

《农业水土资源监控研究》专题快报

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中国工程科技知识中心农业分中心

中国农业科学院农业信息研究所

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【动态资讯】

1. 遥感卫星加入农业生产 保护黑土地增产增效

【吉林日报】“东北是世界三大黑土区之一，黑土地是一个条带状地形，通过遥感技术可以清楚分析出土地情况，对土地开展‘面’的监测，出施肥处方图，从而进行保护性耕作，保护好黑土地这一‘耕地中的大熊猫’。”三号展馆内的中国科学院东北地理与农业生态研究所研究员宋开山介绍，从2018年开始，他带领团队与地处辽河源附近的农业合作社进行合作，在试验田进行有机水稻种植。利用卫星遥感技术，精准测量土地土壤情况，因地“施肥”，试验田实现了减少用肥20%、水稻增产10%的效果。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnyCOAEsrkAEpJYDqiP8Q026.pdf>

2. 新模式助力农业绿色发展

【新华网】8月10日，为践行“创新驱动绿色发展”，引领农业“绿色种植革命”，新洋丰农业科技股份有限公司联合全国农技推广中心、中国农业大学等诸多机构、单位，在湖南省常德澧县举办绿色种植王牌挑战赛首场活动。全国农技推广中心肥料技术处处长杜森表示，要实现农业绿色发展需要科学的方法和种植模式。“因为我们的国家化肥用量偏多。所以这些年一直在推广测土配方施肥，化肥减量增效。包括有机肥替代化肥，这样的重大行动，就是为了实现绿色发展。”

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnxjWAI3H5AApJk1O7x7k976.pdf>

3. 中国粮食今年够吃吗？农业农村部：粮食安全完全有保障

【中国新闻网】中新网8月20日电 针对“中国粮食今年够吃吗？农业农村部将采取哪些

举措防止发生粮食危机？”的问题，农业农村部副部长于康震20日指出，旱涝灾害没有逆转今年粮食生产稳中向好的态势。如果后期不发生大的灾害，全年还将是一个丰收年，加上当前粮食库存仍处于高位，我国的粮食安全完全有保障，价格也将保持基本稳定。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnxV-AEoOiAAY7bcVXKZ8238.pdf>

4 . 公安部：全力维护粮食安全 保障农业生产

【新华网】新华社北京8月20日电（记者熊丰）公安部要求，要充分发挥职能作用，紧密结合推进“昆仑2020”专项行动，依法严厉打击制售假劣农资、非法占用农用地、污染环境等违法犯罪活动，全力维护粮食安全、保障农业生产。公安部19日召开会议，要求牢固树立危机意识，充分发挥职能作用，扎实抓好制止餐饮浪费行为、保障国家粮食安全各项措施的落实。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnxPaAEgzAC41k8Ywom4774.pdf>

5 . 人工智能如何彻底改变农业以及未来的前景

【绿色消费网】根据联合国的估计，在30年内，全球人口将达到97亿。这意味着到2050年将需要提供更多的50%的粮食。就像几个世纪前一样，农业部门在未来几十年将面临新的转变。考虑到这一目标，政府和私营部门正在寻找方法来革新农业。一种方法是通过人工智能。到目前为止，人工智能技术已经在诸如精准农业，智能畜牧业和机器人技术等领域产生了影响。农业中AI的常见用例包括：•监视应用程序。这些使农民可以使用由机器学习(ML)驱动的头盔和护目镜来监视作物状况。•自动拖拉机。配备无线电导航和激光陀螺仪的拖拉机遵循驾驶员先前拟定的路线。人工智能学会以最少的人工干预或根本不需要干预的方式执行指令。•在AI支持下进行智能灌溉。现代ML驱动的灌溉技术可以将农作物与杂草区分开来，并用适量的除草剂喷洒杂草。•预测分析。这个领域有各种各样的用例。这些解决方案包括使用ML算法和卫星数据预测农作物产量的解决方案。此外，在我公司专注的金融科技领域，人工智能算法可以评估农场借款人的信誉。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnxzaAQWq3ABpCRCcfXIQ503.pdf>

6 . 精准监测管理：平安智慧用科技赋能农业

【农民日报】这个夏天，每颗山东省潍坊市寒亭区国家现代农业产业园出品的“郭”牌西瓜上都贴有平安智慧农业为其定制的防伪溯源专用标识。消费者通过手机扫码，就可以

在“平安智慧溯源管理系统”上查出所买西瓜的种植、采收、检测、包装、仓储、运输等各环节信息。据了解，区块链技术在这一“码”上起到了关键作用。平安智慧农业将西瓜生产、流通、消费过程以及参与主体的全流程信息存进区块链，实现上链数据智能核验，保证西瓜溯源信息的真实性和准确性。听起来是不是科技感十足？“平安智慧农业就是要用科技赋能农业。”平安智慧城市联席总经理高孟轩介绍，目前，这套智能体系已经辐射带动全国5大产区7000亩“郭”牌西瓜基地管理。“未来，将以点带面引领全国西瓜产业发展。”农村地区幅员辽阔，资源资产众多，想要知道哪里种了哪些作物、分别种了多少面积、产量预计会有多少、气象条件如何等通常依靠经验，精准监管就显得尤为重要。你能想象吗，在四川省大邑县，水稻、小麦、油菜三种主要作物已经可以实现1千米×1千米精细化气象灾害预警，帮助农企和农户实现提前2小时~3天预警，降低灾害损失率2%~5%。“这有赖于‘农业慧眼’能力平台。”高孟轩介绍，2019年，平安智慧农业以网格化的建设架构为大邑县成功打造了可视化农业监控指挥中心，实现了覆盖全县域、聚合“土地管理、补贴管理、灾害预警、生产管理”4个功能的动态精准监管。该平台基于AI、大数据、卫星遥感、地理信息等先进技术，构建县域农业天空地一体化监测体系，创建结构化、可视化数字孪生地，实现从县级宏观监控到农田级精准分析的按图查看、管理、分析和预警，也实现了户-地-物-灾的精准监测与管理。此外，为支撑政府决策，助力企业和农民发展，平安还构建了“农业智脑”能力平台，以“AI+农业知识图谱”技术体系，标准化组建支持新场景扩展。一方面，基于意图解析、语义搜索、文献结构化等AI技术，为政府、农技员、防疫员、村两委、农险理赔员等主体，提供信息推荐、学习辅助、管理支持、职业培训、智能保险推荐等多种类型服务。另一方面，针对具体地区、领域、品种，依托农业信息智能分析决策技术、农业知识智能推送和智能回答等新型知识服务技术，为农业经营主体及农民提供知识、决策支持，实现种养殖业作业信息感知、定量决策、智能控制、精准投入、个性服务。高孟轩介绍，目前，农业知识图谱已覆盖病虫害、农机、种子、肥料、农药5大领域10万个知识点，多维输入，全域关联检索，多态输出，可支持农民职业技能培训，提供线上化、智能化的实时服务。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnntKAWVhNADGuES4dGFI539.pdf>

【文献速递】

1 . Application of LISS III and MODIS-derived vegetation indices for assessment of micro-level agricultural drought

文献源: The Egyptian Journal of Remote Sensing and Space Science,2020-08-20

摘要: Drought in recent years has crippled the livelihoods of millions of people living in India and has also been the cause of many deaths. Puruliya district, India with more than

one-third of its population belonging to the backward community has no proper agricultural drought management system. In this study, spatial and temporal characteristics of agricultural drought were examined using indices derived from Indian Remote Sensing (IRS) Linear Imaging Self Scanning (LISS III) sensor and Terra Moderate Resolution Imaging Spectroradiometer (MODIS) sensor satellite images. MODIS Normalized Difference Vegetation Index (NDVI) results almost match with the results obtained from LISS III NDVI analysis. Vegetation Condition Index (VCI) was prepared from MODIS for a period of 16 years (2000-2016) and subsequently blockwise drought severity maps were generated from MODIS-derived VCI for Kharif and Rabi season. MODIS VCI analysis shows that nearly 34.1% and 76.5% of the study area for Kharif and Rabi season respectively faces drought conditions during the recent year 2015-16. It also shows severe and extreme drought situations for the years 2010-11 and 2005-06 respectively. Blockwise drought severity analysis reveals that Jaipur, Purulia I, Purulia II and Para blocks were chronically drought prone areas. The results indicate significant agreement between NDVI anomaly obtained from MODIS sensor and foodgrain anomaly obtained from crop yield statistics. The outcome of the research may be used for the district's drought preparedness programme so that proper crop planning and management can be carried out to help in agricultural production.

链接:

<http://agri.ckcest.cn/file1/M00/01/C3/Csgk0Trn5VKAbGICADafin0kj18450.pdf>

2 . A multi-level context-guided classification method with object-based convolutional neural network for land cover classification using very high resolution remote sensing images

文献源: International Journal of Applied Earth Observation and Geoinformation, 2020-06-20

摘要: Classification of very high resolution imagery (VHRI) is challenging due to the difficulty in mining complex spatial and spectral patterns from rich image details. Various object-based Convolutional Neural Networks (OCNN) for VHRI classification have been proposed to overcome the drawbacks of the redundant pixel-wise CNNs, owing to their low computational cost and fine contour-preserving. However, classification performance of OCNN is still limited by geometric distortions, insufficient feature representation, and lack of contextual guidance. In this paper, an innovative multi-level context-guided classification method with the OCNN (MLCG-OCNN) is proposed. A feature-fusing OCNN, including the object contour-preserving mask strategy with the supplement of object deformation

coefficient, is developed for accurate object discrimination by learning simultaneously high-level features from independent spectral patterns, geometric characteristics, and object-level contextual information. Then pixel-level contextual guidance is used to further improve the per-object classification results. The MLCG-OCNN method is intentionally tested on two validated small image datasets with limited training samples, to assess the performance in applications of land cover classification where a trade-off between time-consumption of sample training and overall accuracy needs to be found, as it is very common in the practice. Compared with traditional benchmark methods including the patch-based per-pixel CNN (PBPP), the patch-based per-object CNN (PBPO), the pixel-wise CNN with object segmentation refinement (PO), semantic segmentation U-Net (U-NET), and DeepLabV3+(DLV3+), MLCG-OCNN method achieves remarkable classification performance (> 80 %). Compared with the state-of-the-art architecture DeepLabV3+, the MLCG-OCNN method demonstrates high computational efficiency for VHRI classification (45 times faster).

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0Trn0XyACgxHAFHzy0RiHjs667.pdf>

3 . Assessing factors impacting the spatial discrepancy of remote sensing based cropland products: A case study in Africa

文献源: International Journal of Applied Earth Observation and Geoinformation,2020-03-20

摘要: Many African countries are facing increasing risks of food insecurity due to rising populations. Accurate and timely information on the spatial distribution of cropland is critical for the effective management of crop production and yield forecast. Most recent cropland products (2015 and 2016) derived from multi-source remote sensing data are available for public use. However, discrepancies exist among these cropland products, and the level of discrepancy is particularly high in several Africa regions. The overall goal of this study was to identify and assess the driving factors contributing to the spatial discrepancies among four cropland products derived from remotely sensed data. A novel approach was proposed to evaluate the spatial agreement of these cropland products and assess the impact of environmental factors such as elevation dispersion, field size, land-cover richness and frequency of cloud cover on these spatial differences. Results from this study show that the overall accuracies of the four cropland products are below 65%. In particular, large disagreements are seen on datasets covering Sahel zone and along the West African coasts. This study has identified land-cover richness as the driving factor with the largest

contribution to the spatial disagreement among cropland products over Africa, followed by the high frequency of cloud cover, small and fragmented field size, and elevation complexity. To improve the accuracy of future cropland products for African regions, the data producers are encouraged to take a multi-classification approach and incorporate multi-sensors into their cropland mapping processes.

链接:

<http://agri.ckcest.cn/file1/M00/01/C3/Csgk0Trn5baAPc0sAJDtBvaeoHU223.pdf>

【相关专利】

1 . 一种基于静止卫星遥感数据的秸秆焚烧火点信息提取方法

发布源: 知网专利数据库

发布时间: 2020-07-07

摘要: 一种基于静止卫星遥感数据的秸秆焚烧火点信息提取方法,解决了现有秸秆焚烧火点难以准确提取的问题,属于农业环境保护领域。本发明包括: 步骤一: 根据遥感影像数据,估算亮度温度; 步骤二: 利用遥感影像提取监测范围内的农田数据及剔除区域的数据,剔除区域的数据包括非秸秆焚烧火情数据和居民点数据; 步骤三: 以中红外波段的亮温作为阈值判断标准,对步骤一估算的亮度温度进行火点提取,生成火点信息数据; 步骤四: 将步骤二获得的监测范围内的农田数据与步骤三生成的火点信息数据进行叠置分析,得到监测范围内的火点信息数据; 步骤五: 在得到的监测范围内的数据中剔除掉非秸秆焚烧火情数据和居民点数据,获得监测范围内的秸秆焚烧火点信息数据。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnoG2ASyvbABAxrsiKJA0994.pdf>

2 . 基于光谱和纹理特征的地膜覆盖农田遥感监测方法

发布源: 知网专利数据库

发布时间: 2020-06-16

摘要: 一种基于纹理特征的地膜覆盖农田遥感监测方法,包括: S1,对研究区的遥感影像数据进行预处理; S2,建立地膜覆盖农业遥感监测分类体系; S3,利用与研究区的遥感影像数据相同时相的Google Earth影像,采集分类体系中不同地物的不规则多边形样本,通过目视解译重新勾画预定尺寸像元的有规则多边形样本; S4,进行可分离性分析,以选择可用的波段; S5,基于遥感影像的多波段数据,提取多种纹理特征,在四个方向、三个步长上提取纹理特征; S6,对提取的纹理特征参数进行降维处理并挑选纹理特征; S7,构建基于光谱和纹理特征相结合的输入特征参数集; S8,用分类器对分类体系进行地物分类。

本发明提出了一种对地膜覆盖农田进行监测的新方法。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnoWSAAFPRAFmvk61Vx-I694.pdf>

3 . 一种基于遥感数据的规则农田提取方法

发布源: 知网专利数据库

发布时间: 2020-06-09

摘要: 本发明涉及一种基于遥感数据的规则农田提取方法,其包括如下步骤: 获取历史 Sentinel-2序列数据并针对每景图像计算NDVIseries; 对NDVIseries图像采用梯度算子计算梯度和,获得梯度和图像; 对所述梯度和图像采用Canny算子进行边缘检测,获取包括所有潜在的边缘像素的边缘检测图像; 对所述边缘检测图像进行基于多尺度标记的分水岭分割,获取农田的边界。本发明所述的基于遥感数据的规则农田提取方法具有精确反映规则农田的空间分布,有利于农业管理的优点。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnomuAaB4UAC-kpCBUdjo256.pdf>

【会议论文】

1 . Estimation Model of Winter Wheat Yield Based on Uav Hyperspectral Data

发布源: IGARSS 2019 - 2019 IEEE International Geoscience and Remote Sensing Symposium

发布时间: 2019-11-14

摘要: Winter wheat is one of the main food crops in China, accurately forecasting the yield of winter wheat is of great significance for agricultural management and decision. UAV remote sensing has the advantages of high spatial-time resolution, low cost, flexibility and repeatability. In this paper the growth condition remote sensing and yield estimation of winter wheat were carried out using UAV hyperspectral sensor in Xiaotangshan Town, Changping District, Beijing. Based on the DSD (directional second differential) method and AIVI (Angular Insensitivity Vegetation Index), LAI (leaf area index) and LNC (leaf nitrogen content) of winter wheat at heading and filling periods were retrieved, and according to the result of DSSAT simulation, the forecasting model between LAI, LNC at heading and filling periods and yield of winter wheat was established by random forest algorithm. The R^2 of yield estimation model is 0.787 and RMSE is 727.87 kg/ha, which shows the yield estimation model can accurately and effectively estimate winter wheat yield.

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnwvGAdAsvAAgisGweMYc036.pdf>

2 . Integration And Importance Of Soil Mapping Results In The Precision Agriculture

发布源： 2019 8th International Conference on Agro-Geoinformatics (Agro-Geoinformatics)

发布时间： 2019-09-02

摘要： Agricultural productivity and yield quantity are depended on climate, soil characteristics, and use of the factors of production. Agricultural inputs such as fertilizers, irrigation, seeds, pesticides, and farmers' skills also influence farm productivity. Precision agriculture is a new farming management approach, where farmers capture and analyze data in order to optimize inputs and practices for best outcomes. This data then guides decisions on which crop to plant or when and where to apply fertilizer, agrochemicals, or water. As a result, farmers can optimize the use of inputs, making maximum use of the little resources they have. Improving the production capacity of agriculture in Turkey through productivity increases is an important policy goal where agriculture represents an essential sector in the economy. In recent years, projects and research is focused on the precision agriculture sectors in order to increase farmer's income. Research supported by GAP regional development administration is conducting at the South Eastern Anatolia Region for extensification of precision agricultural applications. In the research, spatial and remote sensing data were integrated in order to analysis field. Spatial variation of soil properties is most important in precision agriculture that affecting the crop yields. In the project, detailed soil mapping, at 1:10.000 scale, was completed containing all soil characteristics and productivity map in GIS.

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnxBOAWiXeAAaQsPVdEM0968.pdf>

3 .Fine mapping of key soil nutrient content using high resolution remote sensing image to support precision agriculture in Northwest China

发布源： 2019 8th International Conference on Agro-Geoinformatics (Agro-Geoinformatics)

发布时间： 2019-09-02

摘要： The rapid development of industrialized agriculture has leads to the problems of soil pollution and water pollution. In order to solve these problems, precision agriculture (PA) has been applied to achieve precise management of agricultural water and fertilizer. In PA process, fine mapping of soil nutrient is an effective technology to acquire accurate water

and fertilizer distribution information and make agricultural decision. A significant progress has been made in digital soil mapping (DSM) of soil nutrient content over the past 20 years. However, the accuracy of grid-based DSM cannot meet the practical application needs of PA. This paper proposed a fine DSM method of soil nutrient content using high resolution remote sensing images and multi-scale auxiliary data for PA application. Three key technologies were studied for the implementation of this method. The automatic extraction of fine mapping units was the basis of this method. We designed different automatic extraction methods based on high resolution remote sensing images for agricultural production units in plains and mountainous areas. The auxiliary variables in different scales were chosen and converted to construct fine-scale soil nutrient-environment relationship model. Finally, machine learning methods were used to map the spatial distribution of soil nutrients. We chose Zhongning County, Ningxia Province as the study area, which includes typical plain and mountainous agriculture. The proposed method and technologies were applied for typical soil nutrients mapping. A common grid-based spatial interpolation method was implemented with the same soil sample dataset to evaluate the effect of the proposed method. The result showed that this method could reduce the number of prediction units and effectively improve the prediction efficiency in both plain and mountainous areas for fine soil mapping and precision agriculture application. This study was an attempt to realize fine soil mapping based on PA application unit in different environments. The high-resolution remote sensing images provide basic data for the realization of this idea, and the conversion technology of multi-scale data provides better support for the spatial inference of fine soil attribute information. In the future, we will carry out experiments in larger areas to further improve the efficiency of application, and plan to expand this study to consider three-dimensional soil property prediction.

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnwOSAXkxEASaVilooWI588.pdf>

4 . Mechatronic and IT systems used in modern agriculture

发布源: 2019 Applications of Electromagnetics in Modern Engineering and Medicine (PTZE)

发布时间: 2019-08-01

摘要: This electronic the article presents solutions that are used in modern enterprises and farms supporting the management of technological processes. Complex solutions that can be used to collect data on production conditions, using both contact and contactless sensors.

These sensors take into account the positioning of the measurement site based on satellite navigation systems. Also presented are software enabling the collection of data from these sensors in a remote way using remote sensing and packet data transmission.

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnwaKALw-yABDpNRWEIJ4962.pdf>

【研究报告】

1. 《中国农村发展报告2020》

发布源: 中国社会科学网

发布时间: 2020-08-19

摘要: 8月17日, 中国社会科学院农村发展研究所、中国社会科学出版社在北京联合举办了《中国农村发展报告2020》发布会暨“十四五”时期中国农村发展高层论坛。报告显示, 预计到2025年, 中国城镇化率将达到65.5%, 保守估计新增农村转移人口在8000万人以上; 农业就业人员比重将下降到20%左右; 乡村60岁以上人口比例将达到25.3%, 约为1.24亿人。该报告包括1个主报告, 及综合篇、经济篇、社会篇、生态环境篇4篇19个专题研究报告。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0Trn0MCATgUrAA-SRPaltWY369.pdf>

【科研项目】

1. 高效节水灌溉推动农业高质量发展

发布源: 中国日报网

发布时间: 2020-08-17

摘要: 近年来, 新疆霍城县认真贯彻“节水优先、空间均衡、系统治理、两手发力”的治水思路, 把高效节水灌溉建设作为首要工作, 大力改善农业生产条件, 依靠科技进步, 大力发展高产、优质、高效农业, 在提高农民收入、提高灌溉水利用率的同时, 推动农业高质量发展。

链接:

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnzuWAd1G1AA1864LdxxQ997.pdf>

【专业会议】

1. 重庆武隆绿色发展实践国际论坛将于本月26日举行

发布源: 中新网重庆

发布时间: 2020-08-20

摘要：2020中国•重庆(武隆)绿色发展实践国际论坛将于8月26日至28日在重庆武隆区仙女山举行。据悉，本次国际论坛主题为“建设‘山清水秀美丽之地’，探索‘生态文明’建设实践创新路径”，届时将举办1场主论坛，4场分论坛。

链接：

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnzzKAcs AAf1judGVfE836.pdf>

【标准】

1 . 遥感卫星多光谱数据产品分级

发布源：标准网

发布时间：2019-08-30

摘要：本标准规定了遥感卫星太阳反射波段多光谱数据产品的分级，以及各级数据产品的规格、命名与标识。本标准适用于遥感卫星太阳反射波段多光谱数据产品在生产、管理、应用服务中的分级和各级数据产品的规格描述和使用。

链接：

<http://agri.ckcest.cn/file1/M00/01/C2/Csgk0TrnpwSAQOjkAAwKs9r56ZI081.pdf>

2 . 卫星遥感监测技术导则 水稻长势

发布源：标准网

发布时间：2019-01-18

摘要：本标准规定了水稻长势遥感监测的数据源及卫星数据的前期处理、计算方法、专题地图制作等要求。本标准适用于利用中高空间分辨率卫星遥感观测资料对水稻进行长势监测。

链接：

<http://agri.ckcest.cn/file1/M00/01/C3/Csgk0Trn6XCAAtYnADg6FZcWd0k808.pdf>

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