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《智慧农业发展战略研究》专题快报

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【动态资讯】

1. 智慧农业方兴未艾 田畴沃野尽显芳华

【昌吉日报】盛夏时节，庭州大地万物并秀，风光涟漪，空气中都透着勃勃生机。借助北斗卫星导航系统提前对田块打点定位，规划最优作业路径；利用水肥一体化智能技术，使用手机即可完成施肥灌水；通过卫星遥感技术，气象卫星实时监测温度、湿度、风量、雨量、土壤墒情、病虫害和灾害预警信息；万亩良田上，不变的是肥沃土地和朴实的劳动者，变化着的是农业科技发展的面貌与步伐，越来越多的新科技逐渐应用于农业，让农业插上智慧翅膀，为农村安上智慧“芯”脏，让农民过上智慧生活。农业的根本出路在于现代化，数字化、智能化是重要路径。2021年中央一号文件提出，发展智慧农业，建立农业农村大数据体系，推动新一代信息技术与农业生产经营深度融合。近年来，借助“数字乡村”建设，昌吉州加快推动农业科技技术走进田野，带动农业生产智慧化，促进农业“接二连三”，为乡村振兴“锦上添花”，田畴沃野尽显芳华。

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLqWouAdZKcAAHJfFJC41I727.pdf

2. 罗源：以“数”为翼“智”向未来

【福州日报】蔚蓝色的罗源湾畔，涌动着数据带来的澎湃浪潮。23日，在第五届数字中国建设峰会上，罗源县与东恒集团签订合作协议，拟投资30亿元，自主研发人工智能操控系统，建设东恒机械项目；罗源县鉴江镇拟建设数字乡村数据服务平台，建设乡村物联网，利用大数据进行乡村治理；近年来，罗源县以大数据、云计算、物联网、区块链、人工智能等前沿技术，不断推动城市管理手段、管理模式、管理理念的创新，让城市更聪明、更智慧，推动城市治理体系和治理能力现代化。

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdBCgqALXoBAAlDxhW6060565.pdf

【文献速递】

1. Joint path planning and scheduling for vehicle-assisted multiple Unmanned Aerial Systems plant protection operation

文献源：ScienceDirect,2022-07-29

摘要：Unmanned Aircraft Systems (UAS) for plant protection have been playing increasingly important roles in agricultural field management. Nevertheless, constrained by pesticide loading capacity and battery endurance limit, the operation area of UAS or UAS swarm is quite limited, prohibiting them from serving large-scale applications. Previous works in the UAS or UAS swarm operation never considered vehicle scheduling, thus unable to cover multiple segmented agricultural fields distributed large-scale. Therefore, we propose a joint path planning and scheduling for vehicle-assisted multiple plant protection Unmanned Aerial Systems (UASs) operation. With the help of vehicle, UASs are able to spray pesticide on numerous fields distributed large-scale. Vehicle stop selection, the coordination between vehicle scheduling and UASs tasks assignment along with path planning could be determined and optimized. The test results show that the overall efficiency and the vehicle stop selection are greatly affected by the UAS number and loading capacity. Vehicle-assisted multi-UASs total operation time and non-spraying flight distance could be saved, with optimized vehicle stops utilizing a binary-coded genetic algorithm (GA). The total operation time difference could be minimal in certain cases when deploying different UAS swarms with the same UAS number but different loading capacity. A significant reduction in total operation time and UASs non-spraying flight distance could be achieved by using the proposed method. Compared with other methods, the total operation time could be reduced by 2 h when controlling 2 or 3 UASs; moreover, a sharp decrease (2030%) in UAS swarm non-spraying flight distance wastage could be attained.

链接:

http://agri.ckcest.cn/file1/M00/10/0B/Csgk0GLjkMeAVuX3AGmgZ2iBQDc118.pdf

2．An algorithm for automatic identification of multiple developmental stages of rice spikes based on improved Faster R-CNN

文献源：ScienceDirect,2022-07-19

摘要：Spike development directly affects the yield and quality of rice. We describe an algorithm for automatically identifying multiple developmental stages of rice spikes (AI-MDSRS) that transforms the automatic identification of multiple developmental stages of rice spikes into the detection of rice spikes of diverse maturity levels. The scales vary greatly in different growth and development stages because rice spikes are dense and small, posing challenges for their effective and accurate detection. We describe a rice spike detection model based on an improved faster regions with convolutional neural network (Faster R-CNN). The model incorporates the following optimization strategies: first, Inception_ResNet-v2 replaces VGG16 as a feature extraction network; second, a feature pyramid network (FPN) replaces single-scale feature maps to fuse with region proposal network (RPN); third, region of interest (RoI) alignment replaces RoI pooling, and distance-intersection over union (DIoU) is used as a standard for non-maximum suppression (NMS). The performance of the proposed model was compared with that of the original Faster R-CNN and YOLOv4 models. The mean average precision (mAP) of the rice spike detection model was 92.47%, a substantial improvement on the original Faster R-CNN model (with 40.96% mAP) and 3.4% higher than that of the YOLOv4 model, experimentally indicating that the model is more accurate and reliable. The identification results of the model for the headingflowering, milky maturity, and full maturity stages were within two days of the results of manual observation, fully meeting the needs of agricultural activities.

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdA5EaAYS0xACuU0f1es3Q648.pdf

3．Artificial intelligence-enabled soft sensor and internet of things for sustainable agriculture using ensemble deep learning architecture

文献源：ScienceDirect,2022-07-14

摘要：IoT (Internet of things) and Artificial Intelligence (AI), as well as other advanced computing technologies, have long been used in agriculture.AI-enabled sensors function as smart sensors and IoT has made various types of sensor-based

equipment in the field of agriculture. This research proposes novel techniques in AI technique based soft sensor integrated with remote sensing model using deep learning architectures. The input has been pre-processed to recognize the missing value, data cleaning and noise removal from the image which is collected from the agricultural land. The feature representation has been carried out usingweight-optimized neural network with maximum likelihood (WONN_ML). after representing the features, classification process has been carried out using ensemble architecture of stacked auto-encoder and kernel-based convolution network (SAE_KCN). The experimental results have been done for various crops in terms of computational time of 56%, accuracy 98%, precision of 85.5%, recall of 89.9% and F-1 score of 86% by proposed technique.

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLqMaOAfSy-AEZkQgipV-8852.pdf

4．Can reduced-input direct seeding improve resource use efficiencies and profitability of hybrid rice in China?

文献源：ScienceDirect,2022-06-22

摘要：The mechanization of rice production in China has been accompanied by a rapid reduction in agricultural labor forces and increase in machinery purchase subsidies; however, the comprehensive performance of several major mechanized production modes regarding output, environmental protection, and profit remains uncertain to the Chinese government and farmers alike. Here, a five-year (2015-2019) field experiment was conducted to analyze the performance of farmers' mechanized seedling transplanting (FMST), farmers' mechanized direct seeding (FMDS), and reduced input direct seeding (RIDS) concerning grain yield, energy use, greenhouse gas emissions, and economic benefits. RIDS used an unmanned aerial vehicle for sowing, fertilizing, and spraying, while adopting no-tillage, bed-furrow irrigation technology. The quantity and stability of RIDS-produced grain were similar to those of FMST and higher than those of FMDS. Furthermore, RIDS yields required significantly less machinery, human labor, fuel, and water, with 34.72% and 24.03% decreases in total energy input compared to that for FMST and FMDS, corresponding to 1.45 and 1.34-fold increases in energy productivity, respectively. The resulting CO_2-eq emissions from agricultural inputs for RIDS were 71.26% and

71.32% of those for FMST and FMDS, while CH_4 emissions were 32.60% and 29.24% of those for FMST and FMDS, respectively. Despite the high N_2O emissions and decomposing trend of soil organic carbon in RIDS, the net global warming potential still decreased by 48.84-58.36%, and the carbon sustainability index and carbon efficiency ratio increased by 87.67-142.14% and 105.32-188.22%, respectively, compared with those of FMST and FMDS. RIDS had the lowest cost, its net return was USD 298.81 ha^{-1} higher than that of FMDS (similar to FMST), and its benefit-cost ratio was 10-36.19% higher than that of FMST and FMDS. Generally, RIDS offered a higher-yielding, cleaner, more sustainable rice production technology for meeting the needs of the Chinese government and farmers.

链接:

http://agri.ckcest.cn/file1/M00/10/0B/Csgk0GLhBiOATJDKACVTonlv0ZA458.pdf

5．基于光谱的春季育苗移栽期番茄苗健壮度量化检测

文献源：光谱学与光谱分析,2022-06-07

摘要：为了筛选影响春季育苗移栽期番茄穴盘苗健壮程度的关键指标，并实现其快速无损检测，测定了5项秧苗指标，经向量归一化预处理并采用独立性权系数法确定各指标权重，并根据权重结果挑选出包含信息较全面，影响较大的两个指标：叶绿素和干质量。两项指标所组成的简化秧苗评价值可以近似表示综合评价值，相关系数r为0.92,大大减少了品质检测所需的指标量，并可以很好的表征春季育苗移栽期番茄苗的健壮度。提取了各穴盘苗的可见-近红外光谱数据，经去噪和多元散射矫正（MSC）预处理，消除了由光散射等带来的光谱干扰信息，相较原始光谱信息更具可利用性。随后采用光谱-理化值共生距离（SPXY）算法对样本集进行划分，利用波段值和评价值两种变量同时计算样本间距离，以最大化表征样本分布，提高样本差异性和代表性。采用竞争性自适应重加权算法（CARS）和无信息变量消除连续投影算法（UVE-SPA）优选光谱特征波数，降低光谱数据维度，得到了更能体现光谱特征的简化光谱信息，减少了冗余信息对建立模型精准度和分析速度的影响。最后应用偏最小二乘支持向量机（LS-SVM）和基于U-Net模型改造的卷积神经网络（CNN）,以预处理后的光谱数据和提取特征波长后的光谱数据分别作为模型的输入，建立了光谱数据与综合评价值的非线性映射模型，并进行对比选优。结果显示：应用UVE-SPA预处理方法筛选出的波段，光谱信息更加丰富有效；两种预处理后的优选波段所建模型回归效果整体优于全波段建立的模型；CNN模型的建模效果整体优于LS-SVM模型，且UVE-SPA-CNN模型对光谱数据和秧苗评价值的回归分析效果最好，其建模集和预测集的相关系数r分别为0.988和0.946,均方根误

差RMSE分别为0.085和0.025,为直接利用光谱数据获取融合了多种因素的番茄秧苗评价值，从而判别秧苗健壮度提供了理论依据。

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLqU4uAfUYIAAkO6Pq4at4089.pdf

6．A deep reinforcement learning-based multi-agent area coverage control for smart agriculture

文献源：ScienceDirect,2022-05-31

摘要：Precision agriculture (PA) is a collage of strategies and technologies to optimize operations and decisions in farms by using spatial and temporal variabilities in yield, crops, and soil within an agricultural plot. It is a data-driven technique, therefore, selective treatment of crops and soil, and managing variabilities using robots and smart sensors is the next improvement in PA. In this paper, it is modeled as a multi-agent patrolling problem, where robots visit subregions that required immediate attention in the agricultural field. Furthermore, for area coverage / patrolling task in the agricultural plot, a centralized Convolutional Neural Network (CNN) based Dual Deep Q-learning (DDQN) is proposed. A customized reward function is designed, which rewards worth-visiting idle regions, and punishes undesirable actions. A proposed algorithm has been compared with various algorithms including individual Q-learning (IRL), uniform coverage (UC), and Behavior-Based Robotics coverage (BBR) for different scenarios in the agricultural plots.

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLqKbuAXaTiADStiPt_P3Y072.pdf

7．Field evaluation of a deep learning-based smart variable-rate sprayer for targeted application of agrochemicals

文献源：ScienceDirect,2022-05-27

摘要：The field performance of a newly developed novel smart variable-rate sprayer was evaluated. The sprayer uses convolutional neural networks (CNNs) for target detection and spot-applications of agrochemicals within potato (Solanum tuberosum L.) fields attacked by lamb's quarters (Chenopodium album L.) and corn spurry (Spergula arvensis L.) weeds and the early blight potato disease caused by

Alternaria solani Sorauer. There was a non-significant effect of treatment conditions (i.e., cloudy, partly cloudy, and sunny) on spray volume during weed and diseased plant detection experiments (p-value = 0.93 and 0.75, respectively) showing that the smart sprayer performed well during all treatment conditions. There was a significant effect of spraying application techniques on the use of spray volume (p-value≤0.05) reflecting a significant saving of spraying liquid during variable-rate application (VA). On average, the sprayer reduced spray volume by 47 and 51% for weeds and diseased plant detection experiments as compared to the values of chemicals applied at constant-rate application (CA), respectively, under all treatment conditions. The analysis of water-sensitive papers (WSP) data resulted in non-significant differences between CA and VA under all field conditions. These results suggest that this sprayer has a great potential to get a suitable spot application of agrochemicals and reduce the use of plant protection products thereby ensuring farm profits and environmental stewardship.

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0Yc_vT2ADYZPAPDSMvkS8sk179.pdf

8．Remote detection and measurement of leaf-cutting ant nests using deep learning and an unmanned aerial vehicle

文献源：ScienceDirect,2022-05-25

摘要：Leaf-cutting ants are the main group of insect pests in Brazilian forest plantations, and their nests can be visually identified in remotely sensed images. This study compares two distinct pattern recognition methodologies, each with different computational costs, for detecting and measuring leaf-cutting ant (LCA) nests in RGB images acquired by unmanned aerial vehicles (UAVs), aiming to develop an efficient detection system for day-to-day Eucalyptus plantation management. The first methodology (MLP) is based on traditional Multilayer Perceptron Neural Networks combined with the sliding window technique. The second methodology uses the new Convolutional Neural Networks YOLOv5 architecture, which is a deep learning approach applied to RGB imagery and requires more time and memory. For each input image, existing LCA nests were detected and measured based on their bounding box areas. Images were classified

to detect the presence and measure the area of LCA nests. The quality of both methodologies were evaluated using accuracy, Kappa, sensitivity, specificity, and mean absolute percentage error (MAPE) metrics, considering training and test data sets. Performances of the YOLOv5 methodology were highly superior to those of the MLP methodology, with 98.45% accuracy using the YOLOv5 large architecture net and 0.49% MAPE in measuring the nests with YOLOv5s nets, whose performance was superior to the MLP results (65.45%), demonstrating high complexity in identifying the targets in the field. The YOLOv5 approach, applied to RGB images acquired by UAVs, shows great promise for precision monitoring of LCA nests, and thus can reduce and optimize insecticide use in forest plantation areas.

链接:

http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc6PGWAegTxAJ4CV8w-UPI592.pdf

9．Raman spectroscopy for nutritional stress detection in plant vascular tissue

文献源：ScienceDirect,2022-05-18

摘要：Next-generation agriculture must address its high energy-intensive resource utilization footprint such as excessive use of fertilizer and water. Plants are also sources of natural polymers (cellulose, lignin, and pectin) that have important implications in sustainable materials design. Hence healthy plant growth with optimum utilization and production is essential for future growth, which demands new technologies and sensors for on-field precision agriculture. Here we used Raman spectroscopy (RS) to non-invasively monitor soybean development, a plant of immense economic importance for fuel, feed, and food. We focus on its compositional changes at multiple time points as it transitions from the vegetative (or rapid growth) to the reproductive (or flowering) stage subjected to nitrogen and nutrient stress to identify several indicators of health. The longitudinal growth was severely limited under total nutritional stress. Simultaneously, the cell wall showed early lignification to control growth and allow for efficient transport of limited resources. Healthier plants showed activation of early defense mechanisms via tetraterpenes, greater protein production capacity via glutamic acid, and late lignification by week 12. Nitrogen stressed plants also showed stunted growth though they showed a similar defense mechanism and later lignification as the healthy condition. These differences in the concentrations of structural polymers,

stress signaling molecules, and structural growth inhibitors at different time points and variable stress demonstrated the suitability of Raman spectroscopy for precision plant health monitoring. Development such as the current study is a step towards creating tools, devices, and computational models for next-generation farming.

链接:

https://www.sciencedirect.com/science/article/pii/S2589152922001570

10．Drones in agriculture: A review and bibliometric analysis

文献源：ScienceDirect,2022-05-18

摘要：Drones, also called Unmanned Aerial Vehicles (UAV), have witnessed a remarkable development in recent decades. In agriculture, they have changed farming practices by offering farmers substantial cost savings, increased operational efficiency, and better profitability. Over the past decades, the topic of agricultural drones has attracted remarkable academic attention. We therefore conduct a comprehensive review based on bibliometrics to summarize and structure existing academic literature and reveal current research trends and hotspots. We apply bibliometric techniques and analyze the literature surrounding agricultural drones to summarize and assess previous research. Our analysis indicates that remote sensing, precision agriculture, deep learning, machine learning, and the Internet of Things are critical topics related to agricultural drones. The co-citation analysis reveals six broad research clusters in the literature. This study is one of the first attempts to summarize drone research in agriculture and suggest future research directions.

链接:

http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc6SpiANzbPAHnLNnSh-DQ164.pdf

11．Droplet deposition characteristics detection method based on deep learning

文献源：ScienceDirect,2022-05-12

摘要：Accurate acquisition of spraying quality parameters of plant protection Unmanned Aerial Vehicle (UAV) is helpful to analyze the deposition and distribution of pesticides in field crops. It is of great significance for pest control. UAV spray quality detection system was used to collect droplets, the droplet deposition

parameters can be detected by processing the droplet images. However, the spots and the adhesion of the droplets led to large data errors. In order to solve this problem, this paper developed a recognition method of adhesive droplets based on Deeplab V3 + deep learning network, and a concave point matching segmentation algorithm based on convolutional neural network was designed to segment adhesion droplets. Used water instead of pesticides to spray to verify the detection effect of the above method. The test results showed that this method was accurate in the identification and extraction of droplets in the detection of droplet coverage. Compared with the droplet coverage measured by Deposit scan, the average relative error is 3.81%. Compared with the manual counting method, the detection error of the droplet deposition density was 3.17%. It was better for the segmentation of adhesion droplets. In terms of droplet size detection, compared with volume middle diameter measured by laser particle sizer, the detection error was 5.48%. This method improves the accuracy of UAV spray quality detection, so as to ensure the correctness of plant protection UAV spraying decisions.

链接:

http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc3vQCAJZTZAF3EgFeVGxQ565.pdf

12．A Reversible Automatic Selection Normalization (RASN) Deep Network for Predicting in the Smart Agriculture System

文献源：Web of Science核心合集,2022-04-07

摘要：Due to the nonlinear modeling capabilities, deep learning prediction networks have become widely used for smart agriculture. Because the sensing data has noise and complex nonlinearity, it is still an open topic to improve its performance. This paper proposes a Reversible Automatic Selection Normalization (RASN) network, integrating the normalization and renormalization layer to evaluate and select the normalization module of the prediction model. The prediction accuracy has been improved effectively by scaling and translating the input with learnable parameters. The application results of the prediction show that the model has good prediction ability and adaptability for the greenhouse in the smart agriculture system.

链接:

http://agri.ckcest.cn/file1/M00/03/39/Csgk0Yc3pKmAPgXIAFoiW4u-jN0696.pdf

13．基于改进YOLO v5的夜间温室番茄果实快速识别

文献源：农业机械学报,2022-03-30

摘要：为实现日光温室夜间环境下采摘机器人正常工作以及番茄快速识别，提出一种基于改进YOLO v5的夜间番茄果实的识别方法。采集夜间环境下番茄图像2 000幅作为训练样本，通过建立一种基于交并比的CIOU目标位置损失函数，对原损失函数进行改进，根据计算函数anchor生成自适应锚定框，确定最佳锚定框尺寸，构建改进型YOLO v5网络模型。试验结果表明，改进YOLO v5网络模型对夜间环境下番茄绿色果实识别精度、红色果实识别精度、综合平均识别精度分别为96.2%、97.6%和96.8%，对比CNN卷积网络模型及YOLO v5模型，提高了被遮挡特征物与暗光下特征物的识别精度，改善了模型鲁棒性。将改进YOLO v5网络模型通过编译将训练结果写入安卓系统制作快速检测应用软件，验证了模型对夜间环境下番茄果实识别的可靠性与准确性，可为番茄实时检测系统的相关研究提供参考。

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdBB02AKBN1AAd8xrYRWkc056.pdf

14. Adaptive feature fusion pyramid network for multi-classes agricultural pest detection

文献源：ScienceDirect,2022-03-03

摘要：The accurate and robust crop pest detection system is an important step to enable the reliable forecasting of agricultural pest in the community of precision agriculture, attracting great attention in many countries. For achieving the automatic recognition and detection of agricultural pest, previous methods adopt image processing-based methods, leading to lower efficiency. Then, machine vision-based methods are introduced into crop pest detection by using hand-crafted feature descriptors, improving the detection precision and speed. However, the manual feature is powerless for precise recognition. Considering powerful ability of feature extraction of convolutional neural network(CNN), we have developed a CNN-based method for multi-classes pest detection under complex scenes. In this paper, an adaptive feature fusion is introduced into feature pyramid network for extracting richer pest features. Then, an adaptive augmentation module has been developed for reducing the information loss of the highest-level feature maps. Finally, a two-stage region-based convolutional neural network (R-CNN) was built for refining

predicted bounding boxes, which can obtain the categories and locations of pests of each image. We have conducted large quantities of comparison experiments on AgriPest21 dataset. Our method could achieve an accuracy of 77.0%, which significantly outperforms other state-of-the-art methods, including SSD, RetinaNet, FPN, Dynamic R-CNN, and Cascade R-CNN.

链接:

https://www.sciencedirect.com/science/article/pii/S0168169922001442

15．基于Mask R-CNN的番茄植株整枝操作点定位方法

文献源：农业工程学报,2022-02-08

摘要：针对工厂化番茄智能化整枝打叶作业需要，研究了基于MaskR-CNN模型的整枝操作点识别定位方法，以期为整枝机器人的精准操作提供依据。鉴于丛生植株中主茎和侧枝茎秆目标随机生长、形态各异，结合植株在不同生长阶段、远近视场尺度和观测视角等条件下的成像特征，构建了温室番茄植株图像样本数据集。采用学习率微调训练方法，对Mask R-CNN预训练模型进行迁移训练，建立了主茎和侧枝像素区域的识别分割模型。在对视场内同株相邻主茎和侧枝目标进行判别基础上，提出基于图像矩特征的茎秆中心线拟合方法。以中心线交点为参考，沿侧枝进行定向偏移，实现对整枝操作点图像坐标的定位。最后，通过测试试验评估该方法对目标识别和定位的效果。试验结果表明，模型对番茄主茎和侧枝目标识别的错误率、精确率和召回率分别为0.12、0.93和0.94，对整枝操作点平均定位偏差与对应主茎像素宽度的比值为0.34，模型对于近景仰视图像中目标的识别和定位效果优于其他视场的图像。该研究可为整枝机器人视觉系统的研发提供技术依据。

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLgV3WADOwkABMgyDHVtSQ359.pdf

16．Transfer Learning for Multi-Crop Leaf Disease Image Classification using Convolutional Neural Network VGG

文献源：ScienceDirect,2022-01-07

摘要：In recent times, the use of artificial intelligence (AI) in agriculture has become the most important. The technology adoption in agriculture if creatively approached. Controlling on the diseased leaves during the growing stages of crops is a crucial step. The disease detection, classification, and analysis of diseased leaves at an

early stage, as well as possible solutions, are always helpful in agricultural progress. The disease detection and classification of different crops, especially tomatoes and grapes, is a major emphasis of our proposed research. The important objective is to forecast the sort of illness that would affect grapes and tomato leaves at an early stage. The Convolutional Neural Network (CNN) methods are used for detecting Multi-Crops Leaf Disease (MCLD). The features extraction of images using a deep learning-based model classified the sick and healthy leaves. The CNN based Visual Geometry Group (VGG) model is used for improved performance measures. The crops leaves images dataset is considered for training and testing the model. The performance measure parameters, i.e., accuracy, sensitivity, specificity precision, recall and F1-score were calculated and monitored. The main objective of research with the proposed model is to make on-going improvements in the performance. The designed model classifies disease-affected leaves with greater accuracy. In the experiment proposed research has achieved an accuracy of 98.40% of grapes and 95.71% of tomatoes. The proposed research directly supports increasing food production in agriculture.

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdA4FSAaVrlADOM93gkoyY425.pdf

【会议论文】

1. Internet of Thing and Machine Learning Approach for Agricultural Application: A Review

发布源：IEEE

发布时间：2022-06-15

摘要：Plants provide a significant portion of the global food supply. Plant infections are a factor in productivity loss, although they can be avoided with constant observation. Plant illness detection by hand is time-consuming and a mistake. Earlier diagnosis of fungal pathogens with computer vision and artificial intelligence (AI) can assist decrease illness severity and overcoming the limitations of continuous human observation. There have been significant advances in the creation of plant illness identification, and classifying systems based on “Machine Learning (ML) and Deep Learning (DL)” models, with a sample of assessment of several plant leaf illness classification techniques displayed with tables. In this article, we conduct a comprehensive literature review on the applications of state-of-the-art Machine, and

Deep Learning techniques for plant disease categorization, including Support Vector Machine, Convolutional Neural Network, K-Nearest Neighbor, Naive Bayes, and other prevalent Machine learning algorithms, as well as AlexNet, GoogleNet, VGGNet, and other prevalent Deep learning techniques. Every algorithm can be defined by the processing techniques used, such as image segmentation and extraction and classification, as well as the standardized experimental-setup metrics used, such as the total number of training/testing datasets used, the number of diseases considered, the category of classification model used, and the classifier performance.

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdA_deAWpz_AANFkeAjfOM753.pdf

2．SA1D-CNN: A Separable and Attention Based Lightweight Sensor Fault Diagnosis Method for Solar Insecticidal Lamp Internet of Things

发布源：IEEE

发布时间：2022-05-05

摘要：Sensor faults can produce abnormal and spurious observations in the solar insecticidal lamp Internet of Things (SIL-IoTs) system. Early detection and identification of the sensor node’s abnormality are critical to ensure the SIL-IoTs system’s reliability. In this study, we propose a lightweight separable 1D convolution neural network that can be implemented in SIL-IoTs nodes to identify sensor faults, reduce detecting delay, and decrease data transmission. However, the reliability of data acquired by sensors is decreased because a SIL-IoTs node releases high voltage pulse discharge (a kind of electromagnetic interference) when pests collide with its metal mesh. This kind of data fluctuation impacts fault diagnosis accuracy. Consequently, fault-related feature maps and temporal signals are characterized via a novel time and channel attention module (TCAM) method, which contributes to separating electromagnetic interference noise from sensor faults of SIL-IoTs nodes. A real-world testbed is applied to validate the effectiveness of the proposed method on sensor fault diagnosis in the SIL-IoTs system. Experimental results demonstrate that the proposed method can detect four typical sensor faults with the best trade-off between accuracy (99.9% average accuracy and 97.6% average F1-score) and efficiency (351 KB inference model size and 4.33 W average energy consumption on

Raspberry Pi).

链接:

http://agri.ckcest.cn/file1/M00/03/3A/Csgk0YdBAeaAXTUtAFtCsmh--0E919.pdf

3. Real Time Riped Fruit Detection using Faster R-CNN Deep Neural Network Models

发布源：IEEE

发布时间：2022-04-25

摘要：Computer Vision and its associated emerging technology prove high potential in advanced agricultural applications. Recently Deep Learning algorithms are much more efficient in producing solution to Computer Vision Problems. In this paper, a literature review on deep learning algorithms and its uses in agriculture is done. Also, this paper reports the research work on autonomous harvesting system using IOT Technology. Fruit detection and plucking mechanism using Deep Learning Faster RCNN method is proposed. The accuracy rate of fruit recognition using VCG16, ResNet50 and InceptionV2 architectures are discussed. The mean average precision of fruit is 0.869. At the end, several problems related to recognition and localization are addressed.

链接:

http://agri.ckcest.cn/file1/M00/10/0C/Csgk0GLqOT6AZKUPADXA6ljqoEE190.pdf

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