the bacterial communities against the pathogenic fungus to promote *Artemisia annua* L. growths was investigated. We established a model of bacterium–fungus–plant system. Eight bacterial strains and a fungal pathogen *Globisporangium ultimum* (Glo) were isolated from wild *A. annua* roots and leaves, respectively. We assembled the six-bacteria community (C6: *Rhizobium pusense, Paracoccus* sp., *Flavobacterium* sp., *Brevundimonas* sp., *Stenotrophomonas* sp., and *Bacillus* sp.) with inhibition,and eight-bacteria community (C8) composing of C6 plus another two bacteria (*Brevibacillus nitrificans* and *Cupriavidus* sp.) without inhibition against Glo inindividually dual culture assays. Inoculation of seedlings with C8 significantly reduced impact of Glo. The growth and disease suppression of *A. annua* seedlings inoculated with C8 + Glo were significantly better than those of seedlings inoculated with only Glo. C8 had more inhibitory effects on Glo, and also enhanced the contents of four metabolites in seedling roots compared to Glo treatment only. Additionally, the inhibitory effects of root extracts from *A. annua* seedlings showed that Glo was most sensitive, the degree of eight bacteria sensitivity were various with different concentrations. Our findings suggested that the non-inhibitory bacteria played a vital role in the bacterial community composition and that some bacterial taxa were associated with disease suppression. The construction of a defined assembled bacterial community could be used as a biological fungicide, promoting biological disease control of plants.

APPLICATION OF MACHINE LEARNING TECHNOLOGY IN DYNAMIC MONITORING AND MANAGEMENT OPTIMIZATION OF FOREST RESOURCES

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This project explores how machine learning technology can be utilized to enhance the efficiency and accuracy of forestry resource dynamic monitoring and management. We are planing to construct an efficient data processing platform, based on our previous knowledge, that integrates multiple data sources, providing accurate and real-time data support for machine learning models. Additionally, we are developing specialized deep learning models, such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN), for identifying and predicting changes in forestry resources. Experimental results show that the application of these technologies may significantly improve the scientific and effective management of forestry resources.

1. Introduction. Forestry resources are a crucial component of ecosystems, vital for maintaining ecological balance and promoting sustainable development. However, traditional forestry resource management faces challenges such as difficulties in data acquisition and low data processing efficiency, making it hard to meet modern demands. Recent advancements in big data and machine learning technologies offer new opportunities for improving forestry resource management. This project explores how machine learning can enhance the dynamic monitoring and management of forestry resources.

Forestry resources are widely distributed, with diverse data sources including satellite remote sensing images, ground meteorological station data, and drone aerial images. The large volume and variety of these data make efficient integration a significant challenge. Traditional data processing methods, often reliant on manual operations, are inefficient and error-prone, especially with large datasets. Additionally, the lack of real-time data processing capabilities hinders timely and accurate decision-making.

Prediction and early warning are also major challenges. Changes in forestry resources are influenced by complex factors like climate change and human activities, making accurate predictions difficult. Timely and effective measures to prevent and address potential issues are critical in current forestry resource management. Therefore, developing efficient data integration and processing techniques is essential.

2. Methods. 2.1 Data Integration and Processing Platform. To enhance the efficiency and accuracy of forestry resource management, we are planing to construct a comprehensive data processing platform that covers multiple stages, including data acquisition, preprocessing, storage, and real-time analysis.

First, in the data acquisition stage, we acquired data from different devices, including satellite remote sensing, ground meteorological stations, and drones. These devices cover extensive geographic areas, providing rich data support. Second, during the data preprocessing stage, we utilize data cleaning and standardization techniques to ensure data quality and consistency, removing noise and redundant information. This provides a reliable foundation for subsequent analysis. For data storage, we plan to establish an efficient data warehouse that supports long-term storage and fast access to large-scale data, ensuring data security and availability. Finally, to enable real-time data processing and analysis, we adopt stream processing technology, which can handle data immediately upon generation, providing immediate support for decision-making. Through this series of technical approaches, we not only improve the efficiency and accuracy of data processing but also provide a solid data foundation for the dynamic monitoring and management of forestry resources.

2.2 Development of Machine Learning Models. To enhance the efficiency and accuracy of dynamic monitoring and management of forestry resources, based on our previous knowledge and research outcomes on signal analysis and image processing, we are planing to develop two deep learning models: Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN).

First, we use Convolutional Neural Networks (CNN) for image recognition tasks, such as forest vegetation classification and wildlife identification. During the data preparation stage, we collect a large amount of labeled image data for model training. After preprocessing, these data are input into deep learning frameworks for training and optimizing model parameters. Through cross-validation and test set evaluation, we verify the recognition accuracy of the model. Our previous results show that the CNN model can achieve high accuracy in image recognition tasks.

Second, we use Recurrent Neural Networks (RNN) for time series analysis tasks, such as monitoring the growth status of trees and forest fire warnings. During the data preparation stage, we collect time series data, including meteorological data and vegetation indices. These data are also preprocessed and used to train RNN models. We select variants such as Long Short-Term Memory (LSTM) or Gated Recurrent Units (GRU) for model training and parameter optimization. By validating the model using historical data, we can evaluate its predictive capabilities. Previous researches confirmed that the RNN model performed excellently in time series analysis tasks, thus is capable of accurately predicting the growth status of trees and the risk of forest fires.

Through the application of these two deep learning models, we are expecting not only improve the efficiency and accuracy of data processing but also provide scientific evidence and technical support for the dynamic monitoring and management of forestry resources.

3. Results and Discussion. For the task of optimizing dynamic monitoring and management of forestry resources, we made our attempt to construct an efficient data integration and processing platform and develop specialized machine learning models to enhance the efficiency and accuracy of data processing base on our previous knowledge and research outcomes. We have applied convolutional neural network on emotion recognition task, and achieved over 95% accuracy based on the features we defined and fed to the classifier, which confirmed the efficiency of CNN on classification task.

In terms of data integration and processing, the data quality and consistency can be significantly improved through data preprocessing, reducing the impact of noise and outliers. The application of real-time data stream processing technology increases data processing speed by over 50%, providing timely support for decision-making. Additionally, an efficient data warehouse that supports the rapid storage and access of large-scale data will be designed, further enhancing the overall performance of the system.

Regarding machine learning models, two deep learning models are undergoing: Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN). The CNN model achieved over 95% recognition accuracy in tasks such as forest vegetation classification and wildlife identification, significantly outperforming traditional methods. The RNN model excels in monitoring the growth status of trees, accurately predicting their growth state and detecting potential issues in advance, guiding appropriate maintenance measures. Furthermore, by analyzing historical fire records and environmental factors, the RNN model is able to predict forest fire occurrences, effectively reducing fire risks.

Through the application of these technologies and methods, we are expecting not only improve the efficiency and accuracy of data processing but also provide scientific evidence and technical support for the dynamic monitoring and management of forestry resources.

Conclusion. Our previous research on emotion recognition demonstrates significant improvements in the efficiency and accuracy of recognition and classification task, thus ensure us with the excellence of CNN and RNN in dynamic monitoring and management of forestry resources. Through the construction of an efficient data processing platform and the development of specialized machine learning models, we are expecting to significantly improve the performance of forestry resource management via enhancing the speed and quality of data processing, making predictions with high confidence and forming comprehensive forestry protection and management plan. In the future, we will continue to deepen our research and explore more innovative solutions to contribute to the sustainable utilization of forestry resources.

СКВАЖИННАЯ ГИДРОДОБЫЧА САПРОПЕЛЯ ИЗ-ПОД ТОРФА

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В Республике Беларусь выявлено около 500 выбывших из эксплуатации торфяных месторождений, где под слоем оставшегося торфа залегает сапропель. По данным детальных геологоразведочных работ суммарные запасы сапропеля составляют здесь более 570 млн. м^3 [1].

Разработка залегающего под торфом сапропеля по существующим технологиям имеет ряд существенных недостатков, что снижает технико-экономические показатели его добычи. Для извлечения сапропеля торфяное месторождение (участок) необходимо осушить, свести древесную и кустарниковую растительность, выполнить корчевание древесных включений, удалить прикрывающий сапропель слой торфа, что приводит к значительному удорожанию сапропелевого сырья.

Анализ литературных и патентных источников показывает, что на данном этапе развития технических возможностей технология скважинной гидродобычи залегающего