Big Data Monitoring Application Based on Multi-Source Heterogeneity Helps the Construction of Modern Marine Pasture

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Abstract: In recent years, the construction of marine ranches in China has entered a rapid development stage, gradually advancing towards deep and distant sea areas. Considering the complexity of the deep-sea environment and the need for marine ecological protection, it is necessary to introduce multi-source heterogeneous big data monitoring technology to achieve comprehensive collection and accurate detection of marine environmental data. In order to further scientifically develop marine resources and expand the construction of marine ranches, this article analyzes the collection and integration of multi-source heterogeneous big data and intelligent monitoring of marine environment based on big data. It explores the application strategies of big data in breeding varieties and ranch operation management, in order to promote the construction and development of modern marine ranches.

Keywords: Multi-Source Heterogeneity; Big Data Detection; Ocean Ranch

Preface

The construction of marine ranches is a complex system engineering involving multiple aspects. In order to achieve efficient and sustainable development, it is necessary to use scientific and advanced big data technology to comprehensively monitor and manage the marine environment, integrate information, investigate and statistically analyze fishery resources, finely manage the aquaculture production process, and trace the quality of aquatic products. Through the integration and analysis of multi-source heterogeneous big data, we will deeply explore the operational rules of marine ranches, and build a scientific and comprehensive data platform to achieve the sharing of marine ecological environment data, providing strong data support and technical support for the construction of modern marine ranches.

1. Collection and integration of multi-source heterogeneous big data

1.1 Diversity of data sources

Multi source heterogeneous big data of marine ranches, including buoys, satellite remote sensing, and drones used for marine environmental monitoring; And data on the growth of breeding varieties, the operation of ranch equipment, and the operation and management of ranch operations recorded by staff. Through these rich data, comprehensive monitoring of ranches can be achieved, ensuring the safe management and sustainable development of marine ranches.

1.2 The importance of data integration

The integration of big data in ocean ranches provides decision-making support for the production, expansion, and management of ocean ranches. This includes a series of process steps such as data cleaning, format conversion, and data classification to ensure the quality and availability of data. Through data integration, we can gain a more comprehensive understanding of the marine environment and ranch operations, thereby improving production efficiency, reducing costs, and providing strong support for decision-making.

1.3 Methods and Technologies for Data Integration

There are various methods and technologies for data integration in marine ranches, and the key lies in these methods and technologies, including ETL tools, data warehouse technology, data lakes, etc. According to the characteristics and processing requirements of the data, suitable methods and technologies can be selected for data integration. At the same time, in order to ensure the security and privacy of data, corresponding encryption and desensitization measures need to be taken.

2. Intelligent monitoring of marine environment based on big data

2.1 Monitoring equipment and technology

Intelligent monitoring of marine environment based on big data mainly relies on advanced equipment such as sensors, buoys, and satellite remote sensing to collect, transmit, and process parameters such as ocean water temperature, salinity, dissolved oxygen, and pH value, and accurately detect these data in real time, providing a foundation for subsequent data analysis and application.

2.2 Data analysis and application

Intelligent analysis of marine environment based on big data can predict the growth status of aquaculture species and optimize the operation and management of pastures through analysis of water temperature trends, dissolved oxygen content, and other links. Develop appropriate analytical models and methods to provide strong support for decision-making and improve the economic and social benefits of ranches.

2.3 Data security and privacy protection

The protection of marine environmental data based on big data requires strengthening the security and privacy protection of data collection, transmission, storage, and use processes. Through data encryption, access restrictions, establishing data management systems, and personnel training, data security awareness and privacy protection capabilities can be improved.

2.4 Data sharing and cooperation

The intelligent sharing platform for marine environment based on big data can effectively connect domestic and foreign meteorolog-ical, environmental protection, fisheries and other departments, achieving comprehensive and accurate monitoring, data sharing, and multi-lateral cooperation. Promote the complementary advantages of all parties, share and integrate resources, and promote the development and application of marine environmental monitoring technology.

3. The Future Construction and Development Direction of Modern Marine Ranch

3.1 Policy support for talent cultivation

We should give full play to the supervisory and guiding role of government departments, actively introduce relevant policies to support the construction and development of marine ranches, and provide necessary policy support and financial guarantee for the development of projects and related work. We should also strengthen the introduction and training of relevant professional talents, and provide necessary tal-ent support and technical support for the healthy and sustainable development of marine ranches.

3.2 Adhere to marine ecological protection

To firmly uphold the basic principles of protecting marine ecology, it is necessary to adhere to green and sustainable development, and take a series of effective measures to protect the ecological environment and species diversity of the ocean. And adopt rich technological means such as rational planning of aquaculture areas, control of aquaculture scale, and promotion of environmentally friendly aquaculture technologies, to establish a scientific and reasonable development model for marine fisheries.

3.3 Efficient utilization of circular resources

We should pay attention to the concept of efficient recycling of marine natural resources and marine ranch economy, and ensure that aquaculture waste is properly treated and reused through a series of scientific planning and design, thereby improving the stability and sustainability of marine ecosystems. Minimize the impact of ranching on the surrounding environment, thereby improving economic benefits and achieving sustainable development.

3.4 Development and application of intelligent technology

We should pay attention to the technological progress in the fields of artificial intelligence and the Internet of Things, and make the construction of marine ranches more intelligent. By installing sensors and real-time monitoring equipment, we can efficiently collect various

data such as water temperature, salinity, and flow rate. Through intelligent computing and analysis technology, we can predict environmental changes and biological growth, so as to more accurately manage aquaculture and resource scheduling.

3.5 Promote data sharing and cooperation

In order to actively respond to the convenience and challenges brought by multi-source and heterogeneous big data, we should first recognize the importance of data sharing and cooperation and communication. The government, research institutions, enterprises and other departments are required to give full play to the rational industrial development and social value, strengthen cooperation and resource sharing, jointly carry out scientific research and technological innovation, and promote the process of modern Marine pasture construction.

Conclusion: To sum up, multi-source heterogeneous big data has broad application prospects in the modern Marine pasture industry. Through the collection, integration, analysis and application of big data, we can have a deeper understanding of the operation rules of Marine pastures, improve the management efficiency, and ensure the ecological security. Relying on big data technology, accurate management of breeding varieties, intelligent decision-making of pasture operation and optimal allocation of resources can be realized. With the continuous development of technology, big data will play a more important role in the construction of Marine pastures. Therefore, it is necessary to make full use of this opportunity, constantly explore and innovate, and promote the sustainable development of modern Marine pasture construction.

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