中国工程科技知识中心
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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．How AI and Unmanned Aerial Systems Could Change the Future of Crop Scouting

【The Ohio State University】Crop scouting may transition from a boots-on-the-ground job to an artificial intelligence endeavor in the sky thanks to research from The Ohio State University (OSU) and investments made by the Ohio Soybean Council (OSC) and soybean checkoff. Dr. Scott Shearer, professor and chair of OSU's Department of Food, Agricultural and Biological Engineering, and his team are testing the use of small Unmanned Aerial Systems (sUAS) in Ohio fields to automate the scouting process with data collected directly from the crop canopy.Over the past two growing seasons, we have been scouting soybean fields and building an extensive image library of soybean crop stress imagery. Convolutional Neural Networks (CNNs), AI algorithms used for image recognition, have been trained using the image library to support real-time classification of crop stress. The resulting CNN classifiers are being field tested for accuracy. Currently, the predominant sensing technique uses low-cost RGB cameras. However, additional work has been conducted this growing season to include a near-infrared spectroscopic sensor as well as tissue sampler, both suspended on the stinger beneath the drone. Ideally, farmers using this method will be alerted of stressors affecting their soybean crop sooner so they can implement corrective measures more quickly and preserve yield potential for improved profitability. This rapid assessment approach will move the industry toward a more prescriptive approach to crop stress management where economic thresholds are addressed on a refined spatial basis.

链接:

https://www.ocj.com/2019/09/how-ai-and-unmanned-aerial-systems-could-change-the-futureof-crop-scouting/

2．なぜスマート農業ベンチャーが宮崎県新富町を選択しているのか。Society5.0時代の農業がわかるイベント開催

【excite】～The CAMPus 井本喜久氏、株式会社ヴァカボ 長岡康生氏らが登壇。AIやIoT、ロボットなどの技術活用事例をシェア～一般財団法人こゆ地域づくり推進機構（宮崎県児湯郡新富町、代表理事：齋藤潤一、以下こゆ財団という）は、次世代の農業を牽引するAIやIoT、ロボットといったテクノロジーの最新活用事例を共有するイベント「スマート農業サミット2019」を2019年9月27日（金）にSENQ京橋（東京都中央区）で開催します。2019年6月から連続開催している「スマート農業サミット2019」は、今回が4回目となります。イベントではAIやIoT、ロボットといった先進技術を活用している農業ベンチャーや識者をゲストに招聘。次世代農業に関心を寄せる方にとって、最新技術や知見を共有できるまたとない機会です。こゆ財団では、Society5.0の実現に向けた農業分野での先進技術活用を促し、農業の町・新富町にスマート農業の集積地をつくって食糧問題やフードロスといった世界の問題解決に取り組みます。

链接:

http://agri.ckcest.cn/

https://www.excite.co.jp/news/article/Prtimes_2019-09-19-28395-148/

3．Artificial intelligence could predict El Niño up to 18 months in advance

【SCIENCE】The dreaded El Niño strikes the globe every 2 to 7 years. As warm waters in the tropical Pacific Ocean shift eastward and trade winds weaken, the weather pattern ripples through the atmosphere, causing drought in southern Africa, wildfires in South America, and flooding on North America's Pacific coast. Climate scientists have struggled to predict El Niño events more than 1 year in advance, but artificial intelligence (AI) can now extend forecasts to 18 months, according to a new study. The new research uses a type of AI called a convolutional neural network, which is adept at recognizing images. For example, the neural network can be trained to recognize cats in photos by identifying characteristics shared by all cats, such as whiskers and four legs. In this case, researchers trained the neural network on global images of historic sea surface temperatures and deep ocean temperatures to learn how they corresponded to the future emergence of El Niño events. Such neural networks need a large number of training images before they can identify underlying patterns. To get around the shortage of historic El Niño data, the scientists fed the program re-creations of historic ocean conditions produced by a set of reputable

climate models, ones frequently used for study climate change, says the study's lead author, Yoo-Geun Ham, a climate scientist at Chonnam National University in Gwangju, South Korea. As a result, the scientists could show the computer system not just one set of actual historic data, spanning 1871 to 1973, but several thousand simulations of that same data by the climate models. When tested against real data from 1984 to 2017, the program was able to predict El Niño states as far out as 18 months, the team reports today in Nature. The program was far from perfect: It was only about 74% accurate at predicting El Niño events 1.5 years into the future. But that's still better than best current model, which is only 56% accurate for that time frame, Ham says.

链接:

https://www.sciencemag.org/news/2019/09/artificial-intelligence-could-predict-el-ni-o-18-months-advance

4．智能家庭农场破解"无人种地"难题

【农民日报】喝着咖啡就能把地种了！或许你觉得这是异想天开，但是在山东省淄博市禾丰种业生态无人家庭农场，农场主朱俊科已经把这个想法变成了现实。"你看，这块地的玉米受台风'利奇马'影响，出现倒伏。通过无人机实时监控，我们就能及时分辨出哪个品种的玉米更抗倒伏！"近日，记者来到朱俊科的家庭农场，但见坐在农场指挥中心的朱俊科，在大屏幕前就能把各块地的作物长势情况尽收眼底。生态无人农场的智能化水平远不止这些。在指挥中心，朱俊科通过发送不同的信号指令，田间的农机就按照规划路线自动整地、播种、施肥、打药、收割。在无人农场，机器几乎已经将人力要素从土地耕作中彻底解放出来。朱俊科的无人农场是与山东理工大学合作开展的。农场整合了现代农艺和农机装备、绿色植保技术、无人机等，依托天空地一体化农情信息获取系统，达到绿色生态农业的无人化、精准化操控，形成可复制、易推广的循环生态农场新模式。"农场实现了前期耕种阶段、中期管理阶段和后期收获阶段的全程智能化。"山东理工大学教授张彦斐告诉记者，比如在中期，水的管理尤为重要，而无人浇水也是整个无人农场建设的关键节点。农场的智能灌溉系统在实际运作中，能及时给作物解"渴"。据了解，在无人农场的田间设有多处探头探测土壤中水的含量，根据大数据测算系统，获取作物在未来一段时间需水量，再根据田间的持水量，计算出需要补灌的用水量，根据需要补灌用水量，完成作物的"补水"。"智能化的农场，包括'大脑中枢'、'传感系统'和'操作系统'，能够完整地获取信息、处理信息并应用信息。"张彦斐补充道。云平台监控系统，是无人农场的"大脑"。系统对农场进行整体调控，监控农场内作物生长环境、土壤状态以及所有机具的作业状态，并进行智能实时调控。天地空智能农业传

输系统，是无人农场的“传感器”。通过采用北斗GPS系统+姿态传感器提供的信息，通过无线通信网络实现对农业生产环境的智能感知、分析和决策…… ;结合GIS系统，操作人员可以在办公室里对农机进行精准操控，真正实现农机的无人应用，这让一个人管理上千亩田地成为可能。山东理工大学兰玉彬院士表示，通过小麦/玉米耕、种、管、收等环节全程的智能化，提高了生产效率，劳动用工费用减少了25%，节约了灌溉用水20%，减少农药投入30%，显著改善了农田面源污染，实现土壤的可持续利用。

链接:

http://szb.farmer.com.cn/2019/20190916/20190916_007/20190916_007_1.htm

5．农业农村部部署开展“互联网+饲料监管”工作

【农民日报】“通过政府网站公开饲料监督抽查检测项目，这还是第一次。”近日，记者在全国饲料质量安全监督抽查工作暨承检机构业务培训班了解到，在即将开展的2019年全国饲料质量安全监督抽查工作中，“双随机、一公开”监管方式将全面实施。随机选取1000-1500家左右的被抽查饲料、饲料添加剂生产企业，随机选取100名饲料质量安全监管专家负责采样和生产企业现场检查，全过程运用饲料质量安全监测信息系统实行痕迹管理，在农业农村部门户网站公开检测结果和不合格生产企业名单，“互联网+饲料监管”正稳步推进。记者从培训班上了解到，党的十八大以来，我国已经连续7年成为全球最大饲料生产国。工业饲料总产量从2012年的1.94亿吨增长到2018年2.28亿吨，年均递增率为3.28%。全国年产量100万吨以上饲料企业集团从2012年的24家增加到2018年32家，饲料产量集中度从45%提高到53.0%，年均递增8.55%。我国饲料机械制造业生产几十个系列200多种产品，不仅满足了国内饲料生产需要，还大量出口到东南亚、新西兰、俄罗斯和非洲等国家和地区。据了解，国家为推动饲料工业高质量发展，确保动物产品质量安全，已经连续多年组织开展饲料质量安全监督抽查工作。饲料质量安全监督抽查合格率始终维持较好水平。目前，农业农村部已经建立全国饲料、饲料添加剂生产企业名录库和全国饲料质量安全监管专家库。针对饲料生产环节超量超范围添加等问题，下一步，农业农村部将贯彻落实“四个最严”要求，按照规范抽查、抽检分离、痕迹管理的总体思路，进一步规范监督抽样、检测检验、结果报送、复核仲裁、异议处理等工作程序，确保饲料质量安全监督抽查检测工作公平、公正，监督抽查结果及时向社会公开。

链接:

http://szb.farmer.com.cn/2019/20190913/20190913_002/20190913_002_8.htm

6．我国成功研制畜牧全链条DNA溯源系统

【农民日报】记者近日获悉，中国农业科学院农业质量标准与检测技术研究所畜产品质

量安全研究室开展了“基于DNA分子标记技术的猪牛肉产品溯源鉴定技术研究”，在我国首次建立起贯穿于“动物饲养-屠宰-加工-销售”全链条的DNA溯源系统。作为遗传物质的DNA具有个体唯一性、加工稳定性和不可更改性，每一个牛、猪、羊个体等都具有自身特异的DNA指纹，而且这种DNA指纹从牲畜进栏到屠宰、加工成为生、熟肉制品都稳定存在、无法更改且可检测，利用这一特性建立的DNA溯源系统可以真实地记录我国畜牧生产流动以及畜产品质量安全信息情况，结合信息溯源系统，保证数据的准确可靠。目前我国基于RFID（射频识别）、条码二维码等互联网、物联网技术的畜牧企业畜产品信息溯源系统建设，提升了我国畜牧生产管理水平和畜产品质量安全水平。但信息溯源系统局限性也很明显，针对这一问题，在公益性农业行业科技专项、北京市科委食品安全专项等项目资助下，中国农业科学院农业质量标准与检测技术研究所开展了这项研究，从而提高政府相关部门对畜牧疫病防控及畜产品质量安全监管的力度。这套畜牧DNA溯源系统的原理就是，在畜牧动物刚入栏或打耳标时即采集其血液样本进行保存，并记录传统RFID或二维码等编码信息。当动物经过屠宰销售、物流储运，最后进入超市饭桌后，即对于需要检测的肉样进行采集。然后通过传统信息溯源找到原始保存的生物样本，同时对两份样本进行DNA信息分析比对，若DNA指纹图谱相同则为同一只个体，证明溯源信息可靠准确，反之则证明溯源信息不实。

链接:

http://szb.farmer.com.cn/2019/20190912/20190912_002/20190912_002_1.htm

7．Drones Showing Their Value In AG

【successful Farming】On an 80- to 100-acre field, we would send out anywhere from four to eight crop claims adjusters,” says Todd Manning, a drone pilot and crops coordinator for Country Financial. “They had no idea exactly where the damage was, so they would have to walk the entire field, which can take anywhere from six to eight hours. It’s not pleasant to walk through tall corn when it’s 95ºF.”To more efficiently identify areas of crop damage and to reduce the hours needed to settle a claim, the Illinois-based company began using drones in 2015. Today, it has a fleet of 12 drones and employs 15 FAA-certified pilots. Since the severity of damage varied among the seven hybrids planted, three of which had been planted for the first time, the Applegates also wanted to identify the varieties that stayed healthier throughout the year and were less susceptible to greensnap. “In the worst fields, the damage ranged from 20% to 80%, but I had difficulty quantifying that information and then associating it with specific varieties in the field,” Applegate says. A flight with AeroVironment’s Quantix drone, which can cover about 400 acres in 45 minutes, equipped

the family with the information needed to assess hybrid performance. That insight will be helpful for future seed selections. “We compared the Applegates’ hybrid planted maps to the aerial imagery, and we were able to correlate which hybrids stood better than others,” says Matt Strein, director of business development at AeroVironment. The interesting part, Elmore says, is that the hybrids growing the most aggressively, on some of the best-managed acres, are the ones that often break. If you’re planting a susceptible hybrid, he suggests mixing them up. “Both wind and row direction make a difference. If possible, it’s wise to plant one set east to west and the other north to south,” Elmore says. Knowing all of their crop damage is accounted for as well as having the ability to evaluate hybrid performance are just two of the advantages drone technology offers. With its RGB color and multispectral imagery capabilities, Quantix can also spot crop health and operational issues that might be missed by the naked eye. “We found a band in one of the Applegates’ fields that they may be able to learn from and prevent next year,” Strein says.

链接:

https://www.agriculture.com/technology/crop-management/drones-showing-their-value-in-ag

8．推进数字农业　传统农事更靠谱了

【农民日报】一场连续四五天的秋雨过后，黑龙江省农垦北安管理局长水河农场农业科技示范园区的工作人员对虫情测报灯、气候监测仪及生态远程实时监控系统做定期保养。这几套设备是北安管理局智慧农业综合服务配套设施的一部分，它可以监测农作物虫情、病情和土壤墒情，为农场及周边县区耕地提供大数据服务。近年来，北安管理局充分发挥物联网、互联网的积极作用，在农业种植、销售、服务等各环节融入数字概念，探索推进数字农业，通过数字赋能，为农业插上科技的翅膀。北安管理局智慧农业正成为颠覆传统农业模式的生力军。“过去，种植户和有机户因为作业层次多少和作业质量好坏没少闹矛盾。”正在修理收获机车的赵国民摘下手套擦了擦脸上的汗珠。赵国民介绍说，在机车上安装监控系统后，借助互联网优势和农机作业监管系统综合传感技术，每一台三秋作业机车的作业位置、面积、质量、进度及时间等信息同步采集到服务器上，种植户、有机户及管理人员可利用手机等随身设备随时查看，更好地监管作业质量。这种“在线式”服务是北安管理局正在推进的“智慧农场”平台的一个重要组成部分。

链接:

http://szb.farmer.com.cn/2019/20190909/20190909_008/20190909_008_6.htm

9．内蒙古兴安农垦集团智慧农业服务平台服务垦区发展

【农民日报】8月21-23日，兴安农垦集团举办“开放合作共建智慧垦区”现代农业开放日活动。此次活动由中国农垦经济发展中心、中国农业机械流通协会、中国农药工业协会等单位共同指导，共有来自全国29家智慧农业、农机、农药、种子企业以及部分垦区代表参加。此次开放日主要聚焦兴安盟农垦的智慧农业信息平台建设、万亩药材基地建设以及农业示范园等重点农业项目，以智慧农业为切入点，探索兴安农垦一二三产业融合，实现农垦经济高质量发展的新途径。在此期间，代表们先后参观考察了呼和分公司的现代农机展示区、吐列毛杜分公司大豆标准化示范基地、农业科技示范园区和索伦分公司小麦规模化生产示范基地等，并就农垦智慧农业发展举办了专题座谈会。兴安农垦集团公司总经理武宝林说，农垦开放日活动形式新颖，让农垦企业与农机、农药制造企业面对面地沟通交流，高效务实，对于推动现代农业发展起到了积极的作用。中国农业机械流通协会副会长兼秘书长陈涛表示，协会将在与农垦系统的交流合作中深度关注农垦的各类需求，为农垦和企业搭建一个供需信息高度对称的交流平台，为农垦不断发展壮大给予大力支持。多年来，中国农垦经济发展中心与中国农业机械流通协会保持着良好的合作关系，在服务垦区方面开展了卓有成效的工作，为广大农垦企业、农场及农机企业搭建有效的合作平台，受到了一致好评。

链接:

http://szb.farmer.com.cn/2019/20190909/20190909_008/20190909_008_2.htm

10．航空施药：纳米农药更高效

【农民日报】国家重点研发项目农业航空低空低量喷雾与纳米农药应用技术培训班于近日在黑龙江省绥化市召开。此次培训班由全国农业技术推广服务中心和中国农业科学院植物保护研究所联合主办，与会领导和专家就农业航空低空低量喷雾相关产业及技术要点展开讨论，对航空施药技术的“人、机、剂、技”四位一体的相关技术进行了深入探讨。中国农业科学院植物保护研究所闫晓静副研究员系统介绍了农业航空低空低容量施药技术研究进展。她表示，针对航空施药过程存在的农药利用率低、作物药害以及污染环境等问题，研究意在解决航空植保过程中农药选择和雾滴密度等技术难点，超低容量、悬浮剂、乳油等农药剂型、助剂的选择，解决雾滴的蒸发、飘移、黏附等问题，以及探讨航空植保无人机的速度、高度、喷幅等参数选择，最终可以匹配好高速发展的植保无人机行业。农业农村部南京农业机械化研究所秦维彩副研究员介绍了航空植保精准施药在稻麦油上的应用。纳米农药在水稻的室内测试显示，1升传统农药肟菌酯·戊唑醇水分散粒剂药液加入5毫升助剂，在水稻叶面上的附着展开时间是1.8秒，而不加助剂的肟菌酯·戊唑醇纳米农药则会非常迅速地平铺附着，说明纳米农药药液的表面张力很低，更

容易在作物叶面上均匀分散。对小麦白粉病防治喷药后7天调查显示，纳米农药80%、100%用量防效均好于常规农药防效。经过测试，对油菜菌核病的防治效果，植保无人机施药防治菌核病效果总体要高于人工背负式弥雾机防治效果，不同药剂及剂型条件下，植保无人机5米/秒时的效果要优于4米/秒时的效果；雾滴大小对防治效果有较大影响，小雾滴总体要优于大雾滴；植保无人机喷施纳米农药航空植保专用药剂能更好地喷施小雾滴，有利于药液对靶沉积，药效更好。

链接:

http://szb.farmer.com.cn/2019/20190906/20190906_007/20190906_007_2.htm

11．Weed-Killing Robot

【successful Farming】Imagine a robot killing Palmer Amaranth in your field with a rotating cylinder about the size of a rolling pin in your kitchen and applies herbicide like a honey dripper. A University of Nebraska professor of chemical and biological engineering is working on it. Henk Viljoen's goal is to spot-treat weeds in a way that eliminates the risk of herbicide drift, and also minimizes exposure of crops and soil to the chemical. He says the first step in the process is flying a drone over fields, collecting images and GPS locations of the noxious weed. Those coordinates are then given to a self-driven robot, which drives itself to those sites. "At the front end is this roller and it is hollow in the middle so that is where you fill it up with herbicide, and then through holes it wicks toward the surface. The whole thing is rotating at a specific speed so that it stabilizes the film on the roller," says Viljoen. "And then, it just drives itself down the rows and it contacts the weeds with the roller." The roller deals a secondary blow to weeds it has a serrated surface. "It's like small teeth that sit on the surface of the roller," he says. "And so by spinning, it actually tears up the epidermis of the weed's surface and so when it contacts with the herbicide it's taken up into the plant's vascular system much faster than just by contacting alone." He says so far, a prototype has been tested in small studies in a greenhouse. This summer, they're testing it at a university field plot.

链接:

https://www.agriculture.com/podcast/successful-farming-radio-podcast/weed-killing-robot

【文献速递】

1．Maximization of wireless sensor network lifetime using solar energy harvesting for

smart agriculture monitoring

文献源：Ad Hoc Networks,2019

摘要：The wireless sensor networks (WSNs) are used for the real-life implementation of the Internet of Things (IoT) in smart agriculture, smart buildings, smart cities, and online industrial monitoring applications. Generally, traditional WSN nodes are powered by limited energy capacity, non-rechargeable batteries. The WSN lifetime (days) depends upon, duty cycle, type of application deployment, and battery state of charge (SoC) level. We propose an innovative solution to the limited energy availability design problem by utilizing the ambient solar energy harvesting for battery charging of WSN nodes. However, there are many challenges in solar energy harvesting like intermittency of available power, solar energy prediction, thermal issues, solar panel conversion efficiency, and other environmental issues. The objective of this research work is to maximize the WSN network lifetime using solar energy harvesting technique. From our simulation results, it is proved that the sensor network lifetime is increased from 5.75 days to 115.75 days @ 25% duty cycle and higher, ideally up to infinite network lifetime. Furthermore, the network throughput is also increased from 100 K bits/s to 160 K bits/s. in SEH-WSNs.

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EjF-AbH8fADfkOtMyHM4999.pdf

2．Agroforestry as a pathway to agricultural yield impacts in climate-smart agriculture investments: Evidence from southern Malawi?

文献源：Ecological Economics,2019

摘要：Agroforestry is widely promoted for delivering not only the main food security objective of climate-smart agriculture (CSA) but also increasing resilience and mitigating climate change. Yet rigorous estimates of the impact of this pathway on agricultural yields in CSA interventions remain limited. Here we analyze maize yield effects of agroforestry within a large CSA project, funded by the US Agency for International Development and implemented from 2009 to 2014 in southern Malawi. Using original survey data from 808 households across five districts, we apply a double hurdle specification with a control function approach to account for the endogeneity of CSA program participation and the intensity of agroforestry fertilizer trees (as a proxy for agroforestry adoption) in the study area. We find a positive and statistically significant yield effect of CSA program participation

and the intensity of agroforestry fertilizer trees: maize yields increased, on average, by 20% for participation, and 2% for the intensity of fertilizer trees a modest but useful result with implications for increasing agricultural productivity among smallholder farmers in sub-Saharan Africa and elsewhere. More broadly, our results show that incorporating agroforestry into CSA interventions could enhance agricultural yields among smallholder farmers in the face of climate change — a crucial aspect of sustainable development goals on hunger and climate adaptation.

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EmuOANjJqABLK5_isaPo141.pdf

3．Soybean iron deficiency chlorosis high throughput phenotyping using an unmanned aircraft system

文献源：Plant Methods,2019

摘要：The goal of this study was to use an unmanned aircraft system (UAS) to improve field screening for tolerance to soybean IDC. During the summer of 2017, 3386 plots were visually scored for IDC stress on two different dates. In addition, images were captured with a DJI Inspire 1 platform equipped with a modified dual camera system which simultaneously captures digital red, green, blue images as well as red, green, near infrared (NIR) images. A pipeline was created for image capture, orthomosaic generation, processing, and analysis. Plant and soil classification was achieved using unsupervised classification resulting in 95% overall classification accuracy. Within the plant classified canopy, the green, yellow, and brown plant pixels were classified and used as features for random forest and neural network models. Overall, the random forest and neural network models achieved similar misclassification rates and classification accuracy, which ranged from 68 to 77% across rating dates. All 36 trials in the field were analyzed using a linear model for both visual score and UAS predicted values on both dates. In 32 of the 36 tests on date 1 and 33 of 36 trials on date 2, the LSD associated with UAS image-based IDC scores was lower than the LSD associated with visual scores, indicating the image-based scores provided more precise measurements of IDC severity.

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EjoCADqz_AD2imME3FT4456.pdf

4．Automatic delivery and recovery system of Wireless Sensor Networks (WSN) nodes

based on UAV for agricultural applications

文献源：Computers and Electronics in Agriculture,2019

摘要：In recent times, Wireless Sensor Network (WSN) technology is widely applied in various agricultural applications. However, when a WSN becomes large and complex, it is difficult to maintain and adjust the whole WSN or multiple WSNs manually. Therefore, we propose an UAV-based scheme for automatic delivery and recovery of WSN nodes in the field. This scheme includes a combination of specially designed UAV, node platforms together with a GNSS-RTK (Global Navigation Satellite System, Real Time Kinematic) system. A prototype system was built to test the UAV-based scheme. The results and analyses of indoor and outdoor experiments demonstrated the feasibility and efficacy of the scheme.

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EjYCAGHjkAN677CHhh1E602.pdf

5．地空两用农业信息采集机器人研究—基于STM32微控制器

文献源：农机化研究,2019

摘要：随着科技高速发展及机器视觉、图像识别等技术的出现,图像信息采集技术的应用也越来越多。地空两用农业信息采集机器人的出现解决了农业信息采集中的局限性,实现了农业信息采集的智能化自动化。采集机器人的空用功能可避开机器人在作业环境中障碍物,在空中采集的信息数据是比较全方面的,不会存在因障碍物的遮挡而漏采集信息导致信息不全而无法正常使用。为此,基于STM32微控制器地空两用农业信息采集机器人研究方案,采用意法半导体公司的单片机-STM32为主控制器,OV2640摄像头为图像采集设备,设计了采集系统具有性价比高、实用性强且可靠性高的特点。

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EdwmAUc0pABcuRCz42c4139.pdf

6．基于Radarsat-2全极化数据的多种雷达植被指数差异分析

文献源：中国农业资源与区划,2019

摘要：[目的]雷达植被指数(Radar Vegetation Index, RVI)作为评价雷达影像植被分布与生长状态的重要指标,对植被生长动态监测具有重要意义。然而,不同算法的雷达植被指数对于同一地物类型的表征往往存在一定的差异。文章通过对比分析3种常用RVI在多种类型地物上的差异,为其在SAR影像特征提取、分类、识别等应用提供指导性意见。[方法]实验基于武汉市Radarsat-2全极化数据,结合Google earth历史影像和实地调研数据,选取林地、灌丛、草地、耕地、水生植被、建筑、道路、裸地、湖泊、河流10种典型地物样

本,从样本折线图分布、类内标准差等方面,对分别通过H/A/alpha分解、Freeman分解和后向散射系数计算得到的3种常用雷达植被指数Van_RVI、Freeman_RVI和Kim_RVI进行了测算分析。[结果] 3种雷达植被指数有着相似的折线图走势,对植被的监测能力良好,但对于不同地物的敏感性稍有差异:Freeman_RVI对林地等高密度植被区域敏感程度较高;Van_RVI对耕地与林地、灌木与林地具有一定的区分性;Kim_RVI对水体与建筑的敏感程度较高。[结论] Freeman_RVI对高密度植被识别能力最好,可用于林地提取、森林制图;Van_RVI对植被与非植被的区分能力最好,适用于植被提取;Kim_RVI数据预处理计算速度最快,但提取精度不高,可用于应急制图。

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EgW-ADWw9AA_mXLbaxnA698.pdf

7．基于无人机热红外与数码影像的玉米冠层温度监测

文献源：农业工程学报,2019

摘要：快速、准确、无损地获取田间玉米冠层温度，对实现无人机辅助玉米抗旱性状的监测具有重要的意义。该文以无人机搭载热红外成像仪和RGB高清数码相机构成低空遥感数据获取系统，以不同性状的拔节期玉米为研究对象，采集试验区的无人机影像。利用含有已知三维坐标的几何控制板，进行数码影像几何校正，并利用校正后的数码影像对热红外影像进行几何配准。利用便携式手持测温仪测量辐射定标板黑白面的温度，对热红外影像进行辐射定标。利用高空间分辨率的数码影像对玉米进行分类并二值化处理，基于二值化结果提取热红外影像的玉米冠层像元，并提取试验区不同性状玉米的冠层温度。同时，利用便携式手持测温仪在地面同步测量玉米冠层温度，并与提取的冠层温度经行一致性分析，以验证评估基于热红外影像提取玉米冠层温度的效果。结果表明:提取的冠层温度值与地面实测值具有高度一致性（R2=0.723 6，RMSE=0.60℃），提取精度较高，表明基于无人机热红外影像获取玉米冠层温度的方法具有高通量的优势且精度较高。最后将试验区的植被覆盖度与提取的冠层温度进行对比分析，结果表明:玉米冠层温度与其覆盖度有显著的相关性（R2=0.534 5，P<0.000 1），覆盖度越高冠层温度越低，反之则越高，说明玉米冠层覆盖度的大小影响玉米冠层温度的高低。该研究可为玉米育种材料的田间冠层温度监测提供参考。

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EdnGAYIoVAElqlq0hNuc414.pdf

8．大数据时代人工智能技术在农业领域的研究进展

文献源：吉林农业大学学报,2019

摘要：随着人工智能和大数据技术的飞速发展及对农业领域的全面普及,作为信息技术与农业领域深度融合的标志性技术——智慧农业,必将为现代农业带来革命性的技术创新。文中分析了人工智能和大数据技术在国内外农业领域应用的研究现状,通过案例重点阐述了大数据时代人工智能技术带来的农业生产方式的新模式、农产品经营状态的新体系、农业领域管理服务的新思维,并通过大数据时代下群体智能、混合—增强智能与自主智能等人工智能技术的发展方向,展望了未来农业的应用前景,为我国智慧农业的发展提供理论基础。

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2Efy-ABzxUAAiUQng3Rto305.pdf

9．Wireless sensor network and internet of things (IoT) solution in agriculture

文献源：Pertanika J. Sci. & Technol,2019

摘要：This paper presents the technology of Active Radio Frequency Identification (RFID) and Wireless Mesh Sensor Network (WMSN) that will be used in agriculture. In this paper, ZigBee technology platform is applied in 2.45 GHz and active RFID to sustain the WSN by developing a fully automated IoT solution in agriculture for irrigation system. The system includes a plurality of sensor nodes installed in a crop field sending an ID, which are embedded sensor and WSN that work on ZigBee 2.4 GHz platform. The ID was sent to act as a signal of soil in dry condition of a specific area to a reader at base station. The pump stations will use information from base station to sprinkling water in the specific area of the dry state automatically. The automatic control system is very practical in agriculture but most of it is based on schedule and timer regardless of soil condition and temperature. Therefore, wireless automated irrigation system for efficient water use and production is proposed.

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2EhZeAOPPCAAzAKFZKwPk184.pdf

【研究报告】

1．スマート農業の展開について

发布源：农林水产省

发布时间：2019-07-01

摘要 :現在進められている我が国の強みを活かしたスマート農業の研究開発の状況をご紹介します。

链接:

http://agri.ckcest.cn/file1/M00/0E/C8/Csgk0F2Em3OAE5SpAEZsncJUdBM423.pdf

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