

Research on the Construction of Artificial Intelligence Undergraduate Major in Colleges and Universities

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Abstract: Promoting the rapid development of artificial intelligence (AI) is currently an important strategic policy for our country's technological progress, and cultivating professional AI talents faces many requirements and challenges. This paper focuses on the construction of AI major in colleges and universities, and discusses the critical problems of professional development with corresponding solutions from the perspective of undergraduate teaching in the context of engineering education accreditation. Through the analysis on several aspects, such as the construction of AI curriculum system, the strengthening of faculty and the direction of discipline characteristics, we propose ideas and suggestions to improve the cultivation system, promote the development of the major and cultivate more high-quality professionals.

Keywords: Artificial Intelligence (AI); Professional Construction; Curriculum System

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1. Background

In recent years, artificial intelligence (AI), an emerging information technology, has been developing rapidly and has had a huge impact in all aspects of production, life, military and medical care. AI has become an important part of our national development strategy, which is related to the position in international competition and the guarantee of national security^[1]. In order to accelerate the development of AI industry, the Ministry of Education proposed to continuously promote the construction of AI disciplines in higher education and increase the training of AI professionals. Many universities have started to set up AI major, and our university also adopted a professional construction program in 2019, with official enrollment in 2020. Since AI is classified as an engineering major, it should follow the concept of outcome-based education (OBE) which is advocated by the accreditation of engineering education, in order to cultivate talents scientifically and effectively. This emerging major faces considerable challenges to establish a healthy training system in a short period of time. In the literature of AI construction programs, some of the key issues have been discussed. Zhou et al. proposed new ideas on the construction of professional training system for AI^[2]. Qiu et al. explored the professional construction model of AI, focusing on the problem of insufficient practical skills^[3]. Liu et al. proposed several initiatives for AI collaborative education^[4]. This paper mainly analyzes the construction of the curriculum system, the development of faculty, the direction of discipline characteristics, etc. Combining with the construction experience of our university, we put forward the ideas of professional construction, aiming to continuously improve the training level of talents in AI.

2. The challenges of AI professional construction

2.1 Less experience in AI curriculum system

Since most colleges and universities have established the AI major for a relatively short period of time, less experience has been

accumulated in professional construction. Many universities offer the major as a graduate one, which is relatively difficult while requiring a solid foundation in mathematics and science. The curriculum system is still immature, and the AI major currently belongs to either computer class or electronic information class whose emphasis is different. How to make reasonable adjustments to the curriculum at the undergraduate level is the main problem we are currently facing.

2.2 Highly demanding faculty level

The specialized courses of AI are novel and difficult compared with traditional majors. To ensure the quality of education, teachers are first required to master solid professional knowledge. It should also be noted that specialized courses are constantly updated with the latest advances each year, and that a strong ability of updating knowledge is required of teachers to train qualified professionals. Because of the close combination with industry, the technology of AI has the characteristics of fast implementation. Professional students should master not only the theoretical knowledge, but also good practical skills. Hence, teachers have to capture the dynamics of industrial development.

2.3 Emphasis on cross-disciplinary

AI currently plays a huge role in the transformation and upgrading of many traditional fields, thus the cross-fertilization of disciplines is necessary, and “AI+X” is an important initiative for national development. This also raises the difficulty of learning, as one must be very familiar with both AI and “X” professions and have the necessary theoretical foundation to reasonably integrate the disciplines. On the teaching system, the cultivation program for interdisciplinary intersection should be reasonable and effective. The logical structure, curriculum and training objectives between the professional and cross-integrated parts of AI should meet the capability requirements and talent needs.

3. AI professional development measures

3.1 Curriculum system construction

Curriculum system construction is the key to professional talent training and plays a leading role in professional construction. Due to the less experience in the construction, many universities are trying to figure out how to make a reasonable setting. In this paper, we take Anhui University of Finance and Economics as an example to introduce our ideas in curriculum construction. In accordance with the Ministry of Education’s discipline category, we are enrolling in the AI major in electronics and information class, focusing on developing students’ comprehensive abilities from bottom-level signal acquisition to high-level data analysis. The structure of the professional courses is divided into four main categories. Among them, the general education category mainly includes general education compulsory courses and general education elective courses; the subject specialization category consists of subject foundation courses and professional core courses; the personality development category primarily includes professional advancement courses and professional development courses; the practice category mainly contains innovation and entrepreneurship practice, comprehensive experiment and extracurricular practice.

Based on this structure, specific courses of different categories are set up from the cultivating objectives. For example, the general education compulsory courses primarily comprise of ideology and politics, mathematics, English, and information technology applications, etc. Among the subject foundation courses, college physics, circuit analysis and artificial intelligence language are distributed in the second and third semesters, and courses on artificial intelligence, machine learning and signal system analysis are mainly arranged in the fourth semester. The professional core courses, e.g., neural network and deep learning, data mining and data warehouse, speech signal processing and digital image processing, cultivate students’ abilities from the professional core application fields. The professional advanced courses combine typical application scenarios, including block chain and electronic money, unmanned systems, cloud computing and Internet of Things technologies, etc. The professional extension courses provide interdisciplinary professional courses, such as finance, securities investment, operations research. Innovative and entrepreneurial practice cultivates students’ comprehensive and innovative abilities through principles and practices of entrepreneurship, career planning, and disciplinary competitions. Comprehensive experiments provide a number of practical training courses, emphasizing the enhancement of practical level.

3.2 Faculty development

The improvement of teaching level, which is necessary for the development of professional construction, requires effective and efficient teacher training. At present, several provinces and cities have carried out teacher training in AI, mostly concentrated during the holidays. By organizing teachers to attend training, we can quickly improve their professional quality. At the same time, the collective preparation of lessons by course groups is also an effective means to improve the quality of teaching. The exchange of teaching

problems and the discussion of teaching contents can solve a series of problems that arise in teaching. According to the construction experience of various universities in several engineering majors, collaborative education between industries, universities and research is an important initiative in line with the development of current times. Through joint research and teaching with enterprises, we can give full play to our respective advantages, provide students with more comprehensive teaching resources, exercise in practice and develop in scientific research.

3.3 Discipline characteristic direction

In the construction of AI major, how to highlight the direction of discipline characteristics should be in accord with the features of the university and the structural configuration of the majors. Our university belongs to the financial institutions, and is also vigorously developing engineering majors. Therefore, the main characteristic directions of our AI major are two blocks of “AI + finance and economics” and “AI + electronic information engineering”. The former mainly combines with finance, accounting, economic and management majors to cultivate financial talents who master the emerging information technology and adapt to the new needs of financial majors. As the electronic information class of our university consists of electronic information engineering major and AI major, both of which belong to the same major category and are closely related to each other in themselves, so they are also combined as another characteristic direction.

4. Conclusion

With a national emphasis on fostering the industrial growth of AI, the construction of AI major in colleges and universities has been given a substantial opportunity to grow rapidly. At the same time, it is confronted with several problems. The main topic of this paper is how to hasten the growth of AI major, including curriculum system construction, faculty development, and discipline characteristic direction. We hope to put forward constructive opinions to promote the rapid development of AI major and cultivate more compound talents with professional knowledge.

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