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农牧业信息化专题

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前沿资讯

1. Machine learning to categorise lettuce crops in fields（机器学习在田地中分类莴苣作物）

简介：A new machine learning platform uses deep learning to categorise lettuce crops in fields. Researchers at the British Earlham Institute have developed a machine learning platform, AirSurf-Lettuce, which works with computer vision and ultra-scale images taken from the air to help categorise lettuce crops in fields.

Harvest with precision

The advanced software includes measuring quantity, size and pinpointing location to help farmers harvest with precision and getting the crop to market in the most efficient possible way. Importantly, this technology can be applied to other crops, widening the scope for positive impact across the food chain, reports Science Daily.

Deep learning

The AirSurf technology – developed by members of the so-called Zhou Group at the Earlham Institute (EI), – uses 'deep learning' (a deep structured machine learning technique) combined with sophisticated, ultra-wide-scale imaging analysis to measure iceberg lettuce in a high-throughput mode. This is able to identify the precise quantity and location of lettuce plants, with the additional advantage of recognising crop quality, i.e. small, medium or large lettuce heads.

Combining this system with GPS allows farmers to precisely track size distribution of lettuce in fields, which can only help in increasing the precision and effectiveness of farming practice, including harvest time.

Alan Bauer at EI, said: " This cross-disciplinary collaboration integrates computer vision and machine learning with the lettuce growing business to demonstrate how we can improve crop yields using machine learning."

'Precision is essential'

Industry partner at G's Growers, Innovation Manager Jacob Kirwan, added: "Farming at a large scale means that precision is essential when ensuring that we are producing crops in an environmentally and economically sustainable way. Using technology like AirSurf means that growers are able to understand the variability in their fields and crops at a much higher level of detail that was previously possible."

"The decisions that can then be taken from this information, such as varying applications of inputs and irrigation; changing harvest strategies and planning the optimum time to sell crop, will all contribute towards increasing on farm yields and improving farm productivity."

来源：Future Farming

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http://agri.ckcest.cn/file1/M00/06/81/Csgk0F0TYj6AdxiCAAdjR-wQXk4017.pdf

2. EU smart farming project to deliver real-time soil data（欧盟智慧农业项目可提供实时土壤数据）

简介：CEA Tech下属研究院Leti宣布了一项新的欧洲委员会智慧农业项目，该项目将提供土壤状况的实时数据。CEA-Leti研究主管Suzanne Lesecq表示，“对可持续生产粮食的需求推动了全球农业部门集约化的现行战略。为了应对这些挑战，农民们需要采取全农场的方式来提高资源效率。与此同时，目前还没有一个商业系统能够实时地提供土壤中不同养分的浓度，同时监测土壤上方的气体排放。”

无试剂传感器平台

通过小型私有物联网网络部署，SARMENTI传感器节点将为农民提供下一代无试剂传感器平台，实时监测土壤养分浓度，并测量当地环境条件，特别是氨和温室气体的排放。

《巴黎协定》排放目标

全球农业是温室气体的主要来源。随着欧盟成员国寻求达到《巴黎协定》设定的排放目标，像SARMENTI这样的项目将为其农民提供连续数据，以跟踪有害气体的排放，并监测肥料的适当分解。

欧盟硝酸盐指令

根据CEA-Leti的说法，目前的土壤分析既不是实时的也不是现场的，这限制了结果对农民的价值。SARMENTI开发的传感器将测量原位、高时间分辨率的土壤养分浓度，农民可以使用这些浓度来改进肥料管理实践。这有助于减少因施肥不当而造成的环境氮损失，并达到欧盟硝酸盐指令的目标，该指令旨在通过防止农业来源的硝酸盐污染地面和地表水来保护水质。

SARMENTI土壤和空气探测器

此外，对氨、甲烷和一氧化二氮排放的低成本监测将有助于生产者跟踪氮循环并减少由于反硝化造成的损失，并促进肥料的适当分解。

SARMENTI物联网节点的架构由3个设备组成：土壤探针、空气探测器和智能数据记录器。土壤探针主要是在吸湿膜中装有电化学传感器，用于监测土壤养分浓度；位于地面上方的空气探测器监测土壤探测器周围环境中的气体和环境条件；智能数据记录器从两个探测器收集数据，并将它们直接传输到云，根据这些数据，云高级分析将为农民提供关于最佳施肥的建议。

SARMENTI的项目参与者

CEA-Leti正在协调这个为期三年的项目，并将提供电化学传感器方面的专业知识，为物联网提供土壤探测和网络安全技术。SARMENTI项目的其他参与者包括：Tyndall-UCC（爱尔兰）也将提供电化学传感器方面的专业知识。UCC的企业和法律事务办公室将为该项目提供法律咨询。STMicroelectronics（意大利）负责测量NH3、N2O和CH4浓度的空气探测器，以及通信子模块和边缘计算。CSEM（瑞士）负责智能数据记录器。Atos（罗马尼亚）将实施后端服务器，并开发数据分析和决策支持工具。

三个集团成员将代表农民和该系统的其他终端用户：Terrasolis（法国）是一个农民协会，将评估最终用户的需求并测试其领域的SARMENTI节点；爱尔兰农业和食品发展局Teagasc将提供实验室生长室和现场场地用于校准和表征节点；Spiro，罗马尼亚的一个农场，也将验证节点的运行。

来源：Future Farming

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http://agri.ckcest.cn/file1/M00/06/81/Csgk0F0TYtaAX26_AAWdjhKbtW4270.pdf

3. 中国工程院院士、原常务副院长潘云鹤：构建理想城市 关键在智能城市结合智能经济

简介：“智慧城市”是一个热词。

在中国工程院院士、原常务副院长潘云鹤看来，相较于欧美国家更多把“智慧城市”理解为一种IT技术，中国智慧城市建设的目标和想法有很大不同。

什么是智能城市？潘云鹤给出了一个简单的定义，就是运筹好“物理空间、人类社会空间、信息空间”三元空间，提高城市发展水平和市民生活水平的一项工程。对于未来理想城市的构建，潘云鹤表示，关键在“把智能城市和智能经济结合起来。”

2008年，在IBM提出“智慧城市”（Smart city）以前，世界各地都在推进数字城市和城市网络化。

经过多年实践，中国的“智慧城市”建设逐步变得丰富，内涵远比“Smart city”广阔。“我们发现中国的目标和外国并不一样，二者的发展途径也不相同。”潘云鹤认为，从表述上，“智能城市”更适合中国。

为什么出现这种不同？潘云鹤表示，欧美国家已经走过了大规模城市化和工业化时代，已不需要大规模的基础设施建设，而中国则同时处于信息化、工业化和城镇化相融合阶段，仅从信息化角度，通过技术和设备层面推进智慧城市建设，难以解决城市发展中的问题。

现场，他展示了中国智能城市的目标模型——以智能城市为核心，完成工业化、城镇化、信息化、绿色化和现代农业化。在他看来，肩负着发展经济重任的地方官员，希望通过抓智能城市把另外“四化”也能抓进去，而建设“智能城市”将成为完成“五化”的重要抓手。

潘云鹤用一个细节进一步说明了这种中外差异。“某家信息公司做了很多城市智慧系统，水务的、交通的等等，他们把市长请来看，结果市长失望地评价‘你们的智慧城市没有市长的视野’。”换句话说，IT公司提供了很多“智慧城市”解决方案，研发了许多智能系统，但因为缺乏“市长的视野”，无法真正解决城市发展中的诸多问题。

从实际看，“智慧城市”建设效果不及预期的原因在于，大多还是“局长的视野”。“他们搞的‘智慧系统’没有真正利用城市大数据，用的是数据库技术，也没有深度。”潘云鹤在接受《每日经济新闻》记者采访时评价说。

人类已经走进大数据时代。在潘云鹤看来，近30年来，信息力量迅速壮大，已经成长为除物理空间（P）、人类社会（H）之外新的一极——信息空间（C）。通过信息空间，我们可以看到很多过去看不到的东西，可以用新的方法改造物理世界，也可以更好地理解人类社会。

潘云鹤举例说，在城乡建设中，我们建造了很多房子，但不知道有多少是空置的，而电力部门可以通过安装智慧电表，根据每户的电表运行情况进行统计分析，就可知道这个房子有没有人住。

因此，当世界从二元空间变为三元空间，潘云鹤说，我们可以给智能城市一个简明的定义，即运筹好CPH三元空间，提高城市发展水平和市民生活水平的一项工程。

基于此，中国城市的经济正在向数字化和智能化转型，并呈现出多种新模式，如产品的智能化、企业运行智能化、块状经济的网络平台化、城市经济生态的智能化以及城市与经济的协同进化。

来源：每日经济新闻

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学术文献

1. Applying AI Technology to the Operation of Smart Farm Robot(将人工智能技术应用于智能农场机器人的运行)

简介：The purpose of this research is to apply an artificial intelligence (AI) technology to manage the operation of a farm robot. AI technology can also help farmers analyze environmental conditions, such as weather, and diseases in rice. The researchers have designed a robot for the farming of rice and its control system based on AI. The robot can move automatically in accordance with the data collected. The organization of the robot with AI consists of the following: (1) a subsystem to control movement, (2) a sensor control subsystem, and (3) an analysis subsystem. The sensors monitor environmental and weather conditions, including temperature, humidity, and water level, and transmit images. The AI robot is designed to operate at four positions as required. When the AI robot operates at position 1, the sensors store data after a successful operation, then the robot changes to positions 2, 3, and 4, in sequence progressively. Accordingly, the robot analyzes the collected data and judges the priorities from the data in order to move to the corresponding position. While the robot moves to the correct location, the installed camera scans rice fields to compare images and analyzes the surfaces of rice plants for diseases. When the images captured by the camera indicate a disease, the robot automatically sprays a chemical and a message is sent to inform the farmers. To complete the above operation, power consumption is an important issue, which is discussed in depth in this article.

来源：SENSORS AND MATERIALS

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http://agri.ckcest.cn/file1/M00/06/81/Csgk0F0TYJCASG5nABHZYbDBp4o020.pdf

2. Sensing, smart and sustainable technologies for Agri-Food 4.0(农产品4.0的传感、智能和可持续技术)

简介：Currently, the agri-food sector takes advantage of modern machinery, tools and emerging information and communication technologies (ICTs) that consider the Internet of Things (IoT) capabilities. These implementations have given way to a new era of agri-food production called 'Agri-Food 4.0', where automation, connectivity, digitalisation, the use of renewable energies and the efficient use of resources are predominant in this sector. In this article, the 'sensing, smart and sustainable (S^3)' concept is applied to develop new technologies that can respond to current challenges of agri-food industries. Therefore, this work focuses on describing how S-3 technologies for the agri-food sector can be developed using a systematic process for new product development (NPD). The main objective of this work is to fill the gap vis-à-vis the current lack of design roadmaps that permit the development of this new generation of products in the context of agri-food 4.0. Finally, this

work presents case studies of S^3 technologies applied to the agri-food sector: an intelligent greenhouse, a sun tracker trajectory, an hexapod robot for field monitoring and an agricultural drone.

来源：COMPUTERS IN INDUSTRY

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http://agri.ckcest.cn/file1/M00/06/81/Csgk0F0TYTSABkspACmmrp6bi5o085.pdf

3. The road towards plant phenotyping via WSNs: An overview(通过WSNs实现植物表型的途径:综述)

简介：The recent advances of wireless sensor networks have enabled the integration and application of this technology in vital environmental applications. Among these environmental applications, Plant Phenotyping (PP) arises as one of the state-of-the-art technologies that can introduce a significant increase to the crops, poultry and livestock productivity by effectively managing the available resources and providing the appropriate quantities in terms of water, food, temperature, humidity, fertilizers, etc. It can lead to increased productivity by more than a 100% in some agriculture applications such as the poultry industry. However, the application of the PP to various sectors of agriculture is still facing some serious limitations. The recent widespread of wireless networks and their applications has created a substantial demand for bandwidth and power resources, which is also the case for the PP scenario. To be able to collect precise data about a certain sector, it is usually required to deploy a massive number of low cost and low power wireless sensors. Therefore, such sensors are not expected to have high transmission power. Moreover, having a massive number of sensors communicating over wireless channels triggers the channel access organization and interference problems. Particularly a network is created in an ad hock manner. The aim of this survey paper is to provide a comprehensive understanding of the efficient techniques that can be utilized in increasing the capacity of Wireless ad hock Sensor Networks (WSNs) in PP. Although it can be applied for various precision agriculture applications, the reviewed techniques are mainly focused, analyzed and optimized for PP applications. We believe this promises significant new breakthroughs in plant science.

来源：COMPUTERS AND ELECTRONICS IN AGRICULTURE

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