中国工程科技知识中心
China Knowledge Centre for Engineering Sciences and Technology

《智慧农业发展战略研究》专题快报

2022年第18期（总第57期）

中国工程科技知识中心农业分中心

中国农业科学院农业信息研究所　　2022年9月19日

【动态资讯】

1．走在智慧农业前列

【北京日报】天上飞着无人机，地上跑着无人车，一部手机远程操控 2000 多公里外的温室大棚……这些带有科幻色彩的场景，正在北京农业中频频上演。今年 7 月，2022 全球数字经济大会智慧农业论坛在国家会议中心举办。与会的近百位国内外数字农业农村领域专家学者、企业代表一致认同：随着 5G 时代的到来，大数据、物联网、云计算等现代技术的应用，将极大推动农业现代化发展进程。数字经济正在对农业农村进行一场广泛而深刻的重塑。定位为国际科技创新中心的北京，近年来积极发挥数字经济标杆城市作用，坚持“大城市带动大京郊、大京郊服务大城市”战略，以科技创新打造智慧农业高地，用数字赋能农业农村高质量发展，为首都乡村全面振兴注入新动能。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd-v7GAStVtAAHpk1ee8rA154.pdf

2．科技让农业生产改变了模样

【人民日报海外版】在全国最大的玉米制种基地甘肃省张掖市，再过几天，110 万亩玉米种子将迎来收获。由于使用了卫星导航精量播种、智能水肥一体化等先进技术，今年当地玉米种子有望增产。甘肃省张掖市种子管理局质量管理科副科长杨勇说：“通过现代化制种技术的应用，不断提高供种保障能力，预计今年玉米制种平均亩产量增加 5%左右。”一组数据勾勒出十年来中国农业科技的快速发展：全国农业科技进步贡献率十年间提高 7 个百分点，超过 61%；农作物耕种收综合机械化率超过 72%；农作物良种覆盖率达 96%以上……中国农业科技加快发展，新品种、新技术、新装备、新模式不断涌现，为加快高水平农业科技自立自强和农业科技现代化发挥了重要作用，保障了粮食产量稳定增长，推动了农产品供给充足优质。

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMoD4uAWsBaAAIufrTo2Gk060.pdf

3．力争五年内建一批智慧农业先行样板

【中国农机化导报】加快数字化发展是建设社会主义现代化强国的基础性先导性工作。为推动农业现代化示范区(以下简称“示范区”)在数字技术与现代农业深度融合上先行突破,用数字化引领驱动农业现代化,农业农村部于近日印发了《农业现代化示范区数字化建设指南》(以下简称“《指南》”),对今后一个时期农业现代化示范区数字化建设作出指导安排。《指南》明确的发展目标是,要力争用 3 到 5 年，示范区数字化发展取得显著成效,大数据应用场景丰富拓展，建成一批智慧农业先行样板。农业生产智能化水平明显提高,示范区农牧渔、种养加各行业与数字技术加快融合，农业生产信息化率普遍高于全国平均水平。农业经营网络化水平明显提高，农村电子商务在示范区普及深化，农产品网络零售额占农业交易总额比重在所处区域领先。农业管理高效化水平明显提高，示范区普遍应用农业农村大数据,实现以图管地、以图管产、以图决策。农业服务便捷化水平明显提高,示范区农村信息体系不断健全,获取生产经营、技术服务、供需形势、政策法规等信息更加便捷高效。《指南》提出，各地应在充分把握示范区数字化建设总体要求的基础上，综合考虑本地发展实际，重点选取符合本地资源禀赋条件、数字化发展基础和产业发展水平的建设内容,因地制宜推进示范区数字化建设。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd-wQuAM8BSAAEZaaUrlsE708.pdf

【文献速递】

1．不同作物叶片和茎全磷含量与高光谱植被指数的关系

文献源：河南农业科学,2022-09-15

摘要：为研究不同作物叶片和茎全磷含量与不同高光谱植被指数的关系，于2020年11月至2021年10月进行田间试验，测定冬小麦、油菜、蚕豆、大豆、玉米、红薯6种作物不同生长阶段的叶片、茎全磷含量和高光谱冠层反射率，进而计算归一化植被指数（NDVI）、差值植被指数（DVI）、比值植被指数（RVI）、增强植被指数（EVI）、光化学植被指数（PRI）、红边叶绿素指数（RECI）6种高光谱植被指数。利用Pearson相关分析研究了不同作物叶片、茎全磷含量与高光谱植被指数的关系，并以多元非线性回归建立了基于高光谱植被指数的叶片、茎全磷含量模拟模型。结果表明，随着作物生长，冬小麦、油菜、蚕豆、大豆叶片全磷含量逐渐降低，玉米、红薯叶片全磷含量在生长季中期较高，6种作物茎全磷含量与叶片全磷含量的季节变化规律类似。6种作物叶片全磷含量季节平

均值均高于茎全磷含量季节平均值。6种作物NDVI、DVI、RVI、EVI、PRI、RECI在生长中期相对较高。6种作物叶片全磷含量与不同高光谱植被指数之间的相关系数不同，且与叶片和茎全磷含量存在显著相关关系的高光谱植被指数也不同。基于6种植被指数NDVI、DVI、RVI、EVI、PRI、RECI的模型可模拟6种作物叶片全磷含量33.9%(R2=0.339)～75.2%(R2=0.752)的季节变化，6种作物叶片全磷含量实测值与模拟值之间的一元线性回归线接近1:1线，一元线性回归方程R2=0.657。基于5种植被指数NDVI、RVI、EVI、PRI、RECI的模型可模拟6种作物茎全磷含量23.4%(R2=0.234)～60.0%(R2=0.600)的季节变化，6种作物茎全磷含量实测值与模拟值之间的一元线性回归线接近1:1线，一元线性回归方程R2=0.524。不同作物叶片或茎全磷含量的特征植被指数不同，基于多种植被指数的多元回归模型可较好地模拟冬小麦、油菜、蚕豆、大豆、玉米、红薯叶片和冬小麦、油菜、玉米、红薯茎全磷含量季节变化。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd5yfKAa3XKABVaUtVH5LI533.pdf

2．褐菇采摘的视觉识别-测量-定位一体化方法

文献源：农业机械学报,2022-09-15

摘要：为实现褐菇高效、精准、快速的自动化采摘，针对工厂化褐菇的种植特点，提出一种基于YOLO v5迁移学习（YOLO v5-TL）结合褐菇三维边缘信息直径动态估测法的褐菇原位识别-测量-定位一体化方法。首先，基于YOLO v5-TL算法实现复杂菌丝背景下的褐菇快速识别；再针对锚框区域褐菇图像进行图像增强算法、去噪、自适应二值化算法、形态学处理、轮廓拟合算法进行褐菇边缘定位，并提取边缘点和褐菇中心点的像素坐标；最后基于褐菇三维边缘信息的直径动态估测法实现褐菇尺寸的精确测量和中心点定位。实验结果表明单帧图像平均处理时间为50ms，光照强度低、中、高情况下采摘对象识别平均成功率为91.67%，其中高光强时识别率达100%，菇盖的尺寸测量平均精度为97.28%。研究表明，本文提出的YOLO v5-TL结合褐菇三维边缘信息直径动态估测法可实现工厂化种植下褐菇识别、测量、定位一体化，可满足机器人褐菇自动化采摘需求。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd5x-CAeH6rABbZ279QGKk522.pdf

3．农业传感器技术在我国的应用和市场：现状与未来展望

文献源：浙江大学学报(农业与生命科学版),2022-09-07

摘要：农业传感器技术是农业信息化的基础，是实现农业现代化的核心要素和关键支撑

之一。本文首先在总结农业传感器技术在智能农机装备、农用无人机遥感以及农业物联网三方面的研究及应用现状的基础上，对我国农业传感器技术需求和市场发展进行了深入分析。然后，通过技术产业调研分析，对农业传感器产业化、市场化以及未来的发展趋势进行总结与展望。最后，凝练了农业传感器产业领域的16项关键技术，并在此基础上开展了德尔菲法专家问卷调查，阐明了通用性是农业传感器最重要的属性，明确了相关技术发展最大的制约因素是基础理论和研发投入，提出了农业传感器技术将向着低成本化、高稳定性、高智能化、可移植性和易操作性发展。本文可为我国农业传感器技术研发和产业发展提供参考。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd5y5mAQ5b9ABMBFIJQK1w469.pdf

4．融合YOLOv5s与Criminisi算法的农业遥感图像去云方法研究

文献源：西北农林科技大学学报(自然科学版),2022-09-06

摘要：[目的]构建融合YOLOv5s与改进Criminisi算法的农业遥感图像去云方法，为云层干扰环境下地表信息获取、地表物的解译等研究提供支持。[方法]首先使用基于容差的暗通道先验（dark channel prior，DCP）算法去除雾和部分薄云，以提升图像整体对比度与云层边缘清晰度；然后融合YOLOv5s深度学习网络进行云层区域阈值分割，实现云层蒙版的快速精确自动提取；最后通过样本块大小自适应调整策略对Criminisi算法进行改进，实现遥感图像的有效去云修复处理。通过对含不同大小云层的遥感图像进行去云试验，并利用信息熵、峰值信噪比（peak signalto-noise ratio，PSNR）、均方误差（mean-square error，MSE）和结构相似性（structural similarity index measure，SSIM）4个指标对去云结果进行评价，以验证本研究算法的有效性。[结果]采用融合YOLOv5s和自适应样本块的改进Criminisi算法对8幅含云图像进行了修复，修复后图像的平均PSNR为21.01，平均SSIM为0.77；并对57幅模拟加云图像进行修复，其平均PSNR为28.59，平均SSIM为0.93，表明将改进Criminisi算法应用于遥感图像去云研究是可行的。在此基础上，对本研究算法的适用性以及阴影对去云效果影响的研究表明，不同大小和位置的云层干扰造成未知区域不确定度较大，对修复效果影响较为严重；阴影区域与云区域相接时存在阴影块填充，修复效果尚有待提升。[结论]融合YOLOv5s与改进Criminisi算法的去云方法可有效修复云层遮挡区域，同时保留较为真实的地表信息，可用于农业遥感信息精细感知研究。

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd5xYiAbgtbADDvyRfVmuM299.pdf

5．融合地面高光谱和高分二号卫星遥感监测数据的稻纵卷叶螟危害估算

文献源：中国植保导刊,2022-07-25

摘要：通过对大田稻纵卷叶螟为害情况进行系统观测，测定不同生育期稻纵卷叶螟不同危害程度下的水稻叶绿素相对含量（Soil and Plant Analyzer Development,SPAD），并对水稻SPAD与冠层原始光谱反射率、冠层一阶光谱率以及植被指数进行相关性分析，利用相关性高的光谱特征波段的植被指数建立SPAD估算模型。建立水稻拔节期植被指数与SPAD的关系模型，利用高分二号遥感数据反演地面水稻生长的SPAD值，并使用地面实测点数据对反演数据进行精度验证。主要研究结果如下：（1）不同生育期不同稻纵卷叶螟危害程度下的水稻SPAD与水稻冠层一阶光谱反射率的相关性高于与原始冠层光谱反射率的相关性，光谱敏感波段主要位于红光和近红外波段，SPAD与各种植被指数之间存在显著的相关性。（2）不同生育期不同稻纵卷叶螟危害程度下的SPAD多元逐步回归估算模型的拟合效果好于单因子估算模型，且2种模型均在拔节期拟合效果最好。（3）根据高分二号遥感的波段范围计算出的7个宽波段植被指数与SPAD的相关性比较好，多元逐步线性回归模型的拟合效果优于单变量模型。（4）基于高分二号数据建立的R~2最高的模型反演出的SPAD与地面实测的SPAD具有显著的线性相关关系，这表明利用高分二号数据进行地面SPAD遥感反演是可行的，为准确评估稻纵卷叶螟危害程度提供了新的思路和方法。

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMjGcKAIVBYAB8GAnfYh1k328.pdf

6．Crop Disease Source Location and Monitoring System Based on Diffractive Light Identification Airborne Spore Sensor Network

文献源：IEEE,2022-07-01

摘要：Traditional methods based on the Internet of Things (IoT) or IoT methods based on microscopic imaging are difficult to automatically realize early warning of crop diseases. In this article, a diffraction imaging IoT system based on spore detection is proposed to indirectly monitor crop diseases instead of directly taking crop disease images. Multiple NB-IoT nodes are deployed to build an IoT system to realize the judgment of spore diffraction image transmission, which is based on the detection of environmental temperature and humidity. The method of digital image processing is applied to filter out impurities and count microparticles with the accuracy of 85%. By obtaining the number of spores in different positions, the microparticles diffusion model is established to study the law of microparticles transmission in specific space. According to the diffusion model, the weighted centroid and particle filter

algorithm are applied to locate the particle source in windless and windy conditions. Thirteen nodes are arranged in a 2 m x 2 m laboratory to carry out the experiment. The maximum error in windless and windy conditions is 0.18 and 0.35 m. Compared with the traditional microscopic imaging-based IoT method, the detection limit of the proposed diffraction imaging method is 1/50. It provides inspiration for the IoT in the early detection and disease location of crop diseases.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMm_eqAOgKRADmO6yPqKkk246.pdf

7．基于特征波段卷积神经网络的小麦种子品种分类研究

文献源：中国粮油学报,2022-06-24

摘要：种子纯度是种子质量评价的重要指标，本文针对高光谱图像检测效率难以满足大批量种子检测的问题，采用包络线去除-卷积神经网络（Continuum Removal - Convolutional Neural Network，CR-CNN），开发一种快速、可靠的小麦种子分类方法。首先采用包络线去除法挑选出特征波段，然后结合Ghost模块、MobileNetV2模块压缩架构以及经典架构分别建立卷积神经网络分类模型，最后比较全波段和特征波段的模型检测结果。研究表明，使用包络线去除法之后，检测时间为原先的9.50%～12.87%，百个样本检测时间最快仅需要0.019秒，同时分类精度最高能达到96.125%。CR-CNN方法能够充分利用高光谱图像中的有效信息，快速且准确的鉴别小麦种子品种，为开发高精度小麦种子在线检测多光谱设备提供了一种可能。

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMjF5-AOyhIAAvzEm-KE80330.pdf

8．MTS-CNN: Multi-task semantic segmentation-convolutional neural network for detecting crops and weeds

文献源：ScienceDirect,2022-06-19

摘要：Research is being extensively conducted on using deep learning in the field of crop and weed segmentation based on images captured with a camera. However, the segmentation performance for various crops and weeds varies significantly, implying that certain classes of crops or weeds are not being detected properly. This problem may also occur in the loss calculations used in crop and weed segmentation. In previous studies, the cross-entropy loss (corresponding to a distribution loss) and dice loss (using spatial information) have been widely used. However, such losses lead to large discrepancies in crop and weed segmentation

performance, as the correlations between crop and weed classes are not considered. In order to solve these problems, this study proposes multi-task semantic segmentation-convolutional neural network for detecting crops and weeds (MTS-CNN) using one-stage training. This approach adds the crop, weed, and both (crop and weed) losses to heighten the correlations between the crop and weed classes, and designs the model so that the object (crop and weed) region is trained intensively. In experiments conducted using three types of open databases - the BoniRob dataset, a crop/weed field image dataset (CWFID), and rice seedling and weed dataset -the mean intersection of union (MIOU) values of the segmentation for the crops and weeds in the MTS-CNN are 0.9164, 0.8372, and 0.8260, respectively. Thus, the results indicate higher accuracy from the proposed approach than from the state-of-the-art methods.

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd9pEOAb4-mASXE3wYoSFA567.pdf

9．Crop Yield Maximization Using an IoT-Based Smart Decision

文献源：JOURNAL OF SENSORS ,2022-05-17

摘要：Today, farmers are suffering from the low yield of crops. Though right crop selection is the main boosting key to maximize crop yield by doing soil analysis and considering metrological factors, the lack of knowledge about soil fertility and crop selection is the main reason for low crop production. In the changed current climate, the farmers having primitive knowledge about conventional farming are facing challenges about making sagacious decisions on crop selection. The selection of the same crop in every seasonal cycle makes the low soil fertility. This study is aimed at making an efficient and accurate system using IoT devices and machine learning (ML) algorithms that can correctly select a crop for maximal yield. Such a system is reliable as compared to the old laboratory testing manual systems, which bear the chances of human errors. Correct selection of a crop is predominantly a priority in agricultural arena. As a contribution, we propose an ML-based model, Smart Crop Selection (SCS), which is based on data of metrological and soil factors. These factors include nitrogen, phosphorus, potassium, CO2, pH, EC, temperature, humidity of soil, and rainfall. Existing IoT-based systems are not efficient as compared to our proposed model due to limited consideration of these factors. In the proposed model, real-time sensory data is sent to Firebase cloud for analysis. Its results are also visualized on the Android app. SCS ensembles the following five ML algorithms to increase performance and accuracy: Decision tree, SVM, KNN, Random Forest, and Gaussian Naive Bayes. For rainfall prediction, a dataset containing historical data

of the last fifteen years is acquired from Bahawalpur Agricultural Department. This dataset and an ML algorithm, Multiple Linear Regression leverages prediction of the rainfall in future, a much-desired information for the health of any crop. The Root Mean Square Error of the rain fall prediction model is 0.3%, which is quite promising. The SCS model is trained for 11 crops' prediction, while its accuracy is 97% to 98%.

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd9rI2AOH3_ABvqvszd4G0482.pdf

10．基于CNN-DBN的小麦不完善粒识别技术研究

文献源：河南工业大学学报(自然科学版),2022-05-13

摘要：针对在实际应用场景下，小麦不完善粒识别数据较少所产生识别率不佳的问题，提出并实现了基于迁移学习的CNN-DBN小麦不完善粒识别方法。利用基于大型公开数据集ImageNet的预训练深度卷积神经网络（CNN）中的VGG-16、VGG-19和ResNet50进行小麦特征提取，将获取的特征加以融合并输送至深度信念网络（DBN）进行分类。结果表明：CNN和DBN结合的方法用于小麦不完善粒识别，其中迁移学习VGG-16+VGG-19+ResNet50-DBN模型性能最好，其测试准确率可达91.86%;CNN-DBN模型既避免了小麦复杂的特征提取步骤，又使不完善粒识别因数据集规模小而导致识别率不理想的问题得到了改善；特征融合的方法使提取到的小麦图像信息更加丰富、全面。CNN-DBN模型结合了有监督网络和无监督网络的优点，对高维数据有更好的分类能力，为小麦不完善粒识别提供了理论支持。

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMjFeCAeWv3ABzaiBkB7vQ454.pdf

11．Internet of Things (IoT) and Agricultural Unmanned Aerial Vehicles (UAVs) in smart farming: A comprehensive review

文献源：ScienceDirect,2022-05-07

摘要：Internet of Things (IoT) and Unmanned Aerial Vehicles (UAVs) are two hot technologies utilized in cultivation fields, which transform traditional farming practices into a new era of precision agriculture. In this paper, we perform a survey of the last research on IoT and UAV technology applied in agriculture. We describe the main principles of IoT technology, including intelligent sensors, IoT sensor types, networks and protocols used in agriculture, as well as IoT applications and solutions in smart farming. Moreover, we present the role of UAV technology in smart agriculture, by analyzing the applications of UAVs in various scenarios,

including irrigation, fertilization, use of pesticides, weed management, plant growth monitoring, crop disease management, and field-level phenotyping. Furthermore, the utilization of UAV systems in complex agricultural environments is also analyzed. Our conclusion is that IoT and UAV are two of the most important technologies that transform traditional cultivation practices into a new perspective of intelligence in precision agriculture.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMmrKeAJu7BACK6PazKI-k125.pdf

12．CCTNet: Coupled CNN and Transformer Network for Crop Segmentation of Remote Sensing Images

文献源：REMOTE SENSING,2022-04-19

摘要：Semantic segmentation by using remote sensing images is an efficient method for agricultural crop classification. Recent solutions in crop segmentation are mainly deep-learning-based methods, including two mainstream architectures: Convolutional Neural Networks (CNNs) and Transformer. However, these two architectures are not sufficiently good for the crop segmentation task due to the following three reasons. First, the ultra-high-resolution images need to be cut into small patches before processing, which leads to the incomplete structure of different categories' edges. Second, because of the deficiency of global information, categories inside the crop field may be wrongly classified. Third, to restore complete images, the patches need to be spliced together, causing the edge artifacts and small misclassified objects and holes. Therefore, we proposed a novel architecture named the Coupled CNN and Transformer Network (CCTNet), which combines the local details (e.g., edge and texture) by the CNN and global context by Transformer to cope with the aforementioned problems. In particular, two modules, namely the Light Adaptive Fusion Module (LAFM) and the Coupled Attention Fusion Module (CAFM), are also designed to efficiently fuse these advantages. Meanwhile, three effective methods named Overlapping Sliding Window (OSW), Testing Time Augmentation (TTA), and Post-Processing (PP) are proposed to remove small objects and holes embedded in the inference stage and restore complete images. The experimental results evaluated on the Barley Remote Sensing Dataset present that the CCTNet outperformed the single CNN or Transformer methods, achieving 72.97% mean Intersection over Union (mIoU) scores. As a consequence, it is believed that the proposed CCTNet can be a competitive method for crop segmentation by remote sensing images.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMm9QSATe0NACsmp45vAhE046.pdf

13．Land cover classification from remote sensing images based on multi-scale fully convolutional network

文献源：GEO-SPATIAL INFORMATION SCIENCE ,2022-04-03

摘要：Although the Convolutional Neural Network (CNN) has shown great potential for land cover classification, the frequently used single-scale convolution kernel limits the scope of information extraction. Therefore, we propose a Multi-Scale Fully Convolutional Network (MSFCN) with a multi-scale convolutional kernel as well as a Channel Attention Block (CAB) and a Global Pooling Module (GPM) in this paper to exploit discriminative representations from two-dimensional (2D) satellite images. Meanwhile, to explore the ability of the proposed MSFCN for spatio-temporal images, we expand our MSFCN to three-dimension using three-dimensional (3D) CNN, capable of harnessing each land cover category's time series interaction from the reshaped spatio-temporal remote sensing images. To verify the effectiveness of the proposed MSFCN, we conduct experiments on two spatial datasets and two spatiotemporal datasets. The proposed MSFCN achieves 60.366% on the WHDLD dataset and 75.127% on the GID dataset in terms of mIoU index while the figures for two spatiotemporal datasets are 87.753% and 77.156%. Extensive comparative experiments and ablation studies demonstrate the effectiveness of the proposed MSFCN. Code will be available at https://github.com/lironui/MSFCN.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMmsdSAE-6QAQx661rzWSk634.pdf

14．Intrusion Detection Using Machine Learning for Risk Mitigation in IoT-Enabled Smart Irrigation in Smart Farming

文献源：JOURNAL OF FOOD QUALITY,2022-02-11

摘要：The majority of countries rely largely on agriculture for employment. Irrigation accounts for a sizable amount of water use. Crop irrigation is an important step in crop yield prediction. Field harvesting is very reliant on human supervision and experience. It is critical to safeguard the field's water supply. The shortage of fresh water is a major challenge for the world, and the situation will deteriorate further in the next years. As a result of the aforementioned challenges, smart irrigation and precision farming are the only viable solutions. Only with the emergence

of the Internet of Things and machine learning have smart irrigation and precision agriculture become economically viable. Increased efficiency, expense optimization, energy maximization, forecasting, and general public convenience are all benefits of the Internet of Things (IoT). As systems and data processing become more diversified, security issues arise. Security and privacy concerns are impeding the growth of the Internet of Things. This article establishes a framework for detecting and classifying intrusions into IoT networks used in agriculture. Security and privacy are major concerns not only in agriculture-related IoT networks but in all applications of the Internet of Things as well. In this framework, the NSL KDD data set is used as an input data set. In the preprocessing of the NSL-KDD data set, first all symbolic features are converted to numeric features. Feature extraction is performed using principal component analysis. Then, machine learning algorithms such as support vector machine, linear regression, and random forest are used to classify preprocessed data set. Performance comparisons of machine learning algorithms are evaluated on the basis of accuracy, precision, and recall parameters.

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd9p8KAd3O7AAbHuwr4aAQ844.pdf

15．A Comprehensive Survey of the Recent Studies with UAV for Precision Agriculture in Open Fields and Greenhouses

文献源：APPLIED SCIENCES-BASEL ,2022-01-20

摘要：The increasing world population makes it necessary to fight challenges such as climate change and to realize production efficiently and quickly. However, the minimum cost, maximum income, environmental pollution protection and the ability to save water and energy are all factors that should be taken into account in this process. The use of information and communication technologies (ICTs) in agriculture to meet all of these criteria serves the purpose of precision agriculture. As unmanned aerial vehicles (UAVs) can easily obtain real-time data, they have a great potential to address and optimize solutions to the problems faced by agriculture. Despite some limitations, such as the battery, load, weather conditions, etc., UAVs will be used frequently in agriculture in the future because of the valuable data that they obtain and their efficient applications. According to the known literature, UAVs have been carrying out tasks such as spraying, monitoring, yield estimation, weed detection, etc. In recent years, articles related to agricultural UAVs have been presented in journals with high impact factors. Most precision agriculture applications with UAVs occur in outdoor environments

where GPS access is available, which provides more reliable control of the UAV in both manual and autonomous flights. On the other hand, there are almost no UAV-based applications in greenhouses where all-season crop production is available. This paper emphasizes this deficiency and provides a comprehensive review of the use of UAVs for agricultural tasks and highlights the importance of simultaneous localization and mapping (SLAM) for a UAV solution in the greenhouse.

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd9YHCAbi2yAFc2f5bTe9k792.pdf

16．A Revisit of Internet of Things Technologies for Monitoring and Control Strategies in Smart Agriculture

文献源：AGRONOMY-BASEL,2022-01-05

摘要：With the rise of new technologies, such as the Internet of Things, raising the productivity of agricultural and farming activities is critical to improving yields and cost-effectiveness. IoT, in particular, can improve the efficiency of agriculture and farming processes by eliminating human intervention through automation. The fast rise of Internet of Things (IoT)-based tools has changed nearly all life sectors, including business, agriculture, surveillance, etc. These radical developments are upending traditional agricultural practices and presenting new options in the face of various obstacles. IoT aids in collecting data that is useful in the farming sector, such as changes in climatic conditions, soil fertility, amount of water required for crops, irrigation, insect and pest detection, bug location disruption of creatures to the sphere, and horticulture. IoT enables farmers to effectively use technology to monitor their forms remotely round the clock. Several sensors, including distributed WSNs (wireless sensor networks), are utilized for agricultural inspection and control, which is very important due to their exact output and utilization. In addition, cameras are utilized to keep an eye on the field from afar. The goal of this research is to evaluate smart agriculture using IoT approaches in depth. The paper demonstrates IoT applications, benefits, current obstacles, and potential solutions in smart agriculture. This smart agricultural system aims to find existing techniques that may be used to boost crop yield and save time, such as water, pesticides, irrigation, crop, and fertilizer management.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMm-AyAXzoGADoxsXdJPOw772.pdf

【会议论文】

1．Sustainable and Smart Agriculture: A Holistic Approach

发布源：IEEE

发布时间：2022-07-18

摘要：The sustainability of our future depends on how we produce food and the impact it has on our environment. Smart farming is a revolution in food production through which farmers are able to use technology to generate bigger harvest yields from existing resources. In addition, the creation of smarter irrigation systems, optimized soil composition and smart monitoring systems are leading to agriculture that takes place at a smaller footprint with lower environmental impact. Smart farming is a huge challenge as 70% of the world's population will live in cities by 2050 or later, making it increasingly difficult for farmers to source their crops. In recent times, agriculture is integrated with state of the art technology such as Cloud computing, Internet of Things, RFID, WSNs, data mining etc. for yield improvement with climate conscious approach leading to sustainability of the system. This paper discusses the various trends in smart and sustainable agriculture.

链接:

http://agri.ckcest.cn/file1/M00/10/10/Csgk0GMnAm2AMYqjAAR600ojEM8755.pdf

2．An automated prediction of crop and fertilizer disease using Convolutional Neural Networks (CNN)

发布源：IEEE

发布时间：2022-07-18

摘要：The main motive of this project is “to create a website for the farmers to get a better crop, fertilizer recommendation, and plant disease prediction”. The Open Weather API is used to get the live temperature and humidity of the respective locations and we need to enter the soil nutrition values to get a better crop recommendation. We have used Resnet architecture for leaf disease prediction.

链接:

http://agri.ckcest.cn/file1/M00/03/3E/Csgk0Yd9scSAHFw_AAinMwUOogk933.pdf

主编：赵瑞雪　　本期编辑：陈亚东
地址：北京市海淀区中关村南大街12号　　邮编：100081
电话：010-82106649　　邮件地址：agri@ckcest.cn