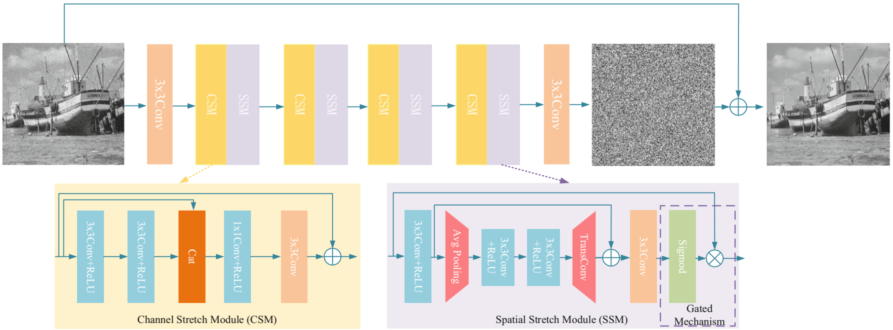

Fig. 2. Network architecture of CSSD

Table 1. Average PSNR (dB) of popular denoising methods on BSD68 with different noise levels.

Method	BM3D [9]	WNNM [10]	TNRD [11]	DnCNN [12]	CSSD(Ours)
$\sigma = 15$	31.07	31.37	31.42	31.73	31.79
$\sigma = 25$	28.57	28.83	28.92	29.23	29.29
$\sigma = 50$	25.62	25.87	25.97	26.23	26.32

4.1 Datasets

During the training process, we employ the Berkeley segmentation dataset (BSD) [6], which contains 432 natural images, to form a synthetic noisy training dataset. To accelerate the training process and enlarge training datasets, each image is randomly cut into 2,100 image patches with a size of 48×48, and we get 907,200 image patches for training synthetic gray denoising models. Additionally, we randomly use a one-way data augmentation with eight ways to make training images richer, mentioned eight ways can be shown as literature [7]. For the test process, synthetic noisy image test datasets are chosen BSD68 [8], to test gray Gaussian noisy image denoising models.

4.2 Comparisons with State-of-the-Arts

We analysis the denoising performance of CSSD both on quantitative and qualitative. The quantitative analysis is that comparing the peak signal-to-noise-ratio (PSNR) with competing denoising methods, i.e., block-matching and 3-D filtering (BM3D) [9], weighted nuclear norm minimization method (WNNM) [10], trainable nonlinear reaction diffusion (TNRD) [11] and a denoising CNN (DnCNN) [12]. As our data in Table 1, the CSSD achieves the best results at 15, 25 and 50 noise levels.

5 Conclusion

In a word, the deep integration of schools and enterprises is a long-term systematic project, which requires the government, universities, enterprises, and other parties to take a long-term perspective, work together, focus on industrial needs, fully integrate resources such as scientific research and market, make overall arrangements for communication and coordination, and jointly build a complete platform and space for mass entrepreneurship and innovation. Cooperate to break through key core technologies and accelerate the integration and docking of discipline chain, talent chain, industry chain, and innovation chain; Expand the depth, breadth, and path of serving the society, and solve various problems existing in previous engineering education. It is our researchers' unremitting pursuit to build a new pattern of open, sustainable, and efficient talent training, help promote the deep integration of industry, education, and research, and jointly build a new highland of mutual benefit and sharing. Finally, our experimental results have proved the effectiveness and progressiveness of our CSSD network structure, and CSSD has also provided strong help for the development of our school-enterprise cooperation.

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