《智慧农业发展战略研究》专题快报

中国工程科技知识中心农业分中心

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【动态资讯】

1．"数字引擎"领创乡村未来

【农民日报】博山巍然，淄水连绵，谈起山东省淄博市，工矿业名城的印象深入人心。然而，走进这座有着110多年近现代工业发展史的城市，记者发现，高效率、标准化的思维远远不囿于工业，以数字技术与农业农村经济社会深度融合为方向，当地引领农业农村现代化发展的"数字引擎"早已动能强劲。"科技革命加速演进，为全面推进乡村振兴提供了新的路径选择。近年来，淄博市抢抓数字化改革机遇，在全国地级市中率先提出建设数字农业农村中心城市，于2020年底成功获批以数 字农业农村改革试验为核心任务的国家农村改革试验区，为打造乡村振兴'齐鲁样板'、助力全国农业农村现代化建设贡献淄博智慧、探索淄博方案。"在淄博市委书记马晓磊看来，实现新时代农业农村高质量发展，有必要"换道超车"，以数字技术推动原有生产要素组合的优化升级。

链接:

http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0ISSANlyeAAIMjCh9Dd4907.pdf

2．智慧农业基层推广探索跨越"数字鸿沟"

【经济参考报】随着智慧农业的加速部署与深入实践，越来越多的"黑科技"正在走进田间地头，为传统农业生产插上智能化翅膀。受访业内人士表示，推进智慧农业发展，既需要权衡由于数字化发展阶 段不同带来的智慧农业的特殊性，又需要在广泛吸收服务业、制造业成功经验的基础上确定可行的发展路径，从而加速推动农业生产向数字化、网络化、智能化方向迈进。农业生产迸发更多可能 在河南省淅川县邹庄村的千亩智慧农田内，流转了100多亩土地的种粮大户邹会议向记者展示了智慧灌溉系统。"现在浇地可方便，我的手机上下载有软件，想浇哪个灌区，打开手机软件一喊，水就出来了。"邹会议说。智慧灌溉只是智慧农业生产的一个缩影。受访专家表示，智慧农业的本质是

利用"数据+算法"加速农业的智能化生产、网络化协同、服务化延伸，进而实现效率提升和成本节约，这为农业产业的绿色化生产、集约化经营、个性化供应提供了可行的发展途径。化肥农药等传统技术要素投入对农业生产效率的带动效应日趋递减，粗放型投入的消极影响正在日益显现，迫使农业必须走绿色发展道路。

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeK0NSABfNWAAEfGcEXHR8327.pdf

3．"数字化"让农业发展更有"智慧"

【各界导报】"只要2到3人就可以操控5万多平方米的温室大棚，每年可生产各类番茄作物上百万吨，这是数字化平台创造的奇迹!"提起大数据平台，秦农现代农业示范园奥达集团农业事业部项目负责人张林有感而发。今年的杨凌农高会，他们所建设的新型智慧农业温室得到了一批又一批参观者的称赞。在他看来，这都是数字化平台带来的荣誉。9月15日，记者乘车来到农高会田间展区的秦农现代农业示范园内，近距离参观了这座新型 智慧农业温室。偌大的温室里，不计其数的番茄在舒适的条件下茁壮生长着。自动除湿、定时灌溉、温度预警等各项工作都在井然有序地开展着。

链接：

http://hs.kns.cnki.net.dr2am.catas.cn:8989/kcms/detail/detail.aspx?dbcode=CCND&dbname=CCNDTEMP&filename=GJDB202209200031&uniplatform=NZKPT&v=NvCwHjJ30wQsk63f2HpDRWSJSOLmEFjI5XZKZ0wcqo2_GyKI0HknPTvIiPYNB1ETZIQ1XYH2CBY%3d&__dp=https

【文献速递】

1．Band Selection Technique for Crop Classification Using Hyperspectral Data

文献源：JOURNAL OF THE INDIAN SOCIETY OF REMOTE SENSING,2022-08-18

摘要：Hyperspectral datasets are widely used in many applications of remote sensing in the fields of agriculture, forestry, weather, urban planning, water study, biodiversity and surface changes. Our focus is agriculture with different perspectives such as classifications of crops, identification of different crop growth stages, fallow land, etc. However, the major challenge in working with hyperspectral data is the large number of narrow bands to deal with while having lack of fully labelled ground-truth data sometimes. In this paper, we propose a new band selection algorithm using the statistical parameter, spectral information divergence (SID), from the hyperspectral dataset. A hypothesis of the proposed band selection algorithm is if two most similar crops can be discriminated based on the

lowest SID value, then other crops can also be discriminated. Subsequently, we use three classifiers: support vector machine (SVM), K-nearest neighbours and artificial neural network (ANN) and present the performance of the algorithm using simulations with the two performance parameters, i.e. overall accuracy (OA) and kappa coefficient. We have applied the algorithm on the three datasets: AVIRIS-NG dataset of Anand district in the state of Gujarat of India, Indian Pines dataset of northern-western Indiana state of the USA and Salinas dataset of Salinas Valley of California state of the USA. We have obtained the OA of 97.55% with the selection of 20 bands using SVM in the case of the AVIRIS-NG dataset. If we increase the selection to 40 bands, there is a nominal improvement in OA, i.e. 98.40%. We have also presented the performance of some prevailing algorithms working on band correlation analysis on the same datasets. We conclude that the proposed algorithm outperforms the prevailing ones.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0GnaAS7rtACsnMiy6zxU919.pdf

2．BioWSN: A Bio-Inspired Method for Optimization of Routing in Wireless Sensor Networks

文献源：MATHEMATICAL PROBLEMS IN ENGINEERING,2022-04-26

摘 要： Wireless sensor networks (WSN) have been recently gaining traction for many applications in monitoring and surveillance systems in the physical world specifically in agriculture, healthcare, and smart cities. Many clustering and routing approaches have been introduced to reduce the consumption of energy in WSNs to increase the lifetime of the network. In this study, we propose an improved version of grey wolf optimizer (GWO), a nature-inspired metaheuristic optimization algorithm, to perform cluster head selection and routing in WSN while maximizing the lifetime of WSN. GWO has a propensity to converge to local optima. To overcome this drawback of the conventional GWO, we introduce a balancing factor between the exploration and exploitation phases of the algorithm in addition to a mapping scheme. Comparative simulation and analysis of the proposed algorithm show significant improvement compared to frequently used and well-known approaches namely LEACH and PSO.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKz32AZ1o1AAm7bQyLwKE885.pdf

3．Combining Climate Smart Agriculture Practises Pays Off: Evidence on Food Security From Southern Highland Zone of Tanzania

文献源：FRONTIERS IN SUSTAINABLE FOOD SYSTEMS,2022-04-26

摘 要：Concerns of food insecurity and climate change are serious global challenges, Tanzania included. In response, farm households are using various climate-smart agricultural practises (CSA-practises) which are believed to play a vital role to increase agricultural productivity, increasing resilience to climate change, and reducing mitigation costs for greenhouse gas (GHG) emissions while improving households' food security. Despite these benefits of CSA-practises but the usage of these practises is still voluntary and its impact on household welfare specifically food security is not well-documented in Tanzania, particularly in Mbeya and Songwe Region. Therefore, the determinants of using CSA-practises (in particular organic manure, drought-tolerant maize seeds, and irrigation) and the impact of the usage of household food security was examined. The cross-sectional study design was used to collect information from farming households in the Southern Highlands of Tanzania (Mbeya and Songwe regions). To evaluate the impact of the combination of CSA-practises on household food security the study used a multinomial endogenous treatment effect model. A counterfactual analysis was conducted to compare the impacts from different combinations of CSA-practises considered. The findings show that household, plot, and institutional characteristics have significant effects on the usage of a different combination of CSA-practises. The study also found that the highest payoff of food security is achieved when CSA-practises are used in combination rather than in isolation. The package that contains a combination of drought-tolerant maize seeds and Irrigation (Or(0)Dt(1)Ir(1)) gave a higher payoff than the combination of all three CSA-practises. The study suggests that based on the practises considered in this study, the usage of a combination of various practises results in better food security compared to the usage of these practises individually. This indicates that promoting a combination of CSA-practises could enhance household food security.

文献类型: Article

链接:

http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0HhGAYDSEAAZmdWa9yo0316.pdf

4．Adigar: a drone simulator for agriculture

文献源：CURRENT SCIENCE,2022-04-25

摘要：Adigar is a drone simulator developed to reduce the adverse effects of pesticides during the spraying process. Here, we propose a path planning algorithm to cover all arable areas of a farmland, while avoiding unsafe areas. The proposed solution outputs the optimal path for the farmland and the drone can fly over along this path to spray pesticides without human intervention. This approach highlights the concept of using drones for agricultural purposes with minimum human intervention.

链接:

http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0HXWATNrNACCwhoypD0o401.pdf

5．Carbon Emissions With Forest Cover Change and Wood Harvest in the Dry Temperate Region of Pakistan Between 1908 and 2015

文献源：FRONTIERS IN ENVIRONMENTAL SCIENCE,2022-04-20

摘要：Regional carbon emissions related to forest cover change (FCC) and wood harvest (WH) are critical for the accurate estimates of global carbon balance over an extended time period. Using remote sensing and inventory data, this study provides a comprehensive record of FCC, WH, and their integrated carbon emissions between 1908 and 2015 in the dry temperate regions of Pakistan. Results demonstrate a significant decline in forest area (21,034 ha) at an annual rate of 0.56% from 1973 to 2015. The total WH was 24.84 million m^3 (0.23 million m^3 yr^{-1}) between 1908 and 2015. Deforestation was responsible for a net loss of 1.39 million Mg C (0.018 million Mg C yr^{-1}), while WH-related carbon emissions accounted for 11.29 million Mg C (0.52 million Mg C yr^{-1}). The present results indicate that under the existing FCC and WH harvest scenario, the forests are acting as a net source of 0.29 million Mg C yr^{-1}. Agriculture expansion and the heavy dependency of local communities on the forest's resources, exclusion of conservation and local communities from forest management, insufficient monitoring, and weak law-enforcement were the striking drivers of FCC, WH, and their related emissions. These findings suggest that to maintain forest carbon and meet the communities' requirements, counter approaches such as agriculture incentives, agroforestry, trophy hunting, alternative energy sources, and inclusion of conservation and secure community-based management are needed.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0HLuAYrNuABq8ukNju3A492.pdf

6．An empirical analysis of surface-level methane emission from anthropogenic sources in

India

文献源：JOURNAL OF CLEANER PRODUCTION,2022-04-20

摘 要：This study presents an empirical analysis of surface-level methane emission from anthropogenic sources in two major Indian cities. Three categories of sources were considered-(1) fossil fuel exploration and energy pro-duction (2) agriculture and livestock farming and (3) waste processing and disposal. In each city, specific sources were identified and mapped to the nearest methane monitoring station. As these sources were active for varying periods, treatment and control periods were designed by partitioning the observation period based on the activity of sources. This experimental design framework was used to formulate and test hypotheses on contribution of these sources to methane emission. Given the limitations and statistical properties (non-normal residuals and heteroskedasticity) of the data a robust alternative to classical analysis of variance (ANOVA) was used to test three hypotheses. Tests confirmed that these sources contributed significantly to methane emission. Specifically, emission from MSW disposal facilities was substantial as evident from the data in Delhi. In Bengaluru, aggregate emission from following sources was found significant-(1) a diesel-based power plant and a landfill (2) a sewage treatment plant and a landfill. This empirical work compliments previous studies on greenhouse gas emissions, which were based on climate models and satellite remote sensing data. This analysis of natural experiment ends with recommendations to manage methane emission from anthropogenic sources.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKytaAIIH4AESiB4_MqjI226.pdf

7．Geospatial solutions for evaluating the impact of the Tigray conflict on farming

文献源：ACTA GEOPHYSICA,2022-04-15

摘要：Military conflicts strongly affect agricultural activities. This has strong implications for people's livelihoods when agriculture is the backbone of the economy. We assessed the effect of the Tigray conflict on farming activities using freely available remote sensing data. For detecting greenness, a normalized difference vegetation Index (NDVI) was analyzed in Google Earth Engine (GEE) using Sentinel 2 satellite images acquired in the pre-war (2020) and during war (2021) spring seasons. CHIRPS data were analyzed in GEE to understand the rainfall conditions. The NDVI of 2020 showed that farmlands were poorly covered with vegetation. However, in 2021, vegetation cover existed in the same season. The NDVI

changes stretched from - 0.72 to 0.83. The changes in greenness were categorized as increase (2167 km(2)), some increase (18,386 km(2)), no change (1.6 km(2)), some decrease (8269 km(2)), and decrease (362 km(2)). Overall, 72% of the farmlands have seen increases in green vegetation before crops started to grow in 2021. Scattered patches with decreases in vegetation cover correspond to irrigation farms and spring-cropping rain-fed farms uncultivated in 2021. There was no clear pattern of changes in vegetation cover as a function of agro-climatic conditions. The precipitation analysis shows less rainfall in 2021 as compared to 2020, indicating that precipitation has not been an important factor. The conflict is most responsible for fallowing farmlands covered with weeds in the spring season of 2021. The use of freely accessible remote sensing data helps recognizing absence of ploughing in crisis times.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0F_OAS9XoAI5EJTR8Htg093.pdf

8．Zinc- and Magnesium-Doped Hydroxyapatite Nanoparticles Modified with Urea as Smart Nitrogen Fertilizers

文献源：ACS APPLIED NANO MATERIALS,2022-04-15

摘要：Excess urea fertilizer application to the agricultural fields causes severe environmental deterioration. Researchers actively seek safer alternatives, such as nanoparticles with unique properties, to reduce chemical inputs without compromising agricultural output. In the present study, three variants-hydroxyapatite-urea, magnesium-doped hydroxyapatite-urea, and zinc-doped hydroxyapatite-urea nanohybrids-have been synthesized in a two-step method and characterized as slow-release nitrogen fertilizers. Doping with Zn and Mg reduces the hydroxyapatite nanoparticles' size and accommodates a higher amount of urea molecules. As per the Hixson-Crowell model equation, the urea molecules were slowly released from the nanohybrids for up to two weeks in the soil environment. With zinc and magnesium integrated into hydroxyapatite, the synthesized nanohybrids serve as a multinutrient complex of nitrogen, calcium, phosphorus, magnesium, and zinc nutrients. We found that nanohybrids containing 50% nitrogen doses maintained wheat crop yield and nitrogen nutrient uptake equivalent to a urea fertilizer containing 100% nitrogen doses, which helped mitigate ammonia emissions from the agricultural fields. The nanohybrid-supplemented soil enhanced the soil dehydrogenase and urease enzyme levels, suggesting no adverse impact of nanohybrids on soil health. We present

comprehensive experimental evidence for the synthesis and application of the nitrogen nanohybrids for agricultural production and for cutting off nitrogen input by up to half to mitigate environmental repercussions. This study unlocks paradigms for designing and applying climate-friendly smart fertilizers in sustainable agriculture.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKyFOAf_4ZAClRR5sfb4U107.pdf

9．Wireless-Sensor Communication Based Wireless-Charging Coil Positioning System for UAVs With Maximum Power Point Tracking

文献源：IEEE SENSORS JOURNAL,2022-04-15

摘要：Drone is a piece of power-hungry equipment whose battery drains within the first few minutes of its takeoff, and the user has to physically change the battery to a fully charged one. Implementation of wireless power transfer (WPT) in unmanned aerial vehicles has started becoming a reality. However, the technology is prone to many problems, especially misalignment between transmitter and receiver coils. The WPT system faces a sudden decline in power transfer with few millimeters of lateral misalignment between the transmitter and the receiver coil. The proposed sensor-based tracking system creates a two-way communication between the transmitter and the receiver coil systems for exchanging maximum power point information. The transmitter coil is adjusted directly beneath the receiver coil for maximum power transfer. The proposed WPT charging system reduces the misalignment issue by a significant factor and achieves maximum coupling efficiency. At 10 mm vertical distance, 0 mm lateral displacement between transmitter and receiver coils, the system achieved 91.3% power transfer efficiency by wirelessly receiving 70 W of power. The system offers practical, autonomous charging use cases in surveying, agriculture, and mapping applications.

链接:

http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0FuSAQl3GAC6Bqi7W4hs329.pdf

10．Effects of landscape complexity on crop productivity: An assessment from space

文献源：AGRICULTURE ECOSYSTEMS & ENVIRONMENT,2022-04-15

摘要：Agricultural producers have many incentives to clear small natural areas from their fields, as this can expand their cultivated land base. However, natural areas can play a role in delivering ecosystem services that improve crop productivity (e.g., by providing habitat

for beneficial arthropods, that deliver pollination or pest control). We assessed the impact of landscape complexity on adjacent canola (Brassica napus) yield at both the field-and subfield-level using remotely sensed products. Fields with higher landscape complexity generally had higher mean yields. However, fields surrounded mostly by either crop or non-crop covers had lower yields, possibly due to a lack of ecosystem services or a strong yield-reducing edge effect. At the subfield-level, we found evidence of a boost in yield between 30 and 100 m from the field edge towards its center, as well as a potential yield stabilizing effect at the same range.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKxyyAHzirAL04tC5cWOA836.pdf

11．Fertilizer-induced nitrous oxide emissions from global orchards and its estimate of China

文献源：AGRICULTURE ECOSYSTEMS & ENVIRONMENT,2022-04-15

摘要：The fruit has become the third-largest agricultural planting industry after cereals and vegetables in China. Fertilization regimes (e.g., application rate and method) in fruit orchards typically differ from cereal croplands, which would incur a pronounced difference in fertilizer-induced nitrous oxide (N_2O) emissions between them. However, fertilizer-induced direct N_2O emissions from orchard fields remain poorly understood. We conducted a field experiment in a peach orchard and a global meta-analysis of N_2O emissions from fruit orchards. The emission factor (EF) of fertilizer N for N_2O averaged 0.81%, with a background N_2O emission of 3.4 kg N ha(-1) yr(-1) in our field study. A global meta-analysis suggested that the linear regression model was the best to fit N_2O emissions by fertilizer N input for most fruit types compared to the nonlinear models. When averaging all global data, the linear model projected the EF of N_2O from orchards to be 0.84%, with the background emission of 1.96 kg N ha(-1). The estimate of direct N_2O derived from the orchard-specific nonlinear model was substantially lower than those from the nonlinear model with global cropland measurements. The fertilizer-induced direct N_2O emission from Chinese orchards during the 2000s was estimated to be 32-49 Gg N yr(-1), equivalent to about 14% of total direct N_2O emissions from Chinese uplands. Therefore, orchard cultivation constitutes a hotspot of N_2O emissions in the agricultural sector, and priority should be given to emissions reduction to achieve the transition to climate-smart agriculture.

链接:

12．Multi-influencing factor (MIF) and RS-GIS-based determination of agriculture site suitability for achieving sustainable development of Sub-Himalayan region, India

文献源：ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY ,2022-04-12

摘要：Agriculture is the primary source of income in the Sub-Himalayan Jalpaiguri District; therefore, identifying the optimal use of existing agricultural land is crucial. The primary objective of this study is to identify potential agricultural sites in the Jalpaiguri District for the sustainable development of the region. About eleven parameters have been considered using the multi-influencing technique in combination with remote sensing (RS) and geographic information system to delineate and model potential agriculture sites. The final agriculture suitability map was created using the 'Weighted Overlay technique,' and the final output can be categorized into five classes, i.e., highly suitability (424.3 km(2)), moderately suitability (1191.8 km(2)), marginally suitable (1141.4 km(2)), currently not suitable (567.1 km(2)), and permanently not suitable (60.8 km(2)). Besides, the results have been thoroughly verified using Google Earth images, in comparison with Landsat 8 output, and field visits using GPS to increase the reliability of the results. The finding reveals potential outcomes for agricultural activity; however, building a sustainable management strategy and resilient farming practices should be adopted to boost the region's agricultural output. Farmers, regional planners, and government officials can use the current agriculture suitability map to make comprehensive judgments for the region, such as determining the potential for agriculture sites, improving agricultural growth, and promoting self-reliant local economies.

链接:

13．Enhanced FCN for farmland extraction from remote sensing image

文献源：MULTIMEDIA TOOLS AND APPLICATIONS,2022-04-11

摘 要：As farmland being the foundation of national agribusiness, it is of paramount significance to obtain data more efficiently about the distribution of farmland for further agricultural resource monitoring. Through classification of Remote Sensing (RS) images combined with deep learning approaches, however, previous studies did not attach enough

attention to boundary ambiguity, thus achieving relatively low accuracy and demands artificial refinements in farmland extraction. To remedy flaws in current approaches and improve overall accuracy, our work reviewed relevant literature and utilized K-Means model, U-Net model and DeelLabV3 model respectively, to refine and make adjustments to farmland extraction model of RS image afterwards. After model training and parameter tuning, the final result of the classification model reached 95.76% in terms of overall accuracy, and the average cross-comparison ratio in farmland recognition rate reached 85.44%. We closed our paper with future directions and possible improvements to our work.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0G6eAE33TAEfP5vejIic508.pdf

14．Use of Unmanned Aerial Vehicle in Sugarcane Cultivation in Brazil: A Review

文献源：SUGAR TECH,2022-04-05

摘要：The use of Unmanned Aerial Vehicles (UAVs) is becoming increasingly popular and present in various activities around the world, as an important innovation tool to optimize work and research in general. Among the various areas in which UAVs are present, in this article we will highlight their use as a Precision Agriculture tool, with emphasis on their use in the cultivation of sugarcane in Brazil, a crop with the third largest planted area in the country. The objective was to carry out a systematic review of the work already carried out on the use of UAVs in Brazilian crops, seeking to elucidate: where, how much and how this innovation has been used in national crops. To achieve this goal, we use important scientific articles indexing databases (Scopus, Web of Science, Scielo and Google Scholar), where we identify articles published in journals and annals of important events inside and outside the country. With this, it was possible to visualize the scenario of the distribution of researches identified throughout the national territory, noting that there are regions of the country where studies are concentrated more than others. In the end, we conclude that the country has a heterogeneous distribution regarding the use of this technology, which can be explained by legal restrictions imposed in the past or by the absence of works and/or advertising in the research carried out so far. In this sense, the present article contributes to elucidate the current state of research and dimension perspectives for the future.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0Hw-AfCeAADYpBHFRHbg963.pdf

15．Fruit recognition from images using deep learning applications

文献源：MULTIMEDIA TOOLS AND APPLICATIONS,2022-04-05

摘要：Smart imaging devices have been used at a rapid rate in the agriculture sector for the last few years. Fruit recognition and classification is noticed as one of the looming sectors in computer vision and image classification. A fruit classification may be adopted in the fruit market for consumers to determine the variety and grading of fruits. Fruit quality is a prerequisite property from a health viewpoint. Classification systems described so far are not adequate for fruit recognition and classification during accuracy and quantitative analysis. Deep learning models have the ability to extract the potential image features without using handcrafted features. In this paper, Type-II Fuzzy, TLBO (Teacher-learner based optimization), and deep learning Convolution Neural Network (CNN), Recurrent Neural Network (RNN), and Long Short-Term Memory (LSTM) applications proposed to enhance, segment, recognize and classify the fruit images. Thus, the examination of new proposals for fruit recognition and classification is worthwhile. In the present time, automatic fruit recognition and classification is though a demanding task. Deep learning is a powerful state-of-the-art approach for image classification. This task incorporates deep learning models: CNN, RNN, LSTM for classification of fruits based on chosen optimal and derived features. As preliminary arises, it has been recognized that the recommended procedure has effective accuracy and quantitative analysis results. Moreover, the comparatively high computational momentum of the proposed scheme will promote in the future.

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http://agri.ckcest.cn/file1/M00/10/11/Csgk0GM0GUuARTR0ACBsd9921qo121.pdf

16．Security in IoT-enabled smart agriculture: architecture, security solutions and challenges

文献源：CLUSTER COMPUTING-THE JOURNAL OF NETWORKS SOFTWARE TOOLS AND APPLICATIONS,2022-04-05

摘要：Agricultural industry is one of the most vital industries that has a major contribution to the economy due to its share in the Gross Domestic Product (GDP) and as a source of employment. The past few decades have seen immense change in the operation of agricultural sector with the introduction of precision farming in conjunction with Internet of

Things (IoT). The application of such advancements is highly based on exchange of messages between various devices in the farming. This paper aims to study the security scenarios applicable in husbandry through the analysis of possible attacks and threats. The testbeds available for agriculture based on IoT have been studied. An architecture for smart farming is proposed which is independent of the underlying technologies that may be used and the requirements of security have been laid out based on the proposed architecture. A literature survey of security protocols for various subsectors of security in smart agriculture along with authentication protocols in smart applications provides a detailed direction of the progress in each of farming security sub-areas and identifies the dearth of existing protocols. The current progress in development of IoT-based tools and systems from industry has also been studied.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKyZ2AJuUvABku2I6f_w8268.pdf

17．BMDD: a novel approach for IoT platform (broker-less and microservice architecture, decentralized identity, and dynamic transmission messages)

文献源：PEERJ COMPUTER SCIENCE,2022-04-04

摘要：Undeniably, Internet of Things (IoT) devices are gradually getting better over time; and IoT-based systems play a significant role in our lives. The pervasiveness of the new essential service models is expanding, and includes self-driving cars, smart homes, smart cities, as well as promoting the development of some traditional fields such as agriculture, healthcare, and transportation; the development of IoT devices has not shown any sign of cooling down. On the one hand, several studies are coming up with many scenarios for IoT platforms, but some critical issues related to performance, speed, power consumption, availability, security, and scalability are not yet fully resolved. On the other hand, IoT devices are manufactured and developed by different organizations and individuals; hence, there is no unified standard (uniformity of IoT devices), i.e., sending and receiving messages among them and between them and the upper layer (e.g., edge devices). To address these issues, this paper proposes an IoT Platform called BMDD (Broker-less and Microservice architecture, Decentralised identity, and Dynamic transmission messages) that has a combination of two architectural models, including broker-less and microservices, with cutting-edge technologies such as decentralized identity and dynamic message transmission. The main contributions of this article are five-fold, including: (i) proposing broker-less and

microservice for the IoT platform which can reduce single failure point of brokering architecture, easy to scale out and improve failover; (ii) providing a decentralized authentication mechanism which is suitable for IoT devices attribute (i.e., mobility, distributed); (iii) applying the Role-Based Access Control (RBAC) model for the authorization process; (iv) exploiting the gRPC protocol combined with the Kafka message queue enhances transmission rates, transmission reliability, and reduces power consumption in comparison with MQTT protocol; and (v) developing a dynamic message transmission mechanism that helps users communicate with any device, regardless of the manufacturer, since it provides very high homogeneity.

链接:

http://agri.ckcest.cn/10.7717/peerj-cs.950

18．Inter-annual variability of land surface fluxes across vineyards: the role of climate, phenology, and irrigation management

文献源：IRRIGATION SCIENCE,2022-04-01

摘要：Irrigation and other agricultural management practices play a key role in land surface fluxes and their interactions with atmospheric processes. California's Central Valley agricultural productivity is strongly linked to water availability associated with conveyance infrastructure and groundwater, but greater scrutiny over agricultural water use requires better practices particularly during extended and severe drought conditions. The future of irrigated agriculture in California is expected to be characterized neither by perpetual scarcity nor by widespread abundance. Thus, further advancing irrigation technologies and improving management practices will be key for California's agriculture sustainability. In this study, we present micrometeorological observations from the Grape Remote Sensing Atmospheric Profile and Evapotranspiration eXperiment (GRAPEX) project. Daily, seasonal, and inter-seasonal surface flux patterns and relationships across five vineyards over three distinct California wine production regions were investigated. Vineyard actual evapotranspiration showed significant differences at the sub-daily and daily scale when comparisons across wine production regions and varieties were performed. Water use in vineyards in the Central Valley was about 70% greater in comparison to the vineyards at the North Coast area due to canopy size, atmospheric demand, and irrigation inputs. Inter-annual variability of surface fluxes was also significant, even though, overall weather conditions (i.e., air temperature, vapor pressure deficit, wind speed, and solar radiation)

were not significantly different. Thus, not only irrigation but also other management practices played a key role in seasonal water use, and given these differences, we conclude that further advancing ground-based techniques to quantify crop water use at an operational scale will be key to facing California's agriculture present and future water challenges.

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http://agri.ckcest.cn/file1/M00/03/3F/Csgk0YeKxXCADzxtAD1Md5Yt1Jg497.pdf

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