2022年第31期总352期

农业与资源环境信息工程专题

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前沿资讯

1．USDA IT Strategic Plan FY 2022-2026(美国农业部IT战略计划FY 2022-2026)

简介：USDA致力于实施客户至上模式，利用现代技术为美国公众提供简单、无缝和安全的数字服务和产品世界一流的体验。美国农业部IT战略愿景的主要内容如下：• 农业范围内客户至上的体验：将客户需求置于创新、安全和现代化的信息环境。• 促进创新和采用新的通信技术。• 提高数据和信息的质量和可用性。• 促进IT的效率提高、透明度和问责制。• 为所有用户和利益相关者提供业务价值。

来源：USDA

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学术文献

1．Information and communication technology-based service platform enabling the co-creation of agrometeorological services: A case study of the Laos Climate Services for Agriculture(基于信息和通信技术的服务平台，能够共同创建农业气象服务：老挝农业气候服务的案例研究)

简介：Climate services for agriculture (agrometeorological services) are only possible through collaborative, interdisciplinary efforts. To this end, a national-scale service operated by centralized governments will mandate institutional coordination for data sharing, in addition to designated staff time and budget commitments for effective and sustainable operation; however, previous efforts have revealed that institutional coordination, particularly between meteorology and agriculture, represents the most difficult part preventing successful implementation in most countries. In this study, we examined the use of a top-down, information and communication technology (ICT)-based multidisciplinary platform for agrometeorological services for facilitating institutional coordination and ensuring project sustainability. The Strengthening Agro-climatic Monitoring and Information Systems (SAMIS) project, operational since 2018, focuses on building the adaptive capacity of agrometeorological services in Laos by combining the agricultural and meteorological sectors. The research here utilized the ICT-based service platform Laos Climate Services for Agriculture (LaCSA) to systematically engage relevant institutional partners in the co-creation process of agrometeorological services. The results showed that LaCSA enabled co-creation, including data sharing, collaborative tool use, institutional coordination, and policy support from multiple government entities across the agricultural and meteorological sectors. Key lessons and suggestions included co-training for both sectors, easy-to-use data management processes, early buy-in for policy makers, and creating standard operating procedures designating staff time and budgets. These results indicate that the coordinated operation of agrometeorological services through an ICT-based service platform can be successfully achieved in Laos as well as other developing countries, where institutional disconnects and human capital constraints hinder successful implementation of agrometeorological services.

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2．Blockchain-Enabled Smart Agricultural Knowledge Discovery System using Edge Computing（基于边缘计算的区块链智能农业知识发现系统）

简介：Blockchain empowered agricultural knowledge discovery system provides the secured environment for the people to store and exchange agricultural data. The integration of the Internet of Things (IoT), blockchain technology, and edge computing supports the agricultural fields to increase crop productivity and reduce the usage of natural resources. The smart decision support system provides efficient data management to the farmer to make the best decision to increase crop productivity and profit. In the agriculture field, different sensors and devices collect different data about the land then it can be sent to the server in the cloud environment. These data are highly sensitive and need to be securely stored and protected against unauthorized access. The farmers can communicate with the intelligent decision support system using the mobile app and web applications to get information about the land from domain experts. The proposed system used blockchain technology to provide privacy, security, easy accessibility, and availability of information to the people to use natural resources effectively and reduce the effect of soil and water pollution by using pesticides and fertilizer based on data stored in the knowledge base. We have implemented a knowledge discovery system using the platform hyperledger for efficient storage and sharing of sensor data which provides security and data privacy. Precision agriculture with IoT and Edge computing allows people and devices to be connected anywhere, anytime in a smart cloud environment to provide intelligent service to the farmers.
来源：Procedia Computer Science
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3．Optimal smart contract for autonomous greenhouse environment based on IoT blockchain network in agriculture（基于物联网区块链网络的农业自动环境调控温室）

简介：The Internet of Things (IoT) has been widely adopted in many smart applications such as smart cities, healthcare, smart farms, industry etc. In recent few years, the greenhouse industry has earned significant consideration from the agriculture community due to its ability to produce fresh agricultural products with immense growth and production rate. However, labour and energy consumption costs increase the production cost of the greenhouse by 4050% approximately. Moreover, the security and authenticity of agriculture data, particularly for yield monitoring and analysis, is also a challenging issue in current greenhouse systems.The greenhouse require optimal parameter settings with controlled environment to produce increase food production. Therefore, slight advancement can bring remarkable improvements concerning the increase in production with reduced overall cost. In this work, we contributed blockchain enabled optimization approach for greenhouse system. The proposed approach works in three steps to provide optimal greenhouse

environment that are; prediction, optimization, and finally controlling. Initially, the Kalman filter algorithm is employed for predicting the greenhouse sensor data. In next step, the optimal parameters are computed for the indoor greenhouse environment. Finally, the optimized parameters are utilized by the control module to operate and regulate the actuator's state to meet the desired settings in the indoor environment. To evaluate the performance of our proposed greenhouse system, we have developed an emulation tool. The proposed system has been investigated and compared against baseline approach concerning production rate and energy consumption. The obtained results reveal that the proposed optimization approach has improved the energy consumption by 19% against the prediction based approach and 41% against the Baseline scheme. Furthermore, the proof-of-concept based on the Hyperledger Fabric network is implemented on the top of the proposed greenhouse platform. For experimental analysis, we have conducted a series of experiments using Hyperledger calliper concerning throughput, latency, and resource utilization. These results advocates the efficiency of the proposed optimal greenhouse system.

来源： Computers and Electronics in Agriculture

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4．Eden Library: A long-term database for storing agricultural multi-sensor datasets from UAV and proximal platforms（Eden图书馆：用于存储无人机和近端平台农业多传感器数据集的长期数据库）

简介： In modern agriculture, visual recognition systems based on deep learning are arising to allow autonomous machines to execute field operations in crops. However, for obtaining high performances, these methods need high amounts of data, which are usually scarce in agriculture. The main reason is that building an agricultural dataset covering exhaustively a specific problem is challenging, as visual characteristics of the symptoms may change, and there is a high dependency on environmental factors, such as temperature, humidity and light conditions. Therefore, an efficient methodology is necessary to consistently cover the entire workflow for creating an agricultural dataset, from the image acquisition to its online publication. This paper presents the Eden Library, a platform for contributing to this existing gap in open access crop/plant databases covering proximal and aerial images. The complete workflow on the design and deployment of the platform is also explained and discussed. This workflow is relevant because the provided datasets are thought to be maintained and enriched along the time, and they do not just remain as a static research output covering only specific species, growth stages, and conditions. The image annotations of plants and symptoms are provided, saving users from manually annotating images. Currently, the Eden Library covers 15 different crops, 9 weeds and 30 disorders (pests, diseases and nutrient deficiencies). Eden Library aspires to close this gap by providing a large and diversified image collection of plants, organized in a consistent manner, in order to boost further vision-based and AI-enabled field applications.

来源： Smart Agricultural Technology

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