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．宁夏：与农业农村厅签订协议共推智慧农业服务

【中国气象局】2月28日，宁夏回族自治区气象局与自治区农业农村厅签订战略合作协议（以下简称“协议”）。按照协议，双方将共同推进智慧农业气象服务建设，气象防灾减灾和气候资源开发利用，不断提高农业生产经营全链条气象服务能力，全面推进乡村振兴，为促进农业稳产增产、农民稳步增收、农村安宁稳定作出更大贡献。根据协议，双方将建立日常会商和应急联动机制，进一步完善联合会商和信息共享机制，联合制定农业气象灾害应急预案和专项预案，成立农业防灾减灾工作领导小组，共同建立农业和气象专家库；联合开展农业气象灾害风险预警，共同制定完善分区域、分作物、分时段、分灾种、分影响的农业气象灾害风险预警指标体系，联合会商发布精细化农业气象灾害风险预警产品；推进农业气候资源优势利用，联合开展宁夏重要农产品种植区划“一张图”，完善优质粮食和特色农作物气候评价体系，共同打造“农业气候好产品”，强化中长期气候变化对农业影响的研究；打造宁夏智慧农业气象服务“云”品牌，推进“气象+农业”智慧农业综合服务平台建设，推进农业标准化和智慧化建设；共建农业气象灾害预警和惠农信息传播合力，推进信息进村入户、防御措施到田，提高农村预警信息和农情信息的覆盖面和时效性。双方将进一步完善合作机制，深化拓展合作内容，共同推进乡村全面振兴取得新进展，农业农村现代化迈出新步伐。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIiN-AAtlHAAPVVpY2Nc4277.pdf

2．信息技术与农业农村全面深度融合——北京市密云区国家现代农业产业园建设智慧平台推动农业信息化

【农民日报】生产管理智能化，对实现农业高产、优质、高效、生态、安全具有重要意

义。北京市密云区在国家现代农业产业园创建中，通过建设智慧农业平台，绘出农业农村时空一张图，利用实时、动态的农业物联网信息采集系统，实现快速、多维、多尺度的农业信息实时监测，用科学数据为农业现代化建立起支撑。悬挂在温室大棚顶端的深绿色扁园形植保机不仅具有杀虫功效，还会实时采集棚内温度、湿度和光照强度等数据。农户点开手机软件，即可随时随地看到棚内的这些指标数值，并可视情况点击屏幕，对顶棚进行开合操作。而同时，这些数值和农户相应的操作措施等数据会传至园区智慧农业数字化管控平台，生成数据积累和分析。位于北京市东北部的密云区，是首都重要饮用水源地和生态涵养区。2019年以来，密云区在国家现代农业产业园创建过程中，立足构建与首都功能定位相适应的农业生产模式，以巨各庄镇蔡家洼村为核心区，以特色果品、精品蔬菜为主导产业，推动“高精尖”农业发展。同时应对推进农业现代化、全面建成小康社会的迫切需要，产业园实施了智慧农业建设项目，建成包括一个智慧农业数字化管控平台、两个主系统和30个专业子系统的数字农业系统，开启了推动信息技术与农业农村全面深度融合的新航程。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx2bGAH54zAEQqNlV4kzU257.pdf

3．加强农药包装废弃物管理

【农民日报】“为了保护好绿水青山，我对农药包装废弃物管理特别关注，因此今年我提交了尽快出台农药包装废弃物管理办法的议案。”全国人大代表、安徽省肥东县总工会兼职副主席李小莉呼吁。李小莉说，应建立农药包装废弃物集中贮存场所，引导和扶持专业化机构开展农药包装废弃物的无害化处置工作，减轻农业面源污染，为子孙后代留下绿水青山，制定出台全国性农药（农膜）包装废弃物管理办法迫在眉睫。为此，应从国家层面着手制定出台农药包装废弃物管理办法。建议统一回收价格，制定标准化管理流程，做好宣传工作、统一规范无害化处置；统一纳入乡村振兴战略生态文明建设目标的考核，鼓励引导各地争创全国农废回收、处置模式，建立全国统一的农药包装废弃物回收处置信息化管理平台。加大财政资金支持力度，做到应收尽收，保障农药包装废弃物回收工作持续开展。尽快开展农药统一配送，为财政预算公益投入提供依据，同时增强溯源管理，减少农药使用量。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIsSeALtMKAC9RgCF8CdA281.pdf

4．打造餐桌上的“科技安全阀”

【光明日报】打开手机摄像头轻轻一扫，产地、品质、种植周期、采收时间、农药残留

检测结果等信息一目了然……如今，走进许多城市的大型超市卖场，一些食品和农产品外包装上的二维码，让消费者轻轻松松就能了解这些瓜果食粮的“前世今生”。小小溯源码，正是科技改善民生的缩影。民以食为天，食以安为先，食品安全以及农产品质量安全受到老百姓高度关注，也是全国两会上的热门话题。今年的政府工作报告提出，严格食品全链条质量安全监管。如何更好地发挥科技作用守护“舌尖上的安全”？中国工程院院士孙宝国委员，中国农业科学院农业质量标准与检测技术研究所教授王静委员和内蒙古蒙牛乳业（集团）股份有限公司研发创新部党支部书记、研发高级经理史玉东代表各抒己见，建言献策。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx1v-AA8yuABaPD3Tqyq4594.pdf

【文献速递】

1．基于IMU的细粒度奶牛行为判别

文献源：中国农业大学学报,2022-03-15

摘要：针对奶牛行为判别自动化水平不足、准确率低的问题,采用惯性测量单元（IMU）和卷积神经网络（CNN）,对细粒度奶牛行为判别进行研究。结果表明:1)在KNN、SVM、BPNN、CNN和LSTM 5个模型中,CNN模型在奶牛行为分类测试集上的准确率最高。2)含有三轴加速度计、陀螺仪和磁力计的IMU更加适用于奶牛行为分类,其分类效果优于含一种传感器的IMU。3)传感器频率与分类模型的性能相关,频率越高,正确率越高,当传感器频率设置为25Hz时,奶牛行为判别效果最好。4)在1、2和4s这3种时间窗中,使用4s时间窗的奶牛行为分类模型性能最好。5)采用最优配置时,卷积神经网络模型能够有效的判别奶牛站立、躺卧2种状态,正确率为99%;可以对奶牛卷食、咀嚼、站立反刍、躺卧反刍、躺卧休息、站立休息6类行为进行判别,正确率为85%。采用IMU和卷积神经网络算法,可以有效的对细粒度奶牛行为进行判别,为奶牛养殖的自动化、智能化管理提供支撑。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIp96AWqE2AAeBWt425Jo458.pdf

2．基于特征波段选择和机器学习的小麦白粉病高光谱遥感监测

文献源：作物学报,2022-03-15

摘要：白粉病严重危害小麦生长及制约产量形成，精确监测该病害对精确防控及保障国家粮食安全具有重要意义。在小麦孕穗、开花和灌浆期使用地物高光谱仪获取小麦冠层光谱数据，利用一阶导数（FD）、二阶导数（SD）、对数变换（LOG）、倒数变换（1/R）和连续去除法（CR）对原始光谱（OR）进行光谱变换，基于CARS算法和SPA算法相结合

对五种变换的光谱数据和原始光谱进行特征波段提取，进而利用偏最小二乘回归（PLSR）、岭回归（RR）和高斯过程回归（GPR）建模方法确立小麦白粉病病情指数（mDI）监测模型。结果表明，一阶导数在Pearson相关性、两波段优化组合以及机器学习方法建模中，综合表现最好，是一种处理病害光谱数据的较好预处理方法。经过光谱数据变换后，再使用CARS-SPA算法可以更有效的提取特征波段，特征波段为411、450、476、543、561、594、624、671、726、780、835和950 nm。在不同机器学习建模方法对比中，高斯过程回归（GPR）模型表现最佳，其次为岭回归（RR）和偏最小二乘法回归（PLSR）。其中，一阶导数结合GPR模型的估算精度最高，建模集和验证集的平均R^2为0.805，RMSE和MAE分别为2.532和2.164，相较于OR-GPR模型，R^2提升12%，RMSE和MAE分别降低19.6%和17.6%，表明GPR模型在小麦白粉病监测中具有良好的估算能力。可见，使用一阶导数预处理光谱数据，采用CARS-SPA结合算法提取特征波段，再利用高斯过程回归建模方法能够提升小麦白粉病遥感监测精度。研究结果为实现遥感监测作物病害提供了思路与方法。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx9oiAL4RFABg7c1CCOlk408.pdf

3．技术嵌入、信息困境消解与区块链监管赋能——以广州水产品溯源平台为例

文献源：广州大学学报(社会科学版),2022-03-15

摘要：信息困境和协同失灵是食品质量安全监管的痼疾之一，区块链技术为监管场景下的复杂问题提供了新的解决方案。作为一种新兴的监管工具，区块链技术提升了监管效能，通过两个途径实现了对监管体系的赋能：一是构建打破部门边界和信息困境的协同平台，将传统多中心的监管结构变革为“去中心化”的新型组织形态，从而实现了信息共享；二是通过智能合约技术实现数字监管机制的自治和风险自动预警，提升了监管效能。区块链技术赋能水产品质量安全监管机制的过程机理，拓展了区块链监管领域的研究图景，也为跨部门监管实践的反思和重构提供了参考。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIpsGAcJnXAAvIy1jSJiQ931.pdf

4．基于集成学习和多时相遥感影像的枸杞种植区分类

文献源：自然资源遥感,2022-03-14

摘要：利用遥感技术对柴达木盆地枸杞种植区进行精准提取对当地政府开展市场管理与调控具有重要意义。以典型枸杞种植区诺木洪农场为例,选取Landsat8 OLI和GF-1 WFV影像构建作物生长期内时序NDVI/EVI数据,并采用4种新颖的集成学习分类器

（LightGBM,GBDT,XGBoost, RF）和2种应用广泛的机器学习分类器（SVM,MLPC）对枸杞种植区进行分类。研究结果表明:（1）LightGBM（90.4%）,GBDT（90.4%）,XGBoost（89.31%）和RF（86.96%）分类器能获得较高的分类精度,并以LightGBM+EVI的总体分类精度最高,达到了91.67%,Kappa系数为0.90;（2）EVI指数在枸杞生长中后期表现更为灵敏,并在同一分类器下使用EVI时序数据能获得更好的枸杞作物制图效果;（3）利用GBDT,XGBoost和RF分类器的特征重要性评分方法进行枸杞种植区分类时相特征优选,能够在获取高分类精度的同时进一步降低数据冗余。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIqR6ASdRKAC1dwk4O60U874.pdf

5．基于无人机多光谱数据的玉米苗株估算

文献源：自然资源遥感,2022-03-11

摘要：为能及时监测和评估东北大面积的玉米出苗情况,估算苗株数,依据低空无人机（unmanned aerial vehicle, UAV）遥感影像为玉米苗株数的快速估算提供有效支持。研究基于UAV多光谱数据,通过对比ExG,GBDI,ExG-ExR,NGRDI,GLI等颜色指数分割玉米与土壤背景,借助OTSU算法确定最佳阈值,选定最佳颜色指数ExG。优化出最佳形态学特征参数的组合:面积A、周长B、矩形长D、矩形周长G、椭圆长轴长度H、形状因子Q。借助支持向量机回归（support vector regression, SVR）模型,预测出玉米苗株数,评价精度,并估算和绘制了局地玉米苗株数的空间分布图。该SVR模型测试的精度达到96.54%,统计误差为0.6%。研究成果能够在短时间内迅速、快捷、准确地预测玉米苗株数和长势趋势。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx-NmAU4r6ACB_TpvjGMo630.pdf

6．太赫兹时域光谱在农业领域的应用研究进展

文献源：激光与光电子学进展,2022-03-10

摘要：太赫兹波在电磁波谱中位于红外与微波之间，具有穿透性、瞬态性、宽带性、相干性、低能性等优越特性，可以揭示分子间弱的相互作用力。得益于太赫兹波产生和探测技术的发展，太赫兹的实际应用成为了可能。同时，随着机器学习的发展普及，进一步将太赫兹的应用范围扩展到非极性不敏感物质以及“指纹”谱近似的混合物。该文从太赫兹光学采样系统原理，光谱数据分析建模出发，系统讨论了太赫兹在农业领域的前沿应用进展。主要包括农业生物大分子检测、植物生理检测、土壤检测、农药抗生素残留检测、农产品质量检测、育种质量控制等方面。并且在此基础上展望未来发展的若干方向，以期助力太赫兹时域光谱技术赋能智慧农业。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIqi6ATcbTAAzwGp8xOls481.pdf

7．基于荧光光谱信息的绿色植物探测研究

文献源：光谱学与光谱分析,2022-03-09

摘要：针对农作物病、虫、草害化学防治时对靶变量施药以减少农药使用量、提高农药利用率的需求,本文研究了基于荧光光谱信息和主动光源方法在不同环境下探测绿色植物的方法。通过白色、蓝色和红色LED主动光源照射样本,采集了白天室内自然光照、白天太阳直射、白天无太阳直射和夜晚黑暗环境四种场景下的绿色植物和非绿色植物样本光谱。首先基于多波段光谱信息建立簇类独立软模式法（SIMCA）和线性判别分析（LDA）模型,验证利用主动光源照射下绿色植物荧光光谱探测绿色植物的可行性。试验结果表明,白色、蓝色和红色三种LED光源照射下SIMCA模型对预测集样本的识别率均达到92%以上,拒绝率均为100%;三种光源照射下LDA分类模型均能准确识别出预测集所有样本,检测效果优于SIMCA模型,且三种LED光源的效果无显著差异。为开发低成本绿色植物探测传感器,建立了绿色植物与非绿色植物样本分类目标函数,通过粒子群算法（PSO）优选单一连续光谱波段原始光谱并建立了绿色植物和非绿色植物样本的阈值分类模型。结果表明,白色、蓝色和红色LED光源照射下优选的原始光谱波段分别为731.1,730.76和731.1 nm,对应阈值分类模型分类预测集样本的F1-score分别为76.71%, 80.52%和78.48%,蓝色LED光源的效果最好。该研究优选的主动光源类型和连续检测波段可为开发基于单波段的低成本绿色植物探测传感器提供理论依据。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx-9iAOTNPAApN7Hunu_4435.pdf

8．基于优化面积光谱指数的玉米叶片叶绿素值估测

文献源：光谱学与光谱分析,2022-03-09

摘要：综合使用光谱技术对作物养分进行实时、有效诊断,有助于作物的精准管理、保障产量和减少环境污染,提高肥料利用率,并且为定量估测作物生化组分状况提供了一种新的途径。光谱指数是进行作物叶片叶绿素实时估测的重要指标,然而由于受到环境条件及内在生化成分的影响,估测结果不尽满意。为了进一步提高光谱指数在估测作物叶片叶绿素含量时的抗干扰能力和敏感性,于2020年在内蒙古玉米种植典型区域进行不同氮梯度的田间试验,在玉米的四个关键生育时期获取叶片的光谱反射率和叶绿素值,通过建立基于面积的光谱指数和叶片叶绿素值的关系模型并进行光谱指数的优化及评价。结果表明,生育时期对面积光谱指数与叶片叶绿素值的关系有显著影响。前人研究的基于

面积的光谱指数在玉米苗期时对于叶片叶绿素含量的估测效果较差,而对抽雄期叶片叶绿素含量的估测效果最佳。基于优化算法构建的面积光谱指数显著提高了光谱指数对叶片叶绿素含量估测的准确度和稳定性,基于优化算法的优化三角形植被指数（OTVI）、优化叶绿素吸收积分指数（OCAI）和优化双峰面积归一化差值指数（ONDDA）在不同生育时期上比前人研究的面积光谱指数具有更强的叶绿素含量估测能力,估测模型的决定系数R^2在0.94～0.99之间。与优化三角形植被指数（OTVI）和优化叶绿素吸收积分指数（OCAI）相比优化双峰面积归一化差值指数（ONDDA）在估测春玉米不同生育时期叶片叶绿素含量方面更为稳定,预测模型验证结果的决定系数R^2为0.94,并且验证误差最小,RMSE和NRMSE%分别为2.29%, 3.94%,模型估测值与实测值的验证斜率为0.996,接近1。综上所述,ONDDA是一个实用且适合于估测不同生育时期叶片叶绿素含量的面积光谱指数。

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIq6-AOgdgAA93BSkjd08811.pdf

9．基于Landsat 8遥感影像的地上生物量模型反演研究

文献源：西北林学院学报,2022-03-09

摘要：以吉林省延边朝鲜族自治州汪清县的主要针叶纯林树种为研究对象,结合Landsat 8 OLI数据和地面调查数据,通过提取半径为15 m圆形样地林分尺度下的遥感特征变量实现对地上生物量的估算。首先提取128块样地内的34个遥感特征,其次采用随机森林特征重要性分析遥感特征的贡献率,再利用BP神经网络算法的2种训练算法、SVM支持向量机的3种核函数构建地上生物量模型,最后利用32个测试样本评价模型的估算精度。结果表明,BP神经网络的L-M训练算法和贝叶斯正则化训练算法的R^2分别为0.602 9、0.672 1,RMSE分别为5.096 9、4.263 7,MAE分别为4.166 9、3.211 8;SVM支持向量机的线性核函数、RBF核函数、多项式核函数的R^2分别为0.585 8、0.561 9、0.487 7,RMSE分别为5.859 4、5.600 9、5.763 7,MAE分别为4.24、3.89、4.176。以贝叶斯正则化训练算法构建地上生物量模型的估测精度最佳;BP神经网络算法比SVM向量机更适用于本研究;同一种机器学习算法不同的训练函数存在差异性。

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx-feAKUDRAAhjdXQ0_AA803.pdf

【会议论文】

1．Fruit Harvesting Robot Using Computer Vision

发布源：IEEE

发布时间：2022-03-10

摘要：Agriculture has conventionally been a labor-intensive occupation in India. However, in order to provide for the rapidly increasing population, in the face of rising labour costs, there is a need to explore autonomous alternatives in place of traditional methods. This paper proposes a prototype of an autonomous fruit harvesting robot consisting of a robotic arm erected on a mobile chassis. Our proposed design is capable of identifying fruits with the help of a camera module using image preprocessing supplemented with object detection algorithm (YOLO v3). We also qualitatively compared two models, one based only on image processing and the other based solely on object detection algorithm (YOLO), while taking into account the shape and colour of the fruits. When fruits are recognized, the robotic arm is engaged, and the fruit is picked and stored in the container attached to the robot's body. To pick and arrange the fruits, an end effector subsystem is used. We have also used sensors to collect important data like humidity, temperature, and rain for further processing.

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaJycqACxMDAA8qNV39STU678.pdf

2．Soil and Crop Health Analysis Using IoT and ML

发布源：IEEE

发布时间：2022-03-10

摘要：India ranks 2nd in the world in agriculture production, and when it comes to global exporting of agricultural products, India ranks 9th. The rate of agriculture production has been increasing annually at a rate of 12%. With the increasing population and reduction of workforce in India, the rate of agriculture has been skyrocketing. With more and more agriculture production there comes more pesticides leading to more crop diseases. A lot of crops get wasted and expenditure on fertilization and pesting also increases. The goal of this literature survey is to compare and contrast Smart Agriculture Systems which tackle the problems of crop diseases using cutting Edge Technology like Internet of Things (IoT).

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaJxYaAJiXBAA83McPoa2I327.pdf

3．A Study of Blockchain Technology in Agriculture Supply Chain

发布源：IEEE

发布时间：2022-01-20

摘要：The chain of distribution management is predominant wherever the process occurs in stage-by-stage manner. Among the various types, agriculture Supply Chain Management is very critical as it is sensitive to failures. In India, the agriculture supply chain is very poor, and the farmers are not able to know the real condition of their goods. Hence, the farmers must accept the price given by the company person or the brokers. It would be better if there exists some technology helping them to view the status of their goods at the end of each stage. Blockchain is one such technology providing the user security and immutable storage of data. In this paper, the strategies applying Blockchain for the agriculture supply chain are analysed and inferred howfar the technology is utilized.

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaJwiKAeX-aAAK_K__MRTI213.pdf

4．Rapid Plant Development Modelling System for Predictive Agriculture Based on Artificial Intelligence

发布源：IEEE

发布时间：2021-06-30

摘 要： Actual and upcoming climate changes will evidently have the largest impact on agriculture crops cultivation in terms of reduced harvest, increased costs, and necessary deviation from the traditional farming. The aggravating factor for the successful applications of precision and predictive agriculture is the lack of big data, due to slow, year-round cycles of crops, as a prerequisite for further analysis and modelling. The goal of the system we propose is to enable rapid collection of data with respect to various climate conditions, which are artificially created and permuted in the encapsulated design, and correlated with plant development identifiers. The design is equipped with a large number of sensors and connected to the central database in a computer cloud. Such accumulated data is exploited to develop mathematical models of wheat in different growth stages by applying the concepts of artificial intelligence and utilize them for prediction of crop development and harvest. The paper presents a work in progress where the developed models will be publicly and interactively used through a portal for prediction of plant development in real and hypothetical climate conditions, with accumulated and archived feedback from farmers as additional data for tuning of the developed models.

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIzHCuAVAJpAEI_FrsPss0650.pdf

5．Agbots 3.0: Adaptive Weed Growth Prediction for Mechanical Weeding Agbots

发布源：IEEE

发布时间：2021-06-08

摘要：This work presents advances in predictive modeling of weed growth, as well as an improved planning index to be used in conjunction with these techniques, for the purpose of improving the performance of coordinated weeding algorithms being developed for industrial agriculture. We demonstrate that the evolving Gaussian process (E-GP) method applied to measurements from the agents can predict the evolution of the field within the realistic simulation environment, Weed World. This method also provides physical insight into the seed bank distribution of the field. In this work, we extend the E-GP model in two important ways. First, we have developed a model that has a bias term, and we show how it is connected to the seed bank distribution. Second, we show that one may decouple the component of the model representing weed growth from the component, which varies with the seed bank distribution, and adapt the latter online. We compare this predictive approach with one that relies on known properties of the weed growth model and show that the E-GP method can drive down the total weed biomass for fields with high seed bank densities using less agents, without assuming this model information. We use an improved planning index, the Whittle index, which allows a balanced tradeoff between exploiting a row or allowing it to accrue reward and conforms to what we show is the theoretical limit for the fewest number of agents, which can be used in this domain.

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIzFoSABj-NACtSj6T0_Qg565.pdf

6．Agriculture 4.0: An Implementation Framework for Food Security Attainment in Nigeria’s Post-Covid-19 Era

发布源：IEEE

发布时间：2021-06-04

摘要： The challenge of Nigeria's food insecurity in the era of the Covid-19 pandemic, insecurity, climate change, population growth, food wastage, etc., is a demanding task. This study addresses Nigeria's food insecurity challenges by adopting agriculture 4.0 and commercial farming. Using data from six digital libraries, the Nigerian Bureau of Statistics,

and other internet sources, we conducted a Systematic Literature Review (SLR using PRISMA) on Nigeria's agriculture, food security, and agriculture 4.0. Our results show Nigeria's current agricultural state, threats to food security, and modern digital agriculture technologies. We adapted our SLR findings to develop an implementation framework for agriculture 4.0 in solving Nigeria's food insecurity challenge in the post-Covid-19 era. Our proposed framework integrates precision agriculture in Nigeria's food production and the necessary enabling digital technologies in the agri-food supply chain. We analyzed the critical implementation considerations during each agri-food supply chain stage of farming inputs, farming scale, farming approach, farming operation, food processing, food preservation/storage, distribution/logistics, and the final consumers. This study will help researchers, investors, and the government address food security in Nigeria. The implementation of agriculture 4.0 will substantially contribute to SDG 2 (zero hunger), SDG 3 (good health and well-being), and SDG 8 (decent work and economic growth) of #Envision 2030 of the United Nations, for the benefit of Nigeria, Africa, and the entire world.

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIzEk6ABujDACr6eOULsyU094.pdf

【专业会议】

1．2022 3rd International Conference on Computer Vision, Communications and Multimedia (CVCM 2022)

发布源：cvcm

发布时间：2022-03-16

摘 要 ： 2022 3rd International Conference on Computer Vision, Communications and Multimedia (CVCM 2022) will be held during August 26-28, 2022 in Xi'an, China. CVCM 2022 is to bring together leading academic scientists, research scholars and researchers to share and exchange their experiences and research results about all aspects of Computer Vision, Communications and Multimedia. It would also provide a premier interdisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered and the solutions adopted in the field of Computer Vision, Communications and Multimedia.

链接:

http://agri.ckcest.cn/file1/M00/0F/F9/Csgk0GIx86aACmcYAAybjGl0NwA248.pdf

2．2022 IEEE International Conference on Agri-photonics and Smart Agricultural Sensing Technologies (ICASAST 2022）

发布源：中国农业工程学会

发布时间：2022-03-16

摘要：2022 IEEE International Conference on Agri-photonics and Smart Agricultural Sensing Technologies (ICASAST2022) will be held in Zhengzhou, China on June 10-12, 2022. The conference is co-hosted by the Chinese Society of Agricultural Engineering, Henan Agricultural University and Henan International Joint Laboratory of Agricultural Laser Technology. The conference is organized by Henan Electrotechnical Society and Mechanical and Electrical Engineering College of Henan Agricultural University. The conference is co-organized by National Engineering Research Center for Intelligent Equipment Agricultural, Henan Agricultural Engineering Society, Henan Agricultural Machinery Society, College of Biosystems Engineering and Food Science of Zhejiang University, Faculty of Agricultural and Environmental Sciences of McGill University, Agricultural College of Chungbuk National University of South Korea, etc. The objective of this conference is to build a platform for experts, scholars, scientists and other related personnel to exchange and share the latest research achievements around the latest research of "Agricultural Sensing Technologies" and "Agricultural Photonics". This meeting achieves the purpose of mutual promotion and common improvement. At the same time, the key challenges and research directions in Agriculture are discussed in order to promote the development and application of theories and technologies in Agriculture. The conference also serves participants to establish business or research connections and to find global partners for future ventures. Scholars from home and abroad are warmly welcomed to contribute and participate in the conference!

链接:

http://agri.ckcest.cn/file1/M00/03/27/Csgk0YaIku-AEVPvAEvIaUz1Alg212.pdf

主编：赵瑞雪　　本期编辑：陈亚东
地址：北京市海淀区中关村南大街12号　　邮编：100081
电话：010-82106649　　邮件地址：agri@ckcest.cn