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Research on Big Data Talent Cultivation for the Maritime Industry of Jiangsu Province

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Abstract: China, as the global leader in data resources, has witnessed the integration of big data across multiple sectors. Intelligent shipping stands as a cornerstone for a robust transportation network, underpinned by pillars like "Cloud, Big Data, IoT, and Mobility." Situated along the coast and the banks of the Yangtze River, Jiangsu boasts a prime segment of this waterway, leading the nation in cargo throughput. As the intelligent shipping sector in Jiangsu emerges, there's an acute demand for adept professionals who can seamlessly blend shipping insights with the nuances of next-generation information technology. Despite the shipping industry's digital metamorphosis, there's a palpable void of shipping big data professionals. This paper delves into the present landscape of shipping big data talent development, pinpoints challenges, and proffers solutions, all with the objective of fortifying and evolving the big data talent nurturing framework for Jiangsu's shipping sector.

Keywords: Big data technology; maritime industry; talent cultivation system; integration of industry and education; double-qualified teacher.

1. Current Situation Analysis

With the roll-out of national initiatives like "Shipping Power", "Digital Shipping", and "New Shipping Infrastructure Construction", the water transportation industry is undergoing a transformative shift towards digitization, connectivity, and intelligence [1-2]. Employers within the shipping domain grapple with an influx of innovative technologies, models, and business paradigms. There's an acute need for versatile talents who are well-versed in water transportation management and optimization and adept at big data processing, AI algorithms, and computer science. The demand for professionals with dual expertise in shipping and big data is palpable.

Jiangsu province, strategically located at the Yangtze River's estuary, possesses unmatched water transport assets. Its locus on the prime stretch of the Yangtze River accords it a distinct advantage in shipping endeavors. As the leading province in China for cargo throughput, Jiangsu's shipping industry is pivotal for bolstering regional economic prosperity and influencing the nation's trade configuration [3]. Propelled by the "Digital Shipping" blueprint, Jiangsu's shipping industry is on a brisk march towards digitization, connectivity, and intelligence. This digital pivot compels shipping enterprises to harness big data tech more effectively, sift through colossal datasets, and elevate transport efficiency and service caliber. Amidst this evolution, the call for professionals skilled in both shipping operations and big data intensifies, signaling their role as linchpins in the digital shipping journey. Big data shipping experts emerge from an interdisciplinary blend of big data analytics, shipping and port management. Addressing the intelligent shipping industry's talent needs mandates fostering proficient talent equally adept in shipping operations and big data realms.

Currently, numerous tertiary institutions in China provide Intelligent Transportation majors, which predominantly cater to land-based transportation [4]. These courses epitomize the hallmark traits of modern engineering disciplines, seamlessly merging digitization, information technology, and intelligence, and encompassing transport modalities, information systems, control mechanisms, and computing sciences. Yet, when juxtaposed against talent development in land-based transport, the shipping domain lags notably, a disparity further magnified in today's digital age. The shipping sector embarked on its digital voyage slightly later; the broader consciousness and grasp of intelligent shipping remain nascent, leading to a superficial understanding of talent requisites. Predominant talent cultivation paradigms stem from traditional academic molds and falter in addressing the shipping industry's requirements in big data analytics and AI. Regrettably, top-tier talent in shipping big data often gravitates towards the tech sector, leaving Jiangsu's maritime domain underserved. Furthermore, the maritime big data arena calls for holistic professionals, bridging maritime operations, logistics, and IT. Yet, many academic institutions persist with siloed training models entrenched in conventional disciplines.

2. Problem Analysis

2.1. Talent cultivation system issues

The cultivation of talent for intelligent shipping is the result of interdisciplinary overlap between big data and shipping management, among other subjects. It requires students to not only possess in-depth knowledge of the maritime transport domain but also to be familiar with big data processing techniques and intelligent application methods. This composite talent cultivation model can better meet the needs of the intelligent shipping industry's development, enabling individuals to more flexibly employ big data technology in practical applications to address complex shipping management challenges. Despite the growing demand for talent in intelligent shipping, the existing vocational education mechanisms still continue, to a certain extent, the traditional notion of distinct disciplines, lacking adequate interdisciplinary integration. Students usually focus either on maritime transport practices or big data practices during their education, without adequate training that combines both. This

results in difficulties for students to truly grasp how to solve real-world intelligent shipping challenges using big data tools.

2.2. Issues with practical training and practice conditions

The field of shipping big data requires students to possess practical skills in shipping big data collection, processing, analysis, storage, and visualization. However, the current conditions for practical training are insufficient. There's a lack of experimental equipment for the collection and processing of massive maritime data, making it impossible for students to realistically simulate shipping big data scenarios. This has limited the cultivation of their practical abilities.

2.3. Teacher issues

The complexity of the shipping big data field requires teachers to have interdisciplinary knowledge and skills, capable of integrating maritime management with big data technology. However, since this is an emerging domain, teachers might have limited experience and background in both the maritime and big data fields. This makes it challenging for them to comprehensively guide students in interdisciplinary learning and practice.

2.4. Industry-education integration issues

Talent cultivation in the shipping big data field requires close collaboration between the industry and universities to ensure the training of professionals who meet the actual industry demands. However, there's a deficiency in the integration of industry and academia concerning shipping big data talent training, leading to a significant disconnect between talent cultivation and actual employment needs [5]. Both maritime enterprises and universities lack effective mechanisms for interdisciplinary collaboration, resulting in challenges in pushing forward with cross-disciplinary talent development.

2.5. Teaching resources issues

The shipping big data field requires abundant teaching resources, including textbooks, case studies, and experimental platforms, to support students' learning and practice. However, there might currently be a shortage of teaching resources related to the shipping big data domain. This leads to outdated teaching content that cannot promptly adapt to the rapidly changing demands of the industry.

3. Suggestions

3.1. Optimize the talent cultivation system

In order to meet the development needs of the smart maritime industry, it is crucial to optimize the maritime talent training system. By cooperating with enterprises on projects, conducting joint research, and sharing resources, we can ensure that talent training matches the actual industry needs. Shipping enterprises can provide practical cases, data, and technical support, while universities are responsible for cultivating students' knowledge and practical abilities. It is recommended to establish a dedicated shipping big data discipline, formulate a curriculum system that meets industry needs, including maritime knowledge, data analysis technology, artificial intelligence, etc., to cultivate shipping big data talents with comprehensive qualities. Develop interdisciplinary courses that integrate information technology and maritime management, enabling students to fully understand the knowledge and technology in the shipping big data field. Course content should include basics of shipping, big data processing, artificial intelligence algorithms, etc., to cultivate students' multidisciplinary literacy.

3.2. Strengthen practical teaching

The importance of practical projects cannot be overstressed. Through actual cases and projects, students can apply big data techniques in real scenarios to solve smart maritime problems. Practical projects can be collaborations with enterprises or simulated projects, allowing students to hone their abilities through hands-on operations.

Establish a shipping big data experimental platform that offers a big data processing platform, massive maritime data, and simulation experiment equipment. This allows students to conduct hands-on operations in a realistic environment, cultivating their practical skills and problem-solving capabilities.

By utilizing virtual simulation technology, we can create virtual shipping big data scenarios. This enables students to conduct hands-on operations in a virtual setting, compensating for the lack of actual equipment.

Collaborate with maritime enterprises to carry out real projects, allowing students to participate in genuine data collection and processing tasks, thereby enhancing their hands-on operational abilities.

3.3. Enhance the capacity of dual-qualified teaching staff

Collaborate with maritime enterprises and hire experts with extensive practical experience in the shipping big data field as part-time instructors. These experts can bring the latest industry trends and real-world cases into the curriculum, making the teaching content more relevant to actual situations.

Establish a collaborative mechanism between universities and maritime companies to promote exchanges between academia and the industry. University instructors can regularly visit companies for field investigations and discussions, gaining hands-on operational experience, which can then be used to guide students better.

Organize training and exchanges for dual-qualified instructors to enhance their hands-on capabilities and fortify their teaching methods and material innovation. University instructors can gain insights from industry practices, while industry experts can familiarize themselves with the latest teaching methods.

Provide interdisciplinary training for existing instructors, allowing them to gain comprehensive knowledge in both the maritime and big data sectors. Through this training, instructors can better integrate cross-disciplinary knowledge into their teaching. Encourage these dual-qualified instructors to undertake research projects related to shipping big data while teaching. Integrating research with practical applications can elevate teaching standards and deepen academic research.

Integrate real shipping big data cases into teaching, allowing students to understand industry challenges and solutions. Dual-qualified instructors can share their real-world experiences, assisting students in better understanding and applying their knowledge.

3.4. Deepen the integration of industry and education

Establish a joint research center for the cultivation of talents in shipping big data, bringing together university teachers, students, and professional talents from enterprises. This promotes collaboration among universities, enterprises, and research institutions, jointly researching frontier issues in the industry and achieving deep integration of industry, academia, and research. Collaborate with maritime enterprises to establish labs and studios, providing practical operation platforms. Students can carry out data processing and simulation experiments in the labs, gaining more hands-on experience. Launch joint innovation projects where universities and enterprises collaboratively develop innovative solutions to industry challenges. The implementation of these projects can combine academic research with practical applications, promoting deep integration of industry and academia.

Universities and maritime enterprises collaboratively design and develop related courses to ensure that the teaching content closely matches industry needs. Integrate real-world industry cases, data, and technology, enabling students to apply what they learn in courses and cultivate practical application skills. Cooperate with maritime enterprises to set up internship and training projects, allowing students to hone their skills and apply their knowledge in a real work environment. Enterprises provide hands-on guidance and feedback, assisting students in better understanding industry needs. Establish an industry mentorship system, with industry experts acting as mentors for students, providing guidance and training. Mentors can share real-world experiences and provide industry insights, helping students stay updated with industry trends.

Construct a communication platform, set up industry forums, lectures, and other platforms to foster the combination of academia and practice. Strengthen information communication between schools and the industry, ensuring talent training aligns with employment needs. Regularly organize expert lectures and seminars, inviting maritime industry experts and business representatives to share their experiences and insights. This not only broadens students' horizons but also promotes deep integration of industry and academia.

Implement a real-time feedback mechanism, allowing enterprises to regularly assess students' internships and projects. This ensures timely adjustments to the training program, ensuring the direction of student training remains consistent with industry needs.

3.5. Schools and enterprises collaboratively build teaching resources

Colleges should collaborate with maritime enterprises to jointly build databases in the field of shipping big data. These databases can contain shipping data, cases, reports, etc., providing students with actual data and materials, helping them to better carry out analyses and research. By cooperating with maritime enterprises, universities can collect real-world cases and issues, integrating them into textbooks, ensuring that the content of the teaching materials evolves in tandem with the industry's development. By collaborating with maritime enterprises on actual projects and involving students, universities can facilitate the application of the knowledge students have learned in real projects, nurturing their practical operational capabilities. Developing virtual simulation platforms allows students to conduct experiments and operations related to shipping big data in a virtual environment. This compensates for the limitations in actual equipment and experimental conditions, offering more practical opportunities.

Colleges could make their teaching resources open and shared, establishing platforms for teachers and students to communicate and share with each other. Simultaneously, by collaborating and sharing resources with other universities, they can expand the coverage of teaching content.

4. Conclusion

Shipping big data, as an essential driving force for the future development of the maritime industry, urgently requires skilled professionals for support. By optimizing the talent cultivation system, strengthening practical aspects, promoting the integration of industry, academia, and research, as well as building communication platforms, Jiangsu Province can better meet the demands for shipping big data professionals. This in turn would propel the digitization and intelligent development of the maritime industry, injecting new impetus into regional economic growth. Governments, universities, and enterprises need to work together to jointly promote the vigorous development of the shipping big data talent cultivation initiative.

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