农牧业信息化专题

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中国农业科学院农业信息研究所
联系人：王晶静
联系电话： 010-82106769
邮箱：agri@ckcest.cn
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前沿资讯

1．Researchers create algorithm to predict PEDV outbreaks（研究人员发明了一种算法来预测PEDV的爆发）

简介：Researchers from North Carolina State University have developed an algorithm that could give pig farms advance notice of porcine epidemic diarrhea virus (PEDV) outbreaks. The proof-of-concept algorithm has potential for use in real-time prediction of other disease outbreaks in food animals. PEDV is a virus that causes high mortality rates in preweaned piglets. The virus emerged in the U.S. in 2013 and by 2014 had infected approximately 50 percent of breeding herds. PEDV is transmitted by contact with contaminated fecal matter. Gustavo Machado, assistant professor of population health and pathobiology at NC State and corresponding author of a paper describing the work, developed a pipeline utilizing machine-learning techniques to create an algorithm capable of predicting PEDV outbreaks in space and time. Machado, with colleagues from the University of Minnesota and Brazil's Universidade Federal do Rio Grande do Sul, used weekly farm-level incidence data from sow farms to create the model. The data included all pig movement types, hog density, and environmental and weather factors such as vegetation, wind speed, temperature and precipitation. The researchers looked at "neighborhoods" that were defined as a 10-kilometer radius around sow farms. They fed the model information about outbreaks, animal movements into each neighborhood and the environmental characteristics inside each neighborhood. Ultimately, their model was able to predict PEDV outbreaks with approximately 80 percent accuracy. The most important risk factor for predicting PEDV spread was pig movement into and through the 10 km neighborhood, although neighborhood environment - including slope and vegetation - also influenced risk. "This proof-of-concept model identified the PEDV spread bottleneck in North Carolina and allowed us to rank infection risk factors in order of importance," Machado says. "As we get more data from other farm sites across the U.S., we expect the model's accuracy to increase. Our end goal is to have near real-time risk predictions so that farmers and veterinarians can provide preventative care to high-risk areas and make decisions based on data." Next steps for the researchers include improving the model to predict a wider range of diseases and expanding it to include other industries, such as poultry.

来源：EurekAlert

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全文链接：
http://agri.ckcest.cn/file1/M00/06/5D/Csgk0FxRWBaALPUhAAHQP3V6VB4673.pdf

2．Queen's University researchers develop new test to detect disease and infection（皇后大学的研究人员开发了一种新的检测疾病和污染的方法）

简介：Researchers at Queen's University Belfast have developed a highly innovative new enzyme biomarker test that has the potential to indicate diseases and bacterial contamination saving time, money and possibly lives. The test, developed by scientists at the Institute for

Global Food Security at Queen's, can detect enzyme markers of disease known as proteases in humans, animals and food products.

Proteases are crucial for microorganism growth and are responsible for the progression of many diseases. Levels of proteases can be highly elevated in the urine of patients with diabetic kidney disease, or at the sites of infected wounds. Similarly, in cows, an elevation of proteases in their milk can reveal diseases such as bovine mastitis, a type of mammary gland infection. In food, proteases produced by bacteria contaminated in meat and dairy products can lead to rancidity, as well as decreased shelf life and quality.

Current protease detection methods are costly, time-consuming and are not always effective. Scientists at Queen's Institute for Global Food Security have developed a nanosensor which has resulted in sensitive, fast and cost effective protease detection in milk and urine. Dr Claire McVey, Queen's researcher and co-author on the study published in leading journal Nano Research, explains: "Not only is the test cheap to produce, but it can be used anywhere and is not reliant on laboratory conditions. Eliminating the need to carry out tests in a laboratory setting is life-changing. As well as being cost-effective, it means faster diagnosis." The gold-nanoparticle based nanosensor devised by Queen's researchers indicates when proteases are present through a visible colour-change reaction. Gold nanoparticles are well known for their capability in speeding up the oxidization of a chemical called tetramethylbenzidine (TMB), visible through a vivid blue-colour formation. When casein (a molecule present in milk) is added to gold nanoparticles, it surrounds the nanoparticles acting as a protective surface barrier. When TMB is introduced, the casein prevents the oxidization reaction meaning there is no or only a slight colour change. Where proteases are present, they 'eat' the protective casein barrier, exposing the surface of the gold nanoparticles. In this instance, when TMB is added, the proteases have removed the casein meaning oxidization occurs quickly causing a fast change in colour. Dr Cuong Cao, the lead academic on the study: "When we add TMB to the casein-covered gold nanoparticles, we can tell virtually instantly if proteases are present by whether or not the solution turns blue. Normally such testing takes much longer." Using this approach, proteases can be detected within 90 minutes without the need for complicated or expensive laboratory equipment. In addition, the 'ingredients' for making the nanosensor are readily available and low cost. Gold nanoparticles can be produced in abundance, with little restriction on storage requirements, making it a durable and cheap substance.

The approach developed by the Queen's researchers was tested on milk and urine but it could be adapted for a number of other applications. Dr Cao explains: "Using molecules other than casein to coat the surface has the potential to detect other types of enzyme biomarkers. For example, coating the nanoparticles with lipids could detect the lipase enzyme, which could help in the diagnosis of diseases such as pancreatitis. "Following full validation of this test, we would like to explore how we could expand the application to detect a host of other diseases or contaminated foods. This new approach will enable the identification of enzyme biomarkers at the point of care. It could change the landscape of how enzyme biomarkers are detected and diagnosed, making an impact not only on food safety, but on the diagnosis of enzyme-related illnesses among animals and humans. The potential scope for this test is huge." Professor Elliott, founder of the Institute for Global Food security and a

co-investigator in the study commented: "The ability to diagnose disease or contamination quickly can have a huge impact on how serious problems can be dealt with. The ultra-low cost of the system will help reduce costs of testing and could transform the amount of testing performed in the developing world."

来源：EurekAlert

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全文链接：

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxRWLeAYEfnAALfymB7qF8879.pdf

3．邬贺铨院士：中国人工智能在制造业投入明显不足

简介：2019年1月16日，中国工程院院士、中国互联网协会理事长邬贺铨在旷视机器人战略发布会上表示，尽管目前中国在人工智能领域的投资绝对值高于美国，但在制造业的投入明显不足，而制造业是人工智能应用在未来的巨大市场。邬贺铨介绍，在2015年AI给中国各行业带来的增速统计中，制造业排在第一位，但目前中国人工智能投资23.4%集中在商业及零售领域，18.3%在自动驾驶，而制造业却不到1%。邬贺铨认为，这主要是因为相对于面向消费者的人工智能应用，制造业的数据采集流程更长、数据的可靠性挑战较大、检验制造业的成果也更难。"很高兴看到旷视科技已经把这个领域作为自己的主攻方向。"邬贺铨说。在今天的发布会上，旷视科技CEO印奇表示，旷视将进行战略升级，从以深度学习为核心的算法公司转型为AIoT时代的操作系统。旷视科技推出智能机器人网络协同大脑——河图（HeTuan），可以为物流供应链提供一整套解决方案。据了解，目前旷视已经与天猫超市、宝洁等在仓储物流方面达成合作。同时，旷视科技方面宣布，将投入20亿与生态伙伴一起，加速机器人商业化落地。人工智能、大数据、移动互联网、物联网、云计算的协同融合，点燃了信息化新时代的引擎，数字化的转型成为企业向高质量发展的共识，人工智能推动企业向智能制造和智能运营发展。邬贺铨院士认为："基于人工智能的智能制造的实现是长期过程，目前仅仅是开始，还有很大的应用和创新空间，我们需要以管理创新和技术创新并重，来应对发展中的挑战，推动数字经济发展。"（记者 蔡浩爽 编辑 赵力 校对 柳宝庆）

来源：新京报

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全文链接：

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxRV5uAfcLVAAJnJBNfbkM485.pdf

➤ 学术文献

1．N-doped reduced graphene oxide /MnO2 nanocomposite for electrochemical detection of Hg2+ by square wave stripping voltammetry（采用方波溶出伏安法电化学检测Hg2+的N掺杂还原氧化石墨烯/MnO2纳米复合材料）

简介：In this paper, N-doped reduced graphene oxide and MnO2 nanocomposite (N-RGO/MnO2) was synthesized via hydrothermal method, which was used to modify the glass carbon electrode (GCE) for electrochemical detection of Hg2+. p-phenylenediamine

was used as the nitrogen source and "bridging" molecule between MnO2 and RGO. The electrochemical sensing performance towards Hg2+ was evaluated by square wave anodic stripping voltammetry method. The presence of N-RGO/MnO2 nanocomposite has enhanced the electrochemical performance of the GCE toward Hg2+. The N-RGO/MnO2 nanocomposite modified electrode was found to have a good sensitivity toward Hg2+ and the favorable sensitivity (72.16 mA/mM) and LOD (0.0414 nM) for Hg2+ were achieved under the optimized conditions. Moreover, the modified electrode possessed a good stability and reproducibility. The excellent performance can be attributed to the characteristic nanostructure and N-doping property of the N-RGO/MnO2 nanocomposite. This electrochemical sensing strategy is expected to enrich the application field of electrochemical determination and does good to the issue of environment pollution analysis.

来源：ELECTROCHIMICA ACTA

发布日期:2018-09-21

全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxRVaGAAacsABgbfOVOAis273.pdf

2．Gold nanoparticles-based multifunctional nanoconjugates for highly sensitive and enzyme-free detection of E.coli K12(金纳米粒子为基础的多功能纳米偶联物，用于大肠杆菌K12的高灵敏度和无酶检测)

简介：Immobilization of proteins on a biocompatible conductive interface is highly desirable for the fabrication of biosensors. In this study, a nanocomposite has been prepared by assembling well-distributed gold nanoparticles (AuNPs) on the surface of a polypyrrole-reduced graphene oxide (PPy-rGO) composite through electrostatic adsorption. This serves as a platform for immobilization of a capture antibody, which was conjugated onto the ferrocene doped polypyrrole-gold nanoparticles (PPy@Fc/AuNPs) composite. The design and performance of the biosensor was tested against detection of a whole-cell bacteria E. coli K12. This nanocomposite has a high surface area, good conductivity and biocompatibility, which is shown to be very suitable for enzyme-free detection of this bacteria. Results show excellent analytical performance with a linear range from 1.0 x 10(1) to 1.0 x 10(7) CFU mL(-1) and a low detection limit of 10 CFU mL(-1). The sensor has high selectivity, excellent reproducibility, and good stability.

来源：TALANTA

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全文链接:

http://agri.ckcest.cn/file1/M00/06/5D/CsgkOFxRVsyAEiQlABwWrH2FcmM341.pdf

统计数据

1．The Production Quantity of Beef in the World (FAOSTAT, 2017)(2017年世界各个国家/地区牛肉总产量（FAOSTAT）)

简介：FAO统计了2017年世界各个国家/地区的牛肉总产量，项目选择为Meat，cattle，部分数据见下表，全部数据请参见全文。

Area	Year	Value（tonnes）	Note
United States of America	2017	11907239	Official data
Brazil	2017	9550000	Unofficial figure
China	2017	6911741	Aggregate, may include official, semi-official, estimated or calculated data
China, mainland	2017	6898000	FAO estimate
Argentina	2017	2842000	Official data
Australia	2017	2048517	Official data
Mexico	2017	1926901	Official data
Russian Federation	2017	1613647	Official data
France	2017	1423404	FAO data based on imputation methodology
Germany	2017	1137008	Official data
South Africa	2017	1014050	Official data

来源：FAOSTAT

发布日期：2018-12-20

全文链接：

http://agri.ckcest.cn/file1/M00/06/5D/Csgk0FxRWjiAQ_ooAAP7GiPupx0713.pdf