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Guest Editorial

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Special Section on Data-Enabled Intelligence in Complex Agricultural Systems

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1 Introduction

Advances in sensor and data-storage technologies have facilitated the wide applications of sensors in modern agricultural systems, such as irrigation and drainage systems, plant protection systems, greenhouse systems, etc. Various sensors allow the collection of large volumes of data related to operations of agricultural systems in different formats, including time-series, images, videos and sound waves. However, traditional methods and strategies lack the ability to make full use of such large amounts of data. Artificial Intelligence (AI) algorithms are emergingly employed to perform high-level big data analytics tasks, such as prediction, classification, object detection, and clustering. The successful applications of AI algorithms based big data have been verified in different domains, such as manufacturing, healthcare, power supply, and energy management. Thus, it is valuable and meaningful to develop and apply data-enabled intelligence algorithms to relevant aspects of the agricultural systems

This special section aims to attract original research articles that report the latest applications of data-enabled Intelligence algorithms in the field of agricultural systems as well as review papers which describe the current state of the art. The goal is that it provides an opportunity for us to gain a significantly better understanding of the current developments and the future direction of data-enable intelligence in relation to complex agricultural systems. Finally, five papers are included in this special section.

2 Related Works

The first paper "Effects of Different Salt Stress on Physiological Growth and Yield of Drip Irrigation Cotton" by Dr. Wang et al. adopted the method of barrel planting to manually set the salt content of six different soils. The regression analysis was employed to develop the piecewise function and the sail tolerance equation of cotton was obtained.

The section paper "An Improved Algorithm of K-means Based on Evolutionary Computation" by Mr. Wang et al. proposed a novel algorithm to help K-means jump out of the local optimum inspired by the evolutionary computation. The computational results proved that the K-means algorithm was improved by using the proposed algorithm based on two agriculture-related datasets.

The third paper "An Apriori-Based Learning Scheme Towards Intelligent Mining of Association Rules for Geological Big Data" by Chen et al. developed a scheme for intelligent mining of association rules for geological big data. In the proposed scheme, the word embedding data was clustered to improve the performance of the Apriori learning algorithm. The experiments demonstrated the proposed scheme can effectively mine the potential relationships and rules in the mineral deposit data.

The fourth paper "A PSO-XGBoost Model for Estimating Daily Reference Evapotranspiration in the Solar Greenhouse" by Yu et al. proposed a novel evapotranspiration estimation model named PSO-

XGBoost, which took the eXtreme Gradient Boosting (XGBoost) as the main regression model and used particle swarm optimization (PSO) algorithm to optimize the parameters of XGBoost. The proposed method outperformed other benchmarking methods based on real collected data.

The fifth paper "The Soil Moisture Prediction in Peri-urban Beijing, China: Gene Expression Programming Algorithm" by Niu et al. introduced a novel soil moisture predication method based on the Gene Expression Programming algorithm. The numeric study showed that the proposed method could accurately predict the soil moisture in real applications.

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