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Information Strategy Plan (ISP) to Establish a Synergy Platform for Integrated Bio-data Analysis and Utilization

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The explosive growth of bio-data highlights the critical need for platforms that can efficiently analyze and utilize large-scale biological information. However, current data analysis environments are often hindered by a lack of high-performance computing resources, limited data interoperability, and fragmented analysis tools. This study presents an Information Strategy Plan (ISP) for the "Integrated Bio-data Analysis and Utilization Synergy Platform," designed to overcome these challenges and maximize the efficiency and scalability of bio-data analysis. The Synergy Platform is architected as a cloud-based system that integrates the entire workflow of data collection, storage, analysis, and utilization. It is designed to provide a high-performance GPU cloud infrastructure with a large-scale resource pool for parallel computing, enabling the rapid execution of complex bioinformatics algorithms and AI/machine learning model training without the need for individual researchers to invest in costly hardware. Furthermore, a distributed data interoperability system standardizes data linkage between heterogeneous biological databases, enhancing data accessibility and facilitating the integrated analysis of diverse datasets. Automated data pipelines and real-time update features ensure data reliability and currency. The platform also includes AI-powered analysis and prediction models, integrating pre-trained AI models and various bioinformatics tools to allow users to perform sophisticated analyses like disease prediction and drug discovery without extensive coding. Finally, the platform enhances collaboration and reproducibility by providing a collaborative interface for sharing data, code, and analysis results, and by a workflow management system that records all analysis steps and parameters. The Synergy Platform is expected to significantly enhance research productivity by reducing analysis errors and shortening research time. Ultimately, this platform will aims to enhance the productivity, reproducibility, and collaborative potential of the domestic bio-data analysis ecosystem.