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【动态资讯】

1．DJI大疆创新AirWorks 2019：在全球发展安全可信的无人机行业创新生态

【中国日报网站】全球领先的无人机系统及解决方案提供商DJI大疆创新，今天在美国洛杉矶正式开启了AirWorks 2019的大幕。DJI大疆创新2016年在旧金山举办首届AirWorks，历经四年，AirWorks已经成为全球无人机行业极具影响力的行业应用开发者大会。Airworks 2019聚焦数据安全、行业应用生态、企业服务政策等主题。来自全球的无人机技术开发者与各行业无人机应用者在AirWorks 2019深度交流，把握产业迭代升级趋势。DJI大疆创新在此次AirWorks 2019上携手全球多家无人机开发者及战略合作伙伴，共同分享了最新的方案与技术成果，为全球无人机行业深入发展提供技术与服务支持。DJI大疆创新致力于进一步开拓无人机技术生态，与各个行业领域的开发者及合作伙伴在建立信任的基础上展开深度的技术合作，在数据安全、公共服务、农业、能源、建筑和基础设施等领域带来更多价值，推动行业发展。在AirWorks 2019持续3天的活动中，汇集了多场主题演讲与行业案例分享，包括防灾减害、缓解粮食危机、发展数字经济、转化科研成果等方面的积极实践。此外AirWorks 2019上还发布了多项行业新品以及最新企业服务政策等。 在开幕主题演讲中，DJI大疆创新发布了多项产品更新，尤其加强了无人机技术在全球农业市场的应用，包括：精灵4多光谱版无人机 ——这款新品首次将多光谱成像系统集成到轻巧便携的无人机平台上，可以为全球从事精准农业的组织提供高效的工具，大幅提升农田及环境数据信息获取效率，在土地资源管理和环境监管领域有着广泛的应用前景。T16植保无人飞机 ——这款产品在2018年首次在中国市场发布后，已经表现出卓越的作业效率，得到了用户的高度认同，此次T16面向全球客户发布，将行业第二代(2nd Generation)农业植保无人机产品带给全球农业用户。T16 植保无人飞机重塑了整体结构，采用模块化设计，把最大载荷提升到16升的同时，将作业喷幅提升至6.5米，流量提升至4.8升/分钟，最终将全体效率提升了 67%，到达 150 亩/小时。配

合强大的硬件协同 AI 智能引擎技术及三维作业规划功能，T16植保无人飞机为全球农业带来先进的智能植保飞防解决方案。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QDz-APbsaAAR4CkPlqCE440.pdf

2．数字乡村推动农业农村高质量发展

【河南日报】“鹤壁耕地面积虽少，却成为全省粮食稳产高产的重要基地，先后创造了25项全国粮食高产纪录，这得益于农业信息化建设的保驾护航。”鹤壁市农业农村局局长张波表示，鹤壁市正推动农业发展方式转型升级，并与全国整体推进型农业农村信息化示范基地建设相结合，加快推进信息化与农业现代化的深度融合。近年来，该市大力实施“数字农田”工程，在高标准农田项目区建成了“市有平台、县有中心、乡有信息站、田有采集点”覆盖全域的信息网络，并在全市81个粮油绿色高质高效创建示范片实现“双覆盖”，62个站点安装物联采集仪器，布设仪器2400台。同时，该市高效利用星陆双基遥感农田信息协同反演技术等现代信息技术应用，自动收集环境要素、农艺参数等并实时传输、智能分析、及时发布，做到农田生态环境、苗情、灾情的可视化、数据化处理，把预警信号、防范措施及时传递到农业生产一线，进一步提升了粮食生产现代化水平。据初步统计，通过实施“数字农田”等工程，鹤壁市小麦、玉米平均亩产分别增加36公斤、71公斤，化肥和农药利用率提高6%，每年每亩节约人工、化肥、排灌等成本133元，新增效益359元，在实现农业绿色发展的同时，促进了粮油增产、农业增效和农民增收。春天种什么对？买谁的农资服务最实惠…… 长期困扰鹤壁农民的这些问题，如今在该市农业信息化发展中一一得到解答。“依托益农信息社服务体系，通过云计算、大数据、物联网、移动互联网等技术手段以及线上线下相结合的网络和平台，为农民在农业生产、农技推广、农资买卖等方面提供了科学、精准、及时的信息服务。”农信通集团负责人李勇说。“让农业搭乘互联网快车、推进信息进村入户将是破解农村信息服务‘最后一公里’和农村物流‘最后一公里’难题的重要载体，也是推动鹤壁市农业转型升级、促进城乡发展一体化、提升农业现代化水平的重大举措。”鹤壁市农业农村局副局长胡全贵说。在鹤壁，益农信息社作为信息进村入户的重要载体，已经形成了“信息获取+农产品交易+农情咨询+远程诊断+基础服务+物流配送”的服务模式，开通了买、卖、推广、交费、业务代办、物流配送六大核心业务，将农业信息资源服务延伸到乡村和农户，助力鹤壁市农业农村高质量发展。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QC6CAXUsEAAKY_uV6KTI083.pdf

3．STEWARDSHIP IN ACTION IN CANADA: PRECISION AG DEMO DAY

【Aem.org】On Aug. 22, in Ottawa, Ontario, AEM held its second agricultural equipment demo day for Canadian regulators. This year's demo was held on a 5G research farm owned by the City of Ottawa. Over 50 policymakers from Agriculture Canada and the Pest Management Regulatory Agency came out to see equipment and speak with experts from Case IH, John Deere, New Holland and Trimble on the latest in guidance systems, data management, spray drift control and modern harvesting. "AEM is a leader in the sustainability conversation," said AEM Senior Director of Regulatory Affairs and Ag Policy Nick Tindall. "We are proud to represent so many member companies that put sustainability at the forefront of their design and manufacturing process. Not only does this benefit the environment, but it also helps farmers be more efficient with their time and resources." AEM partnered with the Grain Farmers of Ontario and the Canadian Seed Trade Association to provide the grower perspective and information on the importance of seed treatments. This was AEM's sixth agricultural demo day in North America. In all, these events have brought out over 300 U.S. and Canadian officials to learn about the investments the equipment sector is making in sustainability technologies. These demo days are part of AEM's overall advocacy efforts to educate policymakers about the importance of sound agriculture policy.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2RCT6ASYjQAAI-ZuQ3pUQ242.pdf

4．Advancing smart agriculture with 5G

【Gobalspec】Swiss telecom Sunrise, Huawei and Agroscope are teaming up to develop a smart agriculture infrastructure using 5G as the communications platform. Huawei is preparing to work with Sunrise to test how 5G can be used to help the Swiss Future Farm in Tänikon, Switzerland. The companies will look at which technologies will be useful for Swiss agriculture and help reduce the digital gap between rural and urban areas, especially in those regions that do not currently have fiber optic connections. While the companies are short on details regarding what farm applications will be tested using 5G, they said information will be provided at a later date. Even though 5G is in its infancy, companies are experimenting with ways to use the technology's high speed, high capacity and low latency for applications beyond smartphones. For instance, Huawei is exploring how to use 5G to accelerate intelligent agriculture in China in a partnership with smart farming vendor XAG.

Smart farming is just one of many applications being explored for 5G. Other ideas being floated include forming incubator hubs for self-driving vehicles and smart cities, exploring how robots can go farther and do more in the field, the future of television and how to improve emergency services.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2RBo-APFN7AAGKkoxIA4c155.pdf

5．遥感作“天眼” 农业更智慧

【河南日报】通过分析农作物遥感影像数据，可精准客观获取农作物种植面积、分布情况、农业灾害情况等，并可以预测作物产量，如同为农业生产装上了一双“科技眼”。在郑州举办的中国卫星导航与位置服务第八届年会暨中国北斗应用大会上，记者现场见证了河南省农业遥感监测技术的“神奇”之处。指导农业种植、保障粮食安全的“千里眼”。点开河南省农业遥感信息三维展示系统，省农科院农经信息所农业遥感研究室主任王来刚向记者一一展示：“这是我省秋季作物种植分布情况，这是示范区茶叶和大蒜种植分布情况…… ”屏幕上，各种作物的种植面积及结构一目了然，不仅可为政府决策提供参考，同时还可提前预测市场供给、指引相关商家在农产品收购上合理布置人力物力。及时发现农业灾情的“金睛火眼”。2018年郸城县冬小麦赤霉病分布图、2018年滑县冬小麦冻害遥感监测图…… 一张张我省农作物的灾情监测图，让人们认识了农业遥感监测技术的另一大用处。“以旱灾监测为例，过去需要大量人员带着土壤墒情检测仪一个点一个点采集数据，再层层上报，效率低、成本高，各种人为因素也会影响数据的客观性。”王来刚说，农业遥感监测技术效率高、范围大，实现了灾情监测数据的精准客观，可供农业决策部门及时作出反应，为制定抗旱救灾措施提供信息支持。同时，将遥感监测技术应用到农业保险中，可提高农业承保和理赔精度与效率，为农民尽快获得保险定损赔偿提供帮助。对农作物长势动态监测及产量进行预估的“未来眼”。河南省农业遥感监测中心周磊博士介绍：“我们每年在农作物关键生育期内定期开展小麦、玉米长势遥感监测，及时掌握农业生产情况。同时，融合气象数据，构建了河南省小麦产量预测模型，在收获前可以预测产量，为指导全省农业生产提供数据支撑。”

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QC6uACClcAAHzjrk0TEw384.pdf

6．壮丽70年 奋进新时代：现代农业快步走

【农民日报】近年来，北京市农业技术推广站小汤山农业科技展示基地进行了集约化育苗、工厂化生产、商品化加工、高效节水、绿色防控、秸秆利用等新技术的试验示范。

其中，叶菜工厂化生产环境洁净，环境控制、病虫害防治等环节标准化程度高，生产的蔬菜品质稳定。2012年以来，安徽省农垦集团龙亢农场开展物联网实践探索和示范应用，初步建成了远程监控、大田数据采集、农机作业监管、质量追溯等7大部分组成的物联网系统，提高了农业科研和农机使用效率。图为龙亢农场农业物联网应用示范中心实时远程监测，实施精准指挥、调度农机作业。江苏润易国际农业科技园坐落于江苏省宿迁市，该园区的设施大棚以种植果树为主，运用科学的限根栽培和环境控制技术，建立高标准的农业产业化基地，带动当地劳动力800余人就业。图为市场上售价80元一串的阳光玫瑰葡萄喜获丰收。1958年7月20日，第一台东方红—54型履带拖拉机开出了当时第一拖拉机制造厂的厂门，从此结束了中国不能生产拖拉机的历史。时光飞逝。2019年4月3日，200台东方红LX904自动驾驶拖拉机交付给内蒙古通辽市科尔沁汇双利农机合作社。这批预装了北斗农机自动驾驶系统的拖拉机能够实现精确到2.5厘米的精准作业，单台拖拉机就可完成从播种、中耕到收获的全过程自动作业。农业装备的进步是新中国成立70年以来，大家努力奋斗、大步迈向农业农村现代化的一个缩影。70年来，我国农业取得了举世瞩目的成就，今天的中国已成为世界第一农机生产大国和使用大国，农业生产方式实现了从主要依靠人力、畜力到主要依靠机械动力的历史性转变。同时，我国设施农业已成为世界上最大面积利用太阳能的工程，技术水平越来越接近世界先进水平。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QExKACJTsAAeBBAjQGBQ019.pdf

7．Eyes in the Sky Help Farmers on the Ground: Aerial imaging companies using high-resolution cameras and artificial intelligence data analysis are giving the agricultural community a high-tech boost.

【The New York Times】U.S. specialty crop growers are getting help in making their field conditions more visible with venture capitalists sinking billions in recent years into a growing number of agtech start-ups, writes Lauren Smiley at The New York Times. A share of this new crop of businesses is dedicated to what's known as precision agriculture — the Platonic ideal of providing just enough water, fertilizer, and pesticide that a crop needs for maximum yields in an era of climate change and increasing global population. The United Nations estimates that the world's growers will have to produce 70% more food using just 5% more land by 2050 — and technology is seen as the force that will get them there. Among the new start-ups are those flying planes over fields to capture highly detailed images, seeing factors that the naked eye and even satellites cannot. The flyovers use heavy,

sophisticated imaging cameras that provide growers with an unprecedented level of data about their crops, including where they need water or, just as importantly, where they already have enough. One company, Ceres Imaging, began in 2013 while its founder, Ashwin Madgavkar, a Texas-raised engineer, was working on his M.B.A. at Stanford University. Ceres uses high-resolution cameras to capture various wavelengths of the electromagnetic spectrum — measuring the amount of light reflected by the crops in near-infrared as well as green, blue and red edge.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2RDRWAD9ACAAJA_52Kxwg698.pdf

8．Sensor Trends in Agriculture: Finding the Balance Between Affordable and Expensive

【Precisionag】Sensor technology in agriculture is inescapable today. From farm equipment, to irrigation, to weather, sensor technology is firmly engrained in the industry. However, there is a fundamental question that remains largely unanswered, which is, what is the right number of sensors to have or install? Prices of sensors have reduced significantly in recent years as technology has advanced. This closely follows other trends, such as the reduction in prices of computers, cameras, and TVs as reported by the Bureau of Labor Statistics. In the agriculture industry, this has resulted in a proliferation of sensor technology and an enormous amount of largely untapped data. The effect of advancing sensor technology is twofold. First, simple sensors have become fairly affordable and ubiquitous, and second, some sensors have become significantly more advanced and retain a high price tag. Agriculture technology companies tend to be on either side of this divide. Some push for large amounts of simple sensors to better capture and address field-scale variability, while others encourage the deployment of a single, or small number of, advanced sensors that tend to be more expensive.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2REDmAE5lyAASHgOYTJrQ746.pdf

9．XAG introduces drone technology to combat fall armyworm pests

【英国财经新闻】China-based XAG has announced it has introduced automous drones to improve pest control efficacy against disease caused by fall armyworms, the company said. XAG is among the first to introduce fully autonomous drones in some of the most affected countries, such as Zambia, South Africa, Vietnam and China, to improve the control efficacy

that has originally been limited to manual spraying. XAG has discovered that in the worst hit Africa and Asia, the absence of smart devices, the unique natural habits of fall armyworm and farmers' lack of professional expertise have resulted in a rapid large-scale infestations. Fall armyworms are a highly destructive pest species native to tropics and sub-tropics of the Americas, they have aggressively invaded more than 100 countries and devastated millions of hectares of crops since 2016. It is the 'crop-devouring monster' that attacks over 80 crop varieties but has high preference for maize. At its larval stage, it can cause great damage to the leaf, stem and cob of the maize plant and munch the entire cornfield almost overnight. At the end of its lifespan, as a moth, this pest can fly up to 100km in one night and lay as many as 1,000 eggs during its lifetime. With strong migration and reproductive abilities, fall armyworms crossed the Atlantic for the first time and landed in Africa in early 2016, then quickly spread to most Asian countries in July 2018. As for Africa alone, the annual yield loss of the 12 maize-producing countries is estimated at USD 4.6 billion in 2018. XAG's precision UAS spraying solution can suppress the encroachment of fall armyworm through large-scale emergency action involving minimal physical labour. Drone swarm operation can besiege the infested croplands and kill the pests en mass within a large area to reduce moth migration. The drone can safely operate after sunset, working on the nocturnal pests. XAG is an agriculture technology company and industrial UAS manufacturer that developed drones, internet-of-things (IoT), artificial intelligence (AI) and other digital farming tools for precision seeding, fertilising and spraying.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2RDoOAdXJ6AADBDz10AOI320.pdf

【文献速递】

1．基于超像素特征的苹果采摘机器人果实分割方法

文献源：农业机械学报,2019

摘要：针对苹果采摘机器人在自然环境下对着色不均匀果实的识别分割问题，提出了基于超像素特征的苹果采摘机器人果实分割方法。首先采用高效的简单线性迭代聚类（Simple linear iterative clustering，SLIC）超像素聚类算法将图像分割成内部像素颜色较为一致的若干超像素单元，然后提取每个超像素的纹理和颜色特征，并采用支持向量机（Support vector machine, SVM）将超像素分为果实和背景两个类别，最后根据超像素之间的邻接关系对分类结果进行进一步修正。实验表明，该方法能够正确分类大部分超像素单元，平均每幅图像被错误分类的超像素约为2.28个。通过与采用像素级特征的色差法和采用邻域像素特征的果实分割方法相比，采用超像素特征的果实分割方法具有更

好的分割效果。在进行邻接关系修正前，该方法图像分割的准确率达92.14%，召回率达85.65%；平均识别分割一幅图像耗时0.7925 s，基本满足实时性需求。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QRhKAbqN4AA00QpiHvP4307.pdf

2．Fluorescence imaging for rapid monitoring of translocation behaviour of systemic markers in snap beans for automated crop/weed discrimination

文献源：Biosystems Engineering,2019

摘要：Investigating the translocation behaviour of fluorescent markers is significant for the effective application of the markers in weed and crop differentiation. Snap bean was used as a model plant to study the systemic movement of Rhodamine B (Rh-B) in specialty crops for weed control. A fluorescence imaging system was developed to monitor the uptake and translocation of Rh-B from dyed snap bean seeds to bean plants. Bean samples were dyed using different concentrations of Rh-B solutions. As the concentration of Rh-B applied to the seeds increased, the fluorescent signal of the marker was at first enhanced, then weakened. After germination, this marker was observed from the stems of bean seedlings at stages of first leaf to multiple leaves over time. The fluorescence response on the hypocotyl was stronger than that on the epicotyl, while there was limited translocation observed in plant roots and leaves based on this fluorescence imaging system. The fluorescence peak at 590 nm, measured by a spectrometer (3501050 nm), exhibited the greatest contrast between untreated and treated plant samples. The proposed crop signalling approach based on Rh-B emission was able to classify snap bean plants from different weeds (e.g. burning nettle, groundsel, and barley). The results demonstrate that fluorescence imaging technology is a rapid and effective approach to studying the real-time translocation behaviour of a signalling marker in a crop system. Based on the unique fluorescence property, visualisation of the marker in vivo specialty crops grown from Rh-B treated seeds provides potential for their successful application in early season weed discrimination.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2Q-YGAamhBABd_-tGobVQ125.pdf

3．Architecture framework of IoT-based food and farm systems: A multiple case study

文献源：Computers and Electronics in Agriculture,2019

摘要：The Internet of Things (IoT) is expected to be a real game changer in food and farming.

However, an important challenge for large-scale uptake of IoT is to deal with the huge heterogeneity of this domain. This paper develops and applies an architecture framework for modelling IoT-based systems in the agriculture and food domain. The framework comprises a coherent set of architectural viewpoints and a guideline to use these viewpoints to model architectures of individual IoT-based systems. The framework is validated in a multiple case study of the European IoF2020 project, including different agricultural sub sectors, conventional and organic farming, early adopters and early majority farmers, and different supply chain roles. The framework provides a valuable help to model, in a timely, punctual and coherent way, the architecture of IoT-based systems of this diverse set of use cases. Moreover, it serves as a common language for aligning system architectures and enabling reuse of architectural knowledge among multiple autonomous IoT-based systems in agriculture and food.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QUAqAav2IAGo4UYv8xGM835.pdf

4．结合数据融合算法的光能利用率模型反演水稻地上部生物量

文献源：江苏农业学报,2019

摘要：水稻作为世界范围内的重要粮食作物,其生长状况与产量信息的快速、精确获取,对保障耕地资源安全与粮食安全具有重要意义。本研究探索结合数据融合算法的光能利用率模型反演水稻地上部生物量,将增强型空间和时间自适应反射融合模型(ESTARFM)预测的水稻关键生长期数据,驱动EC-LUE(Eddy covariance-light use efficiency)模型反演水稻地上部生物量,分别验证2个模型的精度。结果显示,ESTARFM算法预测值与真实值的Pearson相关系数为0.668(P<0.001),对于中型耕地(11 ~ 50个Landsat像元),ESTARFM算法预测精度最为理想。EC-LUE模型反演的水稻地上部生物量预测值与地面实测值Pearson相关系数为0.630(P<0.001)。EC-LUE模型驱动数据的空间分辨率与时间分辨率是制约反演结果精度的关键因素。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QRtmAS_abABVPF4V7znA082.pdf

5．基于Google Earth Engine与多源遥感数据的海南水稻分类研究

文献源：地球信息科学学报,2019

摘要：水稻是中国乃至亚洲的重要粮食作物之一,稻米产量关系到民生福祉。及时、准确的水稻分布信息是监测水稻产量、调控农业资源配给的基础。遥感(Remote Sensing)

技术能够提供大范围地表的时间序列光谱变化特征,常用于大尺度范围的作物监测。然而,传统基于水稻生长关键时期光谱特征的分类、提取方法对遥感数据的时间分辨率要求较高。由于我国南方水稻产区湿热,雨季云污染降低了遥感数据的有效时间分辨率,因此上述方法在该地难以推广。融合多源遥感数据的分类方案变相缩短了卫星的重访周期,使多云气候区基于遥感影像的水稻分类成为可能。然而,集成多源数据所需更高的数据处理效率和存储需求也成为限制省级乃至更大范围水稻分类的主要因素。本研究基于谷歌地球引擎(Google Earth Engine)云平台,在线调用中分辨率的光学、微波遥感数据,创新性地采用了按月提取、按直方图大小提取特征的方式,采用随机森林分类器,绘制海南省2016年10 m分辨率水稻种植分布图。实验结果证明,该方法可以用于南方多云地区水稻分类,提取结果能够体现不同地类之间的差异,且与实际地表的地块边界、纹理符合良好。经过地表样本点的验证,总体精度为93.2%,满足实际应用需求。因此,本研究采用的自动分类流程能够准确、高效地提取海南省的水稻种植范围,可以向其他地区大范围推广。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QSUaACqcbAB4IgzU1pkM964.pdf

6．Development of an autonomous mobile plant irrigation robot for semi structured environment

文献源：Procedia Manufacturing,2019

摘要：The aim of this research is to develop an autonomous mobile plant irrigation robot. The system uses an Xbee Series 1wireless communication to communicate between the mobile robot and a moisture sensing module which is fully adaptive to a semi-structured environment taking into account the watering needs of the plants. Other components are microcontroller, an on-board water reservoir and an attached water pump. The performance evaluation of the autonomous irrigation robot was based on the analysis of the water carrying capacity, distance of watering per cycle, and time requirements to water a given area of land. It shows that 5 litres of water can be maintained for 150 seconds by the robot. The soil moisture data at different times of the day deduced that the moisture content during the day was lower than after irrigation was carried out. The efficiency of the irrigation robot was also examined by the relationship between volume of water carried and the speed of the mobile robot. It shows that 0.38 N torque would permit the movement of the robot by 1 m at a water carrying capacity of less or equal to 3. 5 litres. The autonomous plant irrigation robot system constructed based on ZigBee overcomes the limitations of the fixed sprinkler system and avoids large space consumption.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QUOKAQhuyAAij44Sr1_A538.pdf

7．CCI遥感土壤水在东北粮食主产区表征干旱的准确性评估

文献源：北京师范大学学报(自然科学版),2019

摘要：针对长时间序列土壤湿度数据集在国内缺乏验证和应用的问题，利用东北粮食主产区1992—2013年土壤10cm表层实测站点数据，采用2种评估方法，即皮尔逊相关绝对法和干旱判断吻合度相对法，对欧洲空间局气候变化倡议(climate change initiative，CCI)的土壤湿度数据集，融合遥感土壤水数据产品在东北粮食主产区表征干旱的准确性进行评估。2种分析结果表明，CCI遥感土壤水在判断东北粮食主产区干旱事件上具有较高的准确性，可以作为东北粮食主产区内表征干旱的有效指标开展农业干旱评价研究。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QQ4OAB7mnACWvWuAaq7g900.pdf

8．低空遥感平台下可见光与多光谱传感器在水稻纹枯病病害评估中的效果对比研究

文献源：光谱学与光谱分析,2019

摘要：高效无损地评估农作物病害等级,对于实际农业生产和研究都具有重要意义。研究探讨了基于低空无人机遥感平台进行水稻纹枯病病害等级评估的可行性,分析可见光与多光谱传感器的光谱响应差异及其对感病水稻光谱反射率获取的影响,并定量对比两种传感器的病害监测效果。实验研究区由67个不同品种的水稻小区组成,每块小区均分为相接的纹枯病接种区和侵染区。以大疆精灵Phantom 3 Advanced小型消费级无人机作为搭载平台,分别搭载该无人机系统自带的可见光传感器和MicasenseRedEdgeTM多光谱传感器获取遥感影像。同时,通过植保专家现场调查的方式识别病害等级,并利用Trimble公司的手持式NDVI测量仪获取实测NDVI值。基于影像拼接、波段叠合、辐射校正后的预处理结果,对可见光图像的接种区和侵染区共134个小区计算七种可见光植被指数,即NDI（normalized difference index）, ExG（excess green）, ExR（excess red）, ExG-ExR, B*, G*, R*,多光谱图像除上述可见光指数外再计算NDVI（normalized difference vegetation index）, RVI（ratio vegetation index）和NDWI（normalized difference water Index）三种多光谱植被指数。将计算得到的图像植被指数与地面实测NDVI进行相关性分析,以选取两种传感器的最优图像植被指数建立水稻纹枯病病害等级反演模型。相关性分析结果表明,基于多光谱传感器计算的图像NDVI与实测NDVI拟合度最高,接种区R2为0.914, RMSE为0.024,侵染区R2为0.863, RMSE为0.024。对于可见光传感器, NDI与实测NDVI的相关性最好,接种区R2为0.875, RMSE为0.011,侵染区R2为0.703, RMSE为0.014。比较两种传感器两

种区域的同一图像植被指数与实测NDVI的一致性,除B*外, NDI, ExR, ExG-ExR, G*, ExG, R*与实测NDVI基本属于高度相关,在病害严重的接种区,两种传感器对水稻纹枯病的监测效果相近,但在病害相对较轻的侵染区,多光谱传感器的监测更为精确灵敏。基于多光谱图像NDVI建立的病害等级反演模型,R2达到0.624, RMSE为0.801,预测精度达到90.04%,模型效果良好。而基于可见光图像NDI建立的反演模型,R2为0.580, RMSE为0.847,预测精度为89.45%,效果稍差。对比分析可见光与多光谱传感器的光谱响应曲线,可见光传感器可获取可见光范围的红、绿、蓝三个波段,波段范围互相重叠,多光谱传感器包含五个成像单元,可独立获取从可见光到近红外的五个窄波光谱波段,提供更加准确的光谱信息。比较传感器获取的接种区和侵染区水稻平均反射率曲线得出,多光谱传感器不仅在可见光波段反映了较可见光传感器更强的差异,在红边和近红外波段差异则更加明显,这说明专业窄波段传感器在病害监测方面较宽波段消费级传感器更有优势。综上所述,基于可见光与多光谱传感器的低空无人机遥感平台进行水稻纹枯病病害等级评估是可行的,多光谱传感器精确灵敏,可用于纹枯病的早期监测,可见光传感器效果稍差但经济易于推广。研究结果为病虫害防治提供决策支持,有助于推动实现精准农业,保障粮食安全。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QR8KAc8SMADqQhnUZWlg539.pdf

9．Sensing, smart and sustainable technologies for Agri-Food 4.0

文献源：Computers in Industry,2019

摘要：Currently, the agri-food sector takes advantage of modern machinery, tools and emerging information and communication technologies (ICTs) that consider the Internet of Things (IoT) capabilities. These implementations have given way to a new era of agri-food production called ‘Agri-Food 4.0’, where automation, connectivity, digitalisation, the use of renewable energies and the efficient use of resources are predominant in this sector. In this article, the ‘sensing, smart and sustainable (S3)’ concept is applied to develop new technologies that can respond to current challenges of agri-food industries. Therefore, this work focuses on describing how S3 technologies for the agri-food sector can be developed using a systematic process for new product development (NPD). The main objective of this work is to fill the gap vis-à-vis the current lack of design roadmaps that permit the development of this new generation of products in the context of agri-food 4.0. Finally, this work presents case studies of S3 technologies applied to the agri-food sector: an intelligent greenhouse, a sun tracker trajectory, an hexapod robot for field monitoring and an agricultural drone.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2Q9s-AZamOACmmrnWhtjU870.pdf

10．Evolution of Internet of Things (IoT) and its significant impact in the field of Precision Agriculture

文献源：Computers and Electronics in Agriculture,2019

摘要：During recent years, one of the most familiar name scaling new heights and creating a benchmark is Internet of Things (IoT). It is indeed the future of communication that has transformed Things (Objects) of the real world into smarter devices. The functional aspect of IoT is to unite every object of the world in such a manner that humans have the ability to control them via Internet. Furthermore, these objects also provide regular as well as timely updates on their current status to its end user. Although IoT concepts were proposed a couple of years ago, it may not be incorrect to quote that this term has become a benchmark for establishing communication among objects. In context to the present standings of IoT, identification of the most prominent applications in the field of IoT have been highlighted and a comprehensive review has been done specifically in the field of Precision Agriculture. This article evaluates contributions made by various researchers and academicians over the past few years. Furthermore, existing challenges faced while performing agricultural activities have been highlighted along with future research directions to equip novel researchers of this domain to assess the current standings of IoT and to further improve upon them with more inspiring and innovative ideas.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QTsiAB_QBAB9-Fe1Szuk490.pdf

11．Adapting weather conditions based IoT enabled smart irrigation technique in precision agriculture mechanisms

文献源：Neural Computing and Applications,2019

摘要：Precision agriculture is the mechanism which controls the land productivity and maximizes the revinue and minimizes the impact on sorroundings by automating the complete agriculture processes. This projected work relies on independent internet of things (IoT) enabled wireless sensor network (WSN) framework consisting of soil moisture (MC) probe, soil temperature measuring device, environmental temperature sensor, environmental humidity sensing device, CO_2 sensor, daylight intensity device (light

dependent resistor) to acquire real-time farm information through multi-point measurement. The projected observance technique consists of all standalone IoT-enabled WSN nodes used for timely data acquisitions and storage of agriculture information. The farm history is additionally stored for generating necessary action throughout the whole course of farming. The work summarizes the optimum usage of irrigation by the precise management of water valve using neural network-based prediction of soil water requirement in 1 h ahead. Our proposed irrigation control scheme utilizes structural similarity (SSIM)-based water valve management mechanism which is used to locate farm regions having water deficiency. Moreover, a close comparative study of optimization techniques, like variable learning rate gradient descent, gradient descent for feedforward neural network-based pattern classification, is performed and the best practice is employed to forecast soil MC on hourly basis together with interpolation method for generating soil moisture content (MC) distribution map. Finally, SSIM index-based soil MC deficiency is calculated to manipulate the specified valves for maintaining uniform water requirement through the entire farm area. The valve control commands are again processed using fuzzy logic-based weather condition modeling system to manipulate control commands by considering different weather conditions.

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2Q_pCAbEydADqw7qcnhX8249.pdf

12．电动多旋翼植保无人机升力特性综合测评方法

文献源：农业工程学报,2019

摘要：升力特性是电动多旋翼植保无人机性能测试的重要参数之一。为了实现对电动多旋翼植保无人机升力特性的性能检测,针对不同型号、不同规格的电动多旋翼植保无人机在评价过程中存在无统一的评价指标问题,该文提出了一种半系留式电动多旋翼植保无人机升力特性的测试与评价方法,包括性能检测平台、升力特性测试方法及指标、升力特性的评价方法。为了验证方法的可行性,对3种不同机型(分别为四旋翼机型Ⅰ、六旋翼机型Ⅱ、八旋翼机型Ⅲ)进行了升力特性指标的性能测试试验。试验结果表明:3种机型在功率载荷、重量效率、热效比等方面有较大差异,功率载荷最好的机型Ⅲ比最差的机型Ⅰ大7.6 m N/W,重量效率最好的机型Ⅰ比最差的机型Ⅱ大0.33,热效比最好的机型Ⅲ比最差的机型Ⅱ大10.5 N/℃,反映出3种机型在设计过程中整个动力系统效率、机型整体结构和材料选择上的差异,从而在整机作业性能上表现出差异。在上述指标测试的基础上,结合无人机动力系统数学模型,提出了运用功率载荷、重量效率和热效比进行电动

多旋翼植保无人机升力特性综合评价的评分方法,对上述3种机型进行综合评分的结果为:机型Ⅲ>机型Ⅰ>机型Ⅱ,该结果表明所提出的评价方法能有效对不同类型电动多旋翼植保无人机的升力特性进行综合评判。该文所给出的测试与评价方法,不仅能用于电动多旋翼植保无人机性能的评测,还能为机型性能的进一步改进提供参考。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QRBmAAzyqABM-1KlUUSs888.pdf

13．中国农业航空发展现状及对策建议

文献源：农业工程学报,2019

摘要：农业航空是现代农业的重要组成部分,为全面、深入地了解中国农业航空行业的发展现状和趋势,同时反映行业面临的困难和问题,增强社会公众对农业航空的了解和认知,推动农业航空行业的健康快速发展,农业航空产业技术创新战略联盟秘书处组织编写了《中国农业航空行业发展报告》。该文以该报告为基础,从有人驾驶航空器和无人驾驶航空器涉农航化作业2个方面对近年来中国农业航空行业的发展情况进行了综述,比较全面地展示了中国农业航空行业的总体状况,分析了目前行业发展中有人驾驶航空器农林航化作业时间稳步增长、无人驾驶航空器发展势头良好的特点,以及在行业标准、法规体系、核心技术以及配套经营主体、社会化服务等方面存在的亟待解决的主要问题:行业标准规范的建设滞后,尚未形成完善的标准化体系;农业航空相关政策及法规体系不健全;研发经费投入不足,共性核心关键技术研究滞后;发展模式未成型,社会化组织的服务能力不强;企业规模小,产业结构不合理,市场无序竞争。随后,针对上述问题,该文从管理、模式、标准、创新、应用和政策6个方面提出了进一步促进中国农业航空行业健康发展的对策与建议,包括应进一步明确中国农业航空的管理办法、探讨中国农业航空的发展模式、加强技术标准和规范的制定、加强关键技术协同创新研究、加强技术推广应用以及制定促进中国农业航空发展的政策等,可为政府引导行业发展和企业规划自身发展提供参考。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2QRR-ATLriAGUWS0Zr-9A132.pdf

【行业报告】

1．2019全国县域数字农业农村电子商务发展报告

发布源：农业农村部信息中心

发布时间：2019-04-20

摘要：《2019全国域数字农业农村电子商务发展报告》对全国县域电商发展现状、发展

特点、存在问题进行深入分析，预测未来县域电商市场的发展趋势，旨在加强政策引导，推动县域电商高质量发展，促进电商扶贫工作的有效开展，助力乡村振兴。

链接:

http://agri.ckcest.cn/file1/M00/0E/CA/Csgk0F2REhyAfOo-ADn6Swa03lQ563.pdf

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