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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．农业农村部部署开展“互联网+饲料监管”工作

【中国农网】“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，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。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。

链接:

http://www.farmer.com.cn/2019/09/04/842464.html

2．Robots, drones and the future of farming

【Euronews】On this week's episode of Futuris, Euronews visits a hazelnut orchard in Italy to see how the new generation of robots can help farmers and agronomists make agriculture cheaper and more environmentally friendly. Italy produces more than 100,000 tonnes of hazelnuts per year. That’s hard labour. Very large farmlands, like the research hazelnut orchard in Ronciglione, inevitably risk wasting water, pesticides, fertiliser and other resources: all plants across large areas have to receive the same treatment, whether they need it or not. To solve this problem, researchers are working to make plant treatment more precise. One of those researchers is Tuscia University agronomist Valerio Cristofori: “Precision farming allows us to carry out targeted treatments at the right time with the right quantities, depending on the actual needs of the plant — something that traditional

agriculture today tends to neglect.” Autonomous Robots： A PANTHEON project robot moves through the orchard, stops and uses its camera to take images Determining the individual needs of each plant would take humans too much time and effort, so that’s where robots could help. This prototype is being developed to move around a hazelnut orchard autonomously, taking measurements of the trees. Renzo Fabrizio Carpio is a robotics engineer at Roma Tre University: “We collect data with a laser scanner for 3D geometric reconstruction, and we use cameras to take multi-spectral and high-resolution images to assess the physical or health status of each tree.” 3D Mapping： The robots send their data to a centralised computer system, also developed by the European research project PANTHEON. An easy-to-use interface helps agronomists with everything they need to make their decisions — from weather data to detailed information on how the plants are doing. Sigma Consulting web developer Silvia Samà works with the researchers at Roma Tre University's laboratory. “In the future, there will also be a 3D model of each tree," she says, "with the recommended treatments — should it be pruned, is it well-watered, well-fertilised, with the whole farming history of that particular plant." The engineers use motion-capture technology and autonomous driving algorithms to make the robot as accurate as possible. One of the goals is for the robot to use a special paint marker so it can label tree branches that need to be pruned. “We’re talking about marking branches so we put a lot of effort into the aiming algorithm, taking into account everything from the wind speed to the position of the tree and the robot, all the uncertainties that could be simulated digitally,” explains Flavio Palmeri, an automation engineering visiting student at Roma Tre University. An Eye in the Sky： And to inspect large orchards even faster, researchers from the ULB University in Brussels are working with their colleagues at TRIER university on an autonomous drone: its cameras help to determine irrigation needs, find pests or disease and predict the harvest from the sky. All these new methods have clear commercial application, says Andrea Gasparri, Professor of System and Control Theory at Roma Tre University and a PANTHEON project coordinator: “The main players in the confectionery industry are certainly interested in this type of technology, simply because they’ll be able to boost the production quality while minimising the environmental impact — which is something that the major players have recently been showing an interest in.” Researchers say their robots won’t replace human workers. They will, in a nutshell, take care of some tedious tasks and cut down on pollution and waste.

链接:

https://www.euronews.com/2019/09/02/robots-drones-and-the-future-of-farming

3．卫星勘察种植面积、多光谱相机为农田精准把脉——高科技让吉林农业更加智能化?

【农业科技报】笔者近日从吉林省的多个科研院所了解到，卫星、无人机、多光谱相机等越来越多的科技手段在田间地头大展身手，过去靠天吃饭的传统农业变得更加科学化、智能化。 过去勘察种植面积，需要人靠脚力一步步去丈量计算。如今，太空中的卫星只需“一眨眼”的功夫，就能轻松探测农田情况。长光卫星技术有限公司负责“吉林一号”卫星农林领域应用的工作人员曲春梅说，“吉林一号”遥感卫星通过获取植被指数影像，根据植被反射不同波段光的比例形成数据信息，从而反映出农作物的长势、产量、出苗率等，200平方公里的农田仅用半个小时就能成像。“卫星种田”技术已经在吉林省农安县等地开展试点。 将重量仅为190克的新型多光谱相机安装到无人机上，绕田地飞行一周，再将获取的数据信息传输至软件，农民便直接掌握该片农作物长势及病虫害信息。新型多光谱相机研发者、中国科学院长春光学精密机械与物理研究所副研究员张军强说，过去农民种地主要靠经验，根据肉眼观察农作物颜色判断长势，这样的传统方法存在精细度不足等缺陷，而光谱相机的查看轻松便捷，图像可以直接形成处方图，农民能对症下药，为农田精准“把脉”。该项技术已经在吉林省公主岭市等地开展试点。 中国科学院东北地理与农业生态研究所农业遥感团队也研发出田间精准管理技术等一系列农情监测方法，助力智能农业。该所遥感与地理信息中心研究员刘焕军介绍，利用土壤与农作物遥感监测模型、大数据分析等技术，可以对田块内部土壤、作物长势、灾害、产量进行时空间动态监测，最终通过农情信息精准服务平台与智能手机客户端反馈给用户。农民打开手机，就能得到施肥、田间管理、防灾减灾预警等个性化指导。 “随着科学技术在农业生产上的广泛应用，越来越多的农田告别过去‘面朝黄土背朝天’的传统耕作方式。”刘焕军说，“智慧农业正逐渐向田间地头普及。”

链接:

http://eb.nkb.com.cn/nykjb/20190902/html/page_04_content_002.htm

4．Hand-versus machine-harvested juice and cider apples: A comparison of phenolic profiles

【Eurekalert】A study out of Washington State University sought to determine if there is a measurable impact of harvest method on the phenolic profile of 'Brown Snout' juice and cider to better inform equipment adoption. Travis Alexander, Thomas Collins, and Carol Miles also evaluated whether different extraction methods would yield differing output in either quantity or quality of 'Brown Snout' apple juice and cider. Their comprehensive

findings are illustrated in their article, "Comparison of the Phenolic Profiles of Juice and Cider Derived from Machine- and Hand-Harvested 'Brown Snout' Specialty Cider Apples in Northwest Washington" as found in the open-access journal HortTechnology, published by the American Society for Horticultural Science. Phenolics are secondary metabolites that have attracted increasing interest in science and industry in recent years due to their beneficial health effects, primarily for their antioxidant properties. They have been proven to act as reducing agents to free radicals. Phenolics contribute significantly to the sensory profile of fermented cider, especially in those made from cider apple fruit. "Phenolics can impact the pressing of fruit, the clarification of juice, the maturation of cider, and final cider quality, including the attributes of aroma, color, taste, and mouthfeel. And so, we wanted to determine if there was a change in phenolics due to harvest method" stated Collins. "The 'Brown Snout' specialty cider apple is desired by cider makers for its relatively high levels of phenolics, and over-the-row machine harvesting of 'Brown Snout' has been demonstrated to provide similar yield to hand harvest at a significantly lower cost" says Alexander. To carry out their research, Miles said they planted a block of 'Brown Snout' apple trees on a low trellis system so that trees were a suitable size to fit the over-the-row small fruit harvester. Each of the eight main plots consisted of an average of nine trees. When the fruit was fully ripe, harvesting was divided equally between hand harvesting by four relatively unskilled agricultural workers and machine harvest by an over-the-row small fruit harvester. When application of the two harvest methods was complete, equal qualities of 'Brown Snout' apples were randomly selected from each yield supply for further evaluation. The selected fruit were pressed separately and fermented and allowed to mature for 5 months before final assessments were conducted. At that time, the researchers determined that harvest method and duration of storage were nonsignificant for all parameters measured on juice and cider samples. Over-the-row machine harvesting resulted in a final product of similar quality at reduced labor costs, and thus shows potential for increasing the commercial sustainability of cider apple operations. The complete article is available on the ASHS HortTechnology electronic journal web site:https://journals.ashs.org/horttech/view/journals/horttech/29/4/article-p423.xml. DOI: https://doi.org/10.21273/HORTTECH04342-19 . Or you may contact Travis Alexander of Washington State University at travis.alexander@wsu.edu or call him at (360) 848-6120.

链接:

http://agri.ckcest.cn/HTTPS://WWW.EUREKALERT.ORG/PUB_RELEASES/2019-08/ASFH-HVM083019.PHP

5．2022年基本实现建制村电商配送全覆盖

【经济日报】近日，交通运输部、国家邮政局等18个部门联合印发《关于认真落实习近平总书记重要指示推动邮政业高质量发展的实施意见》（简称《意见》）。《意见》明确提出，到2022年基本实现建制村电商配送全覆盖。交通运输部新闻发言人孙文剑介绍，《意见》从加快结构调整、提高服务质量等6个方面提出了18项重点任务，鼓励规范新业态健康发展。《意见》指出，到2022年，我国基本建成普惠城乡、技术先进、服务优质、安全高效、绿色节能的邮政快递服务体系，形成覆盖全国、联通国际的服务网络。基本实现邮政“村村直通邮”、快递“乡乡有网点”，通过邮政、快递渠道基本实现建制村电商配送服务全覆盖；建成20家以上的行业科技研发中心，行业自动化分拣率超过90%，电子运单使用基本实现全覆盖；完成寄递渠道安全监管“绿盾”工程建设；智能快件箱投递率上升到12%以上，重点快递企业国内重点城市间实现48小时送达。到2035年，基本建成现代化邮政快递服务体系，行业科技创新和应用处于世界领先水平，邮政和快递网络覆盖全国城乡、通达世界各国，行业治理体系和治理能力现代化基本实现，拥有若干家具有较强国际竞争力的跨国企业集团，我国在世界邮政业的话语权和影响力进一步提升，进入世界邮政强国行列。

链接:

http://country.people.com.cn/n1/2019/0830/c419842-31327683.html

6．直播无人机运输松茸全流程 多式联运助推甘孜农业提速增收

【农业科技报】无人机搭载松茸出山、自动化分拣、路铁空联动运输……8月22日，顺丰利用一件件“黑科技”运载着刚采摘的新鲜松茸，从四川甘孜运往全国各地消费者的餐桌，并通过澎湃直播的镜头记录了松茸运输的全流程。 从直播画面中可以看到，由无人机、冷藏车、飞机、高铁等多种运力工具组成的顺丰松茸多式联运方案已然成型。一架架搭载着新鲜松茸的无人机，从深藏于崇山峻岭的原始森林腾空而起，在基地指挥负责人的调度下，安全抵达无人机基地。过去需要村民徒步几个小时才能完成的运输任务，如今仅需几分钟。无人机抵达基地后，将由顺丰货车接力运输，将松茸统一发往预处理中心，进行筛选和预处理后，集中打包发货运往全国。 顺丰相关负责人介绍，采用无人机运输后，松茸下山的效率相对以往提升了4倍。直播中所测试的无人机直飞预处理中心的模式，因无需在基地中转，可减少松茸装卸环节，缩短40分钟的货车接力车程，从源头为松茸运输增速提鲜。 针对川西地区农特产品外运的需求，顺丰制定了全套物流无人机综合供应链解决方案。除无人机配送服务外，顺丰还在当地搭建了无人机标准化起降平台、无人值守柜等智能化的基础设施。同时通过建设无人机通信网络，利用通

信系统实时传输气象信息，及时向基地工作人员发出极端天气预警，以保证无人机的高效运营。甘孜无人机场景的顺利落地，意味着顺丰实现了从平原到水上再到高原不同运行环境下的应用探索，在无人机低空物流网络建设上日趋成熟，其整体服务能力也得到了有效提升。黑科技的入局为甘孜松茸产业的积极健康发展提供了助力。今年，由顺丰建立的全国首个松茸预处理中心已投入使用，通过引入自动化分拣设施，解决了传统人工分拣效率低、品控不一的难题。此外，采用多式联运方案后，顺丰可在48小时内将甘孜松茸发往全国300多个城市。

链接:

http://eb.nkb.com.cn/nykjb/20190829/html/page_02_content_001.htm

7．首届农产品质量安全高峰论坛聚焦“互联网+”农产品质量安全管理

【农民日报】随着大数据、云计算、物联网、人工智能等基础信息技术不断地突破，一场更大范围、更深层次的科技革命和产业变革正在扑面而来，农业科技创新工作也迎来新的机遇和挑战。“互联网+”监管“信用+”监管已成为转变农业发展方式的新路径、新方法。8月23日，首届农产品质量安全高峰论坛在浙江省宁波市举行。来自国内农业大数据、电商、品牌建设、追溯管理及信息化监管领域的专家、学者们齐聚一堂，共同探讨如何推进“互联网+现代农业”发展，运用现代信息技术手段改造提升传统农业，创新变革农产品质量安全管理模式。

链接:

http://country.people.com.cn/n1/2019/0828/c419842-31322065.html

8．界面可视化技术直观揭示水生植物根际异质性氧环境变化特征和机制

【中国科学院南京地理与湖泊研究所】长期以来，利用水生植物控制湖泊污染并重建良好水生态环境一直是湖泊领域中的研究热点。水生植物根系生长发育和生理代谢等活动会导致其在根系附近沉积物中形成不同于非根际环境的根际微生态系统，这决定了各种污染物质的迁移、转化和生物的有效性，被认为是湖泊污染的生态修复的核心区域。因此，开展根际微环境特征研究，对揭示界面污染过程与控制机制具有重要意义。根际环境具有明显的微域性、动态性和复杂性的特点，而现有研究手段存在界面破坏性、一维、低分辨、操作繁琐等不足，无法准确捕获根际环境界面参数变化信息；而采用二维、高分辨并且可实时监测的界面可视化技术，则可全面阐释生态微界面过程和机制。中国科学院南京地理与湖泊研究所副研究员韩超利用自主研制的根际界面可视化装置，成功获取了典型修复先锋物种——菹草和马来眼子菜等的根际泌氧动力学特征及控制机制(如图)。该研究首次报道了菹草等眼子菜属植物独特的根系泌氧方式；同时原位、定量获

取了湖泊外界环境变化如光照、温度和水体溶氧条件对根际微区氧环境变化特征影响。研究结果不仅首次直观揭示了沉水植物根系调控沉积物异质性氧环境的两条路径，而且发现了温度升高会导致越冬植物根系改造沉积物氧环境的能力明显降低的现象，这表明全球变暖效应可能会导致越冬水生植物生物量锐减并会显著影响植物对污染水体的修复效果。研究成果近期以High-resolution imaging of rhizosphere oxygen (O2) dynamics in Potamogeton crispus: effects of light, temperature and O2 content in overlying water 为题，发表在Plant and Soil上。该研究得到国家自然科学基金和江苏省优秀青年基金联合资助。

链接:

http://www.cas.cn/syky/201908/t20190827_4711644.shtml

9．New biosensor provides insight into the stress behaviour of plants

【UNIVERSITY OF MÜNSTER】They are tiny signalling molecules that play important roles in many processes in living organisms. However, the exact function of these substances is often still unknown, which is why scientists are constantly on the lookout for new methods with which they can further investigate them. Researchers at the Universities of Münster (Germany) and Nanjing (China) have developed such a method for an important messenger substance in plants, called phosphatidic acid. This lipid takes on different roles in the organism: It influences the flexibility and bending of cell membranes, regulates the metabolism of the plant and also serves as a signalling substance to regulate the localization or activity of proteins. However, researchers have not been able to find out which part of the phosphatidic acid pool in the cell has a function for the metabolism and which part serves as a signalling substance. A biosensor developed by German and Chinese scientists has now changed this: By incorporating this sensor into plants, they were able to track the activity of the phosphatidic acid spatially and temporally for the first time. "Our approach enables us to elucidate the dynamics of phosphatidic acid more precisely, especially in plants under stress," says co-author Prof. Jörg Kudla from the University of Münster. A plant is stressed, for example, when exposed to dry or salty soils. The measurements obtained with the new method could in future help to breed plants that are more resilient to adverse environmental conditions. The study was published in the journal Nature Plants. Original publication: W. Li et al. (2019): Tissue specific accumulation of pH-sensing phosphatidic acid determines plant stress tolerance. Nature Plants； DOI: 10.1038/s41477-019-0497-6

链接:

https://www.eurekalert.org/pub_releases/2019-08/uom-nbp082719.php

10．The future of food: Why farming is moving indoors

【**BBC News**】Ten shipping containers dominate a corner of the Brooklyn parking area, each full of climate control tech, growing herbs that are distributed to local stores on bicycles. This is urban farming at its most literal. The containers are owned by Square Roots, part of America's fast-expanding vertical farming industry, a sector run by many tech entrepreneurs who believe food production is ripe for disruption. The world's best basil reputedly comes from Genoa, Italy. Square Roots grows Genovese seeds in a container that recreates the city's daylight hours, humidity, Co2 levels - and all fed hydroponically in nutrient-rich water. "Rather than ship food across the world, we ship the climate data and feed it into our operating system," says co-founder Tobias Peggs. Produce is grown on trays stacked ceiling-high to maximise acreage. Everything from the automatic seeding machine to harvesting is run by Bowery's proprietary operating system (OS) which controls light, adjusts water nutrients and takes camera images of each plant to monitor its health. "The OS is our central nervous system. There are millions of data points," says founder Irving Fain. "The artificial intelligence is constantly learning and predicting how to produce the best quality product." Running the farm manually would be difficult, he says. Staff operate things from computer screens and iPads. Growing food indoors has been around for decades, but the industry got a kick-start from advances in the performance of lower cost LED lighting. Combine that with robotics, innovations and AI, and you have an industry that Mr Fain says is both viable and scalable. "The big question was, how can we grow in large volumes at a consistently high quality? Suddenly, the economics changed," he says. "We can grow 365 days a year - a major departure from thousands of years of agriculture. Unlike outdoor farming, our yield is virtually 100% guaranteed." Vertical farmers talk with a zeal you'd expect of entrepreneurs with tech world backgrounds. With population growth and climate change putting pressure on food production, they think they may have answers.

链接:

https://www.bbc.com/news/business-49052317?intlink_from_url=https://www.bbc.com/news/topics/ce1qrvleggxt/agriculture&link_location=live-reporting-story

【文献速递】

1．Monitoring plant diseases and pests through remote sensing technology: A review

文献源：Computers and Electronics in Agriculture,2019

摘要：Plant diseases and pests endanger agriculture and forestry significantly around the world. The implementation of non-contact, highly-efficient, and affordable methods for detecting and monitoring plant diseases and pests over vast areas could greatly facilitate plant protection. In this respect, different forms of remote sensing methods have been introduced for detecting and monitoring plant diseases and pests in many ways. This review outlines the state-of-the-art research achievements in relation to sensing technologies, feature extraction, and monitoring algorithms that have been conducted at multiple scales. Based on their characteristics and maturity in detecting and monitoring plant diseases and pests, sensing systems are classified into groups that include: visible & near-infrared spectral sensors (VIS-NIR)；fluorescence and thermal sensors；and synthetic aperture radar (SAR) and light detection and ranging (Lidar) systems. Based on the data acquired from these remote sensing systems and sensitivity analysis, a variety of remote sensing features are proposed and identified as surrogates in the detection and monitoring processes. They include (1) optical, fluorescence, and thermal parameters；(2) image-based landscape features；and (3) features associated with habitat suitability. We also review the algorithms that link the remote sensing features with the occurrence of plant diseases and pests for identifying, differentiating and determining severity of diseases and pests over large areas. The algorithms including statistical discriminant analyses, machine learning algorithms, regression-based models and spectral unmixing algorithms using data collected at a single time or multiple times. Finally, according to the review, we provide a general framework to facilitate the monitoring of an unknown disease or pest highlighting future challenges and trends.

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1xG6yAHx2cACP-sZwN9tw877.pdf

2．基于激光雷达的农田环境点云采集系统设计

文献源：农业机械学报,2019

摘要：设计了基于激光雷达的农田环境点云采集系统，可实现农田环境点云与农机位置姿态的稳定、可靠采集;设计了多传感器数据的采集软件，可实现准确、一致的全局点云数据获取。系统以拖拉机为移动载体，由点云数据采集模块、车体位姿采集模块和数据融合模块组成。其中，点云数据采集模块可获取周边环境点云数据，并解决近距离盲区问题;车体位姿采集模块可实时获取农机位置和姿态信息;数据融合模块可接收并融合

环境点云数据与车体位姿数据，进而获取位姿补偿后的点云数据。系统实现了各传感器数据的在线采集、时间同步与空间配准，以及数据的实时显示与存储。在农田环境下进行点云采集试验，结果表明，采集系统具有良好的户外工作稳定性，在线典型丢帧率不超过1%，离线典型丢帧率不超过0. 47%，能够满足农田点云数据采集的要求。为分析系统采集点云数据质量，将经过位姿补偿的点云与原始点云分别进行直通滤波地面点滤除，结果表明，位姿补偿后的点云经滤波后仅包含少量地面点云，可作为农机自主导航避障的可靠数据。

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1wt2yAD06QAAi4crEHB70149.pdf

3．Assimilation of remote sensing into crop growth models: Current status and perspectives

文献源：Agricultural and Forest Meteorology,2019

摘要：Timely monitoring of crop lands is important in order to make agricultural activities more sustainable, as well as ensuring food security. The use of Earth Observation (EO) data allows crop monitoring at a range of spatial scales, but can be hampered by limitations in the data. Crop growth modelling, on the other hand, can be used to simulate the physiological processes that result in crop development. Data assimilation (DA) provides a way of blending the monitoring properties of EO data with the predictive and explanatory abilities of crop growth models. In this paper, we first provide a critique of both the advantages and disadvantages of both EO data and crop growth models. We use this to introduce a solid and robust framework for DA, where different DA methods are shown to be derived from taking different assumptions in solving for the a posteriori probability density function (pdf) using Bayes' rule. This treatment allows us to provide some recommendation on the choice of DA method for particular applications. We comment on current computational challenges in scaling DA applications to large spatial scales. Future areas of research are sketched, with an emphasis on DA as an enabler for blending different observations, as well as facilitating different approaches to crop growth models. We have illustrated this review with a large number of examples from the literature.

链接:

http://agri.ckcest.cn/file1/M00/00/01/Csgk0V1xGvSAM3RmABUrlNHJ7P4816.pdf

4．Agbots: Weeding a field with a team of autonomous robots

文献源：Computers and Electronics in Agriculture,2019

摘要：This work presents a strategy for coordinated multi-agent weeding under conditions of partial environmental information. The goal is to demonstrate the feasibility of coordination strategies for improving the weeding performance of autonomous agricultural robots. It is shown that, given a sufficient number of agents, a team of autonomous robots can successfully weed fields with various initial seed bank densities, even when multiple days are allowed to elapse before weeding commences. Furthermore, the use of information sharing between agents is demonstrated to strongly improve system performance as the number of agents increases. As a domain to test these algorithms, a simulation environment, Weed World, was developed, which allows real-time visualization of coordinated weeding policies, and includes realistic weed generation. In this work, experiments are conducted to determine the required number of agents for given initial seed bank densities and varying allowed days before the start of the weeding process.

链接:

http://agri.ckcest.cn/file1/M00/00/01/Csgk0V1xGgaAEvEwAMPI-gvqYtg992.pdf

5．A phenology-based spectral and temporal feature selection method for crop mapping from satellite time series

文献源：International Journal of Applied Earth Observation and Geoinformation,2019

摘要：Accurate information on crop distribution and its changes is important for food security and environmental management. Although time series analysis is a widely-used and useful tool to characterize the seasonal dynamics of crops, the traditional image stacking approach misses important phenological events. This condition makes it difficult to identify the spectral and temporal features that are potentially important for crop identification, and therefore, makes it difficult to determine the optimal feature inputs for classifying crops with both high accuracy and low computation time. To address this gap, we developed a method to automatically select the spectro-temporal features by mining crop phenology information so as to improve the accuracy of crop classifications. This method of Phenology-based Spectral and Temporal Feature Selection (PSTFS) contains two major components: to identify the features with the highest separability between each pair of classes, and to prune redundant features to retain the best for classification. Using this optimal set of features and support vector machines (SVMs), we generated a high-quality corn cultivation map of China’s Heilongjiang Province for 2011. The corn map had accuracies

greater than 85% and agreed well with the corn census areas. We also demonstrate the goodness of this method for selecting features with high interpretability: it identified two phenological stages (three leaf and milky mature) that could best separate corn from other land use classes in the region. Our approach indicates the great potential for using the PSTFS method in conjunction with SVM classifiers to accurately map crop types based on satellite time series data.

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1xGn2ARUEkAC42N52TqIA425.pdf

6．基于改进粒子群算法的精准农业无线传感器定位研究

文献源：节水灌溉,2019

摘要：为了提高精准农业无线传感器定位的精度，提出改进粒子群算法。首先建立精准农业无线传感器定位过程；接着对粒子群算法的惯性权重进行非线性优化，使得算法前期变化缓慢，后期变化较快，利于算法跳出局部而求得全局最优解；然后对粒子群规模采取收缩扩张控制，其判别结合粒子的聚集度、多样性函数，算法前期的收缩扩张系数值在较大的位置，后期应减慢速度以加强算法的局部搜索能力；最后建立定位误差与粒子适应度函数关系。实验仿真显示本文算法收敛性能较好，相比其他算法能有效地抑制测距误差对定位的影响，提高节点的定位精度。

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1wstWAevkhABQdOfVFUgI823.pdf

7．便携式土壤湿度检测装置用于精准灌溉决策系统

文献源：农业工程学报,2019

摘要：采用最先进的技术进行精准灌溉是现代农业发展的必然趋势，但在准确预测被监测区域的土壤湿度时，面临一个两难的处境:少量土壤湿度固定检测点不能良好地反映作物区域土壤墒情信息，而大量布置传感器检测点又使得投资成本较大。因此该文设计了一种便携式土壤检测装置，同时基于该装置构建了一个精准灌溉决策系统，并把该系统应用于田间的精准灌溉决策。该系统由便携式土壤湿度检测装置和上位机决策软件2部分组成，其中便携式土壤湿度检测装置由FDR原理土壤水分传感器MS-10、低功耗单片机C8051F410、蓝牙无线传输模块、数据显示模块以及部分外围电路组成，可以独立实现时间记录、数据存储和实时显示。经过试验标定，装置的允许最大误差为2.2%，设计精度为95%；上位机决策软件分为数据接收模块、分布式二进制一致性算法模块和系统操作界面3个子模块，分别采用Visual Basic、Matlab和Matlab GUI设计而成，实现对便

携式装置所采集数据的无线传输、归一化处理和数据融合处理，能够根据不同区域划分和不同作物灌水下限进行相应的运算，从而得到估计精度较高、区域大小可调的多尺度精准灌溉决策信息。最后通过30 m×30 m草坪的土壤湿度为检测参数的田间验证，该系统的平均决策准确率大于90%，且可以根据需要增减检测点个数。因此既可以独立应用，也可以作为固定检测方式的有效补充，实现作物区域土壤湿度信息的精确采集，有效提高水资源利用率。

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1ws-KADxUaACj2SG6Q4Og309.pdf

8．基于无人机遥感影像的玉米苗期株数信息提取

文献源：农业工程学报,2019

摘要：准确、快速地获取玉米苗期株数对于育种早期决策起着至关重要的作用。该文利用2017年6月于北京市小汤山镇采集的无人机影像，首先对比分析RGB、HSV、YCbCr及L*A*B 4种色彩空间，变换优选HSV颜色模型对无人机影像前景(作物)与后景(土壤背景)进行分割，得到分类二值图。然后利用骨架提取算法及多次去毛刺处理等数学形态学流程提取玉米苗形态，得到高精度作物形态骨架，结合影像尺度变换剔除噪声影像，将影像分为多叶、少叶2类，经Harris、Moravec和Fast角点检测识别结果对比，Harris角点检测算法可以较好地提取玉米苗期影像的株数信息。结果表明，少叶类型识别率达到96.3%，多叶类型识别率达到99%，总体识别率为97.8%，将目前传统影像识别精度提高了约3%。同时在多个植株叶片交叉重叠覆盖的情况下，该文的研究方法有良好的适用性。通过无人机影像提取玉米苗期作物准确数目是可行的。该文采用了数学形态学的原理，通过HSV色彩空间变换得到的二值图，从无人机影像中识别提取玉米苗期形态信息，利用影像尺度缩放变换去除噪点，优化骨架识别算法使得识别精度大大提高，最后采用角点检测从无人机影像中直接读取玉米材料小区内的具体数目，该方法节省了人力物力，为田间大面积测定出苗率及最终估产提供了参考。

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1wsjuAFPAoACkbtM2_76U981.pdf

9．Joint Deep Learning for land cover and land use classification

文献源：Remote Sensing of Environment,2019

摘要：Land cover (LC) and land use (LU) have commonly been classified separately from remotely sensed imagery, without considering the intrinsically hierarchical and nested relationships between them. In this paper, for the first time, a highly novel Joint Deep

Learning framework is proposed and demonstrated for LC and LU classification. The proposed Joint Deep Learning (JDL) model incorporates a multilayer perceptron (MLP) and convolutional neural network (CNN), and is implemented via a Markov process involving iterative updating. In the JDL, LU classification conducted by the CNN is made conditional upon the LC probabilities predicted by the MLP. In turn, those LU probabilities together with the original imagery are re-used as inputs to the MLP to strengthen the spatial and spectral feature representations. This process of updating the MLP and CNN forms a joint distribution, where both LC and LU are classified simultaneously through iteration. The proposed JDL method provides a general framework within which the pixel-based MLP and the patch-based CNN provide mutually complementary information to each other, such that both are refined in the classification process through iteration. Given the well-known complexities associated with the classification of very fine spatial resolution (VFSR) imagery, the effectiveness of the proposed JDL was tested on aerial photography of two large urban and suburban areas in Great Britain (Southampton and Manchester). The JDL consistently demonstrated greatly increased accuracies with increasing iteration, not only for the LU classification, but for both the LC and LU classifications, achieving by far the greatest accuracies for each at around 10 iterations. The average overall classification accuracies were 90.18% for LC and 87.92% for LU for the two study sites, far higher than the initial accuracies and consistently outperforming benchmark comparators (three each for LC and LU classification). This research, thus, represents the first attempt to unify the remote sensing classification of LC (state; what is there?) and LU (function; what is going on there?), where previously each had been considered separately only. It, thus, has the potential to transform the way that LC and LU classification is undertaken in future. Moreover, it paves the way to address effectively the complex tasks of classifying LC and LU from VFSR remotely sensed imagery via joint reinforcement, and in an automatic manner.

链接:

http://agri.ckcest.cn/file1/M00/00/01/Csgk0V1xGNCAV9pKAD_3hZFu4p8937.pdf

10．植保无人飞机低空低容量喷雾技术应用与展望

文献源：植物保护,2019

摘要：近十年来，我国植保无人飞机迅猛发展，应用的农作物范围越来越广，不仅在水稻、小麦、玉米等主要粮食作物得到了应用，在橡胶、槟榔等高大植株的病虫害防治中更有其独特优势，已经初步形成了我国植保无人飞机低空低容量喷雾的喷头配置、配套

药剂、飞防助剂、作业参数等技术体系，对于重要农作物病虫害如稻纵卷叶螟、水稻纹枯病、小麦蚜虫、玉米黏虫等防治效果均在80%以上，在各地病虫害防控中发挥了重要作用。但是，植保无人飞机喷雾作业过程中，还存在炸机或失控、雾滴飘移药害、药液分层结块、防治效果不稳定等问题。通过汇总分析植保无人飞机在重要病虫草害防治工作的成功经验和安全事故，本文提出植保无人飞机低容量喷雾技术将会得到更广泛的应用，植保无人飞机专用药剂和配套助剂、变量施药、多传感器数据融合、多机协同、精准施药、施药标准和规范等都将得到长足的发展，为现代农业和智慧农业发展提供技术支持。

链接:

http://agri.ckcest.cn/file1/M00/0E/81/Csgk0F1wtueAI3hpAAb9ki-m_Tg299.pdf

【相关专利】

1．一种温室植物病害巡检机器人及巡检方法

发布源：国家知识产权局

发布时间：2018-11-23

摘要：本发明属于设施农业技术领域，特别涉及一种温室植物病害巡检机器人及巡检方法。机器人包括移动平台(1)、三自由度机械臂(2)、病害图像采集摄像头(3)、前置导航摄像头(4)、局部环境因子传感器(5)和远程控制终端。本发明用于代替人工巡检，实现对温室病害的自动巡检，实现对病害的提前预警，机器人结合温室大棚实际情况设计，设计科学结构紧凑，履带式底盘能适应多种温室地形环境，移动灵活，监测效率大幅提高，可以及时准确识别病害。

链接:

http://agri.ckcest.cn/file1/M00/00/01/Csgk0V1xIROAXqZAAAoGkld_aaw374.pdf

【专业会议】

1．6th Next Generation Agriculture Expo Tokyo (AGRINEXT TOKYO)

发布源：Agriweek

发布时间：2019-09-04

摘要：Japan's prominent scale exhibition for agricultural/horticultural industry. IT solutions for agriculture, Drones, Plant factory products & technologies Photovoltaic generation systems, etc., the latest technologies will be showcased all under one roof. Visitors from the relevant areas will turn the show to a venue of numerous lively business meetings.

链接:

https://www.agriexpo-tokyo.jp/en-gb/about/agrinext.html

2．2019年智慧农业科技创新研讨会暨示范观摩会

发布源：中国农业科学院

发布时间：2019-08-28

摘要：智慧农业是国际农业信息化发展的新理念和新方向。2019年中央一号文件提出，加快突破农业关键核心技术，推动智慧农业领域自主创新，实施数字乡村战略。农业农村部高度重视我国智慧农业发展，多次提出推进遥感、物联网、大数据、云计算和移动互联网等新一代信息技术与农业产业深度融合，加快构建天空地数字农业管理系统，实现农业农村发展的数字化、网络化、智能化，服务农业高质量发展和乡村振兴战略。为加强智慧农业关键技术、装备和系统集成交流，分享智慧农业应用案例和经验，探讨未来智慧农业科技创新所面临的机遇与挑战，推动技术成果实际转化落地，中国农业科学院、四川省农业科学院、国家智慧农业科技创新联盟、中国农学会农业信息分会拟于2019年10月10-12日在四川省成都市召开2019年智慧农业科技创新研讨会暨示范观摩会。

链接:

http://www.caas.cn/tzgg/xshy/298250.html

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