ASIA-PACIFIC

CAMBODIA

Blockchain technology for rice farmers

In collaboration with Cambodian organic cooperative Reaksmey Lekkompos Kaksekor, international nonprofit organization Oxfam has completed the first rice shipment to the Netherlands last month with the help of blockchain technology. Through the pilot project called BlocRice, a "smart" contract was developed to help Cambodia's poor rice farmers to track developments in their deal with an exporter. BlocRice is the tool that creates a database that farmers and participants in the project can access. Aside from getting details about the deal through the blockchain system, farmers can also have a better chance of negotiating the price of their products. The BlocRice application can be accessed by Cambodian rice farmers through a smart phone.

While BlocRice has already helped some of Cambodia's rice farmers have access to a network that they could use for negotiating better prices, Oxfam said there is still a need to narrow the huge technological gap. Most farmers don't own smart phones. The BlocRice project was established to help empower Cambodia's rice farmers as they strive to alleviate themselves from poverty. The initiative is still under testing and much work needs to be done for target goals to be achieved, Oxfam noted. On the other hand, industry analysts said blockchain technology initiatives can actually help rice growers in Cambodia connect with sure buyers who pay fairly and are open to negotiating prices.

Blockchain technology has already gained momentum in other sectors in Cambodia, particularly in finance. Earlier this month, the National Bank of Cambodia (NBC) announced that it will integrate the technology in its payment system this year. According to a World Economic Forum (WEF) report, the blockchain-based payment system that Cambodia will use can operate commercial and private accounts. This allows for citizens and businesspeople alike to benefit from the improved services.

https://en.businesstimes.cn

CHINA

Blockchain electricity exchange cuts wastage

Researchers from one of the top universities in China say they have developed a decentralized exchange, not for crypto assets, but for unused power. A patent application filed by team from China's Fudan University in January and revealed on Friday sets out the workings of a blockchain-based electricity exchange that assigns power sellers and buyers as nodes on the network and allows them to securely trade unused electricity without a third-party intermediary.

Using the network, nodes can broadcast requests for sales or purchases, after which smart contracts will connect matching requests, based on data such as volume and price, and then trigger transactions – a mechanism similar to that of a decentralized crypto exchange. The effort is a response to the growing supply of renewable energy in China, especially solar power generated by households, which is often generated in excess of demand in some regions.

The researchers write: "Households then have no other choices but to let the unused solar power go to waste because they don't have a direct way of exchanging electricity."

To facilitate transactions over the decentralized network, a digital currency would be used between buyers and sellers, the patent application explained. Although it's not clear which digital asset(s) the platform might use, the system has so far been made to built on two blockchain systems, according to the Fudan team.

https://www.coindesk.com

INDIA

AI-based detector for malaria, TB, cancer

Researchers at the Indian Institute of Technology (IIT) here have developed an artificial intelligence (AI)-based low-power electronic hardware system that can help in detecting malaria, tuberculosis, intestinal parasite and cervical cancer in a few milliseconds. The research focuses on building a neuromorphic system which can be used for healthcare access in resource-constrained areas with limited access to human specialists.

"While several software AI models exist for healthcare and diagnostic related applications, need of the hour is to efficiently map these models on portable dedicated low-power, low-cost hardware to enable edge-AI systems accessible to all in low resource environment," said Professor Manan Suri, Department of Electrical Engineering, IIT Delhi. Suri, who is leading the team of researchers, said microscopy is particularly well adapted to low-resource, high disease burden areas, being both simple and versatile; even for diagnostic tasks. While newer technologies are available for diagnosis, the cost of specialised equipment may render it impractical in such places, he said.

https://www.business-standard.com

ISRAEL

3D-printed heart using human cells

Israeli researchers have created an entire 3D-printed heart made from human cells in what they say is a world first. The heart doesn't beat and is too small for use in people — it's only about the size of a rabbit's heart. But the little organ is considered a big advance in the ongoing effort to find new treatments for heart disease, the leading cause of death in the United States.

Heart transplantation is currently the only good option for people with severe heart failure. But donor organs are in such short supply that, on average, 18 Americans die each day before one becomes available. Being able to 3D-print a human heart when needed could conceivably help save many lives that are now lost.

"Maybe, in 10 years, there will be organ printers in the finest hospitals around the world, and these procedures will be conducted routinely," Tal Dvir, a researcher with Tel Aviv University's School of Molecular

Cell Biology and Biotechnology and the leader of the team of scientists who created the heart, told NBC News MACH in an email. A paper describing the research was published in the journal *Advanced Science*.

Previously, scientists were able to 3D-print heart structures that lacked cells or blood vessels. But the new 3D-printed heart contains cells, blood vessels, chambers and other structures a heart needs to function normally. To make it, Dvir and his team took fatty tissue from patients and converted the fat cells into stem cells. These were added to a gel and then further processed until they turned into heart cells. The cell-containing "bioink" was added to a 3D printer and used to build the experimental organ layer by layer.

Tal said the next step for his team would be to explore ways to "teach" 3D-printed hearts to function normally and then transplant them into rats to see how well they work. The scientists will also explore the feasibility of 3D-printing larger hearts, with the ultimate goal of building functional human hearts.

https://www.nbcnews.com

EUROPE

AI to analyze floods

Social media gets a lot of negative press, but there's more to Twitter and Facebook than botnets, memes, and political trolls. In a research paper preprint on Arxiv.org ("Integrating Social Media into a Pan-European Flood Awareness System: A Multilingual Approach"), scientists at the Joint Research Center, the European Commission's science and knowledge service, detail a prototype — Social Media for Flood Risk (SMFR) — that "enriches" Europe's Flood Awareness System (EFAS) with real-time reports from Twitter users.

It builds on research published by Harvard and Google in August 2018, which described an AI model capable of predicting the location of aftershocks up to one year after a major earthquake, and by Facebook AI researchers in December, who developed a method to analyze satellite imagery and to quantify damage from fires and other disasters. More recently, scientists at Google published a retrospective on a machine learning system that accurately predicts riverine floods — that is, floods from overrun riverbanks — with 75% precision.

Separately, researchers in the U.K. have used tweet-ingesting machine learning algorithms to map out where violence is likely to occur during riots, to projectwhen mass protests might be imminent, and to identify gang members.

"Over the past decade, social media has emerged as a relevant information source during disasters, prompting researchers from diverse areas to converge on this domain," the paper's coauthors wrote. "Social media analysis has demonstrated the potential to provide timely, precious information about the spatial and temporal development of a crisis, as well as supporting the identification of key disaster-related events."

First, a quick primer on the EFAS: It's a part of the Copernicus Emergency Management Service (Copernicus EMS) and operated by the European Commission's Emergency Response Coordination Centre (ERCC), a division of the European Commission's Civil Protection and Humanitarian Aid Operations set up to support coordinated responses to disasters inside and outside Europe. Much like the U.S.'s Federal Emergency Management Agency, ERCC monitors hazards and risks, collects and analyzes data on disasters, and prepares plans for teams and equipment deployment. And ERCC sources EFAS for forecasts — principally probabilistic medium-range flood forecasts (including short-range flash floods), but also seasonal forecasts, impact assessments, and early warnings.

The researchers' system tapped EFAS to determine when the risk of floods in a certain geographic area exceeded a threshold. This triggered data collection from social media — Twitter — to the tune of up to 400 keywords at a time, the public streamer API's maximum limit.

Extracting messages with relevant keywords (i.e., words indicating a flood is about to happen or recently happened) was no easy task, given that EFAS covers an area where the population speaks more than 27 languages. The team's solution was a multi-lingual classification system that used language-agnostic mathematical representation of words, or word embeddings, to infer similarities among keywords in four tongues: German, English, Spanish, and French. To train it, they sourced a corpus containing over 7,000 annotated messages (between 1,200 and 2,300 messages per language). Meanwhile, they used a separate model to suss out "representative" messages (tweets having at least a 90% probability of being flood-related) for areas in which flood risk had been predicted.

To test the robustness of their approach, the scientists integrated SMFR into EFAS and deployed it during recent floods affecting Calabria, Italy, in early October 2018. SMFR collected two days' worth of tweets — about 14,347 in all — which SMFR analyzed for "relatedness." The researchers report that the AI-filtered messages closely correlated with actual flooding, and they say it's a promising first step toward a system which could shorten response time in early stages of disasters.

"During the development of an event, collected messages could be valuable to international rescue coordinators … because they provide insights about the local response, about whether alerts that have been issued by authorities, and about some of the concerns that those affected by a flood or a flood alert may have," the team wrote.

https://venturebeat.com

GERMANY

Transparent human organs

Researchers in Germany have created transparent human organs using a new technology that could pave the way to print three-dimensional body parts such as kidneys for transplants. The scientists, led by Ali Erturk at Ludwig Maximilians University in Munich, have developed a technique that uses a solvent to make organs such as the brain and kidneys transparent. The organ is then scanned by lasers in a microscope that allows researchers to capture the en-

tire structure, including the blood vessels and every single cell in its specific location. Using this blueprint, researchers print out the scaffold of the organ. They then load the 3D printer with stem cells which act as "ink" and are injected into the correct position making the organ functional.

While 3D printing is already used widely to produce spare parts for industry, Erturk said the development marks a step forward for 3D printing in the medical field. Until now 3D printed organs lacked detailed cellular structures because they were based on images from computed tomography or MRI machines, he said. "We can see where every single cell is located in transparent human organs. And then we can actually replicate exactly the same, using 3D bioprinting technology to make a real functional organ," he said. "Therefore, I believe we are much closer to a real human organ for the first time now."

https://www.3dprintingmedia.network

SPAIN

Traffic prediction system

Researchers of the Miguel Hernández University (UMH) of Elche have developed artificial intelligence solutions based on deep neural networks to predict traffic conditions using data from fixed sensors (such as loops) and connected vehicles. This new system makes it possible to predict traffic 15 minutes ahead of time.

To carry out this study, researchers of the UWICORE laboratory, which belongs to the I3E Centre for Engineering Research of the UMH, have digitised and implemented on the SUMO traffic simulation platform, a real traffic setting corresponding to a 97km stretch from Spain's A-7 motorway, between the cities of Alicante and Murcia. They have worked with the collaboration of the Levante Traffic Management Centre, which provided data on all of its traffic sensors from the chosen stretch over a 12-year period.

This stretch has been chosen for its high influx of traffic (daily average intensity of 100,000 cars in places) and its high number of traffic sensors (99 in total), which make it possible to accurately measure traffic every minute. With a selection of this data, researchers have developed a digital simulation setting which makes it possible to very accurately generate the traffic endured by the A-7 stretch for 10 days. To do so, the UMH researchers have developed a new calibration methodology which enables the accurate and realistic generation of digital traffic simulation settings based on real data.

With the digital traffic platform created at the UMH, researchers have developed techniques based on deep neural networks to predict traffic conditions 15 minutes ahead of time, using data from connected vehicles. Researchers have analysed how the insertion of the connected vehicle affects the accuracy of the traffic intensity, density and speed predictions. Their investigations have allowed them to prove that traffic prediction can be improved with data from just four per cent of the vehicles, compared to when the prediction is done with data from the traffic sensors that are currently deployed in the relevant A-7 stretch.

The UMH researchers have also shown that the merging of data provided by the current traffic sensors with data from connected vehicles allows for an improvement in traffic prediction accuracy. For example, the merger of traffic sensor data from just 10 per cent of the vehicles decreases prediction error by 40 per cent compared to the traffic condition prediction done with data provided by the loops.

Head of the UWICORE group, Javier Gozálvez, explained: "Connected vehicles improve comfort and security, and boosts the digitisation of mobility. Furthermore, it also offers the public administrations and traffic managers new tools to know and manage the traffic. For example, with the data from connected vehicles, it is possible to learn the state of traffic and even predict it, without having to deploy and maintain traffic sensors as is done today. However, access to this data will have a cost, which means it is important for administrations and managers to know how many pieces of data they need to conduct their functions. The research of the UMH not only offers tools based on artificial intelligence for the characterisation and prediction of traffic conditions, but also make it possible to quantify the data necessary to be able to accurately predict traffic conditions. For example, the percentage of vehicles from which data is needed."

The UMH research has been conducted in the framework of the PREDICT project (Prediction and characterisation of traffic with data from connected vehicles and autonomous vehicles), funded by the General Traffic Directorate. UMH researchers have also quantified the impact of autonomous vehicles on traffic as part of the project. Their conclusions show that until at least 15 per cent of vehicles are autonomous, there won't be a noticeable benefit regarding the fluidity of traffic and the capabilities of motorways, unless solutions are developed to guarantee an efficient coexistence between autonomous and conventional vehicles.

https://www.intelligenttransport.com

UK

AI system to track urban inequality

Artificial Intelligence (AI) could be used to identify areas of poverty in cities across the world, after researchers at Imperial College London developed a system that scans street images. Dr Esra Suel and colleagues from the university's School of Public Health used deep learning image analysis to train a computer programme, identifying social, economic, environmental and health inequalities within four UK cities.

The programme was first trained on a total of 525,860 Google Streetview images from London, corresponding to 156,581 postcodes, and provided with government statistics on local incomes, health, crime, housing, and environmental conditions. It was then trialled on three further cities – Birmingham, Manchester and Leeds – where, once researchers had benchmarked the data by manually rating 1% of the available images, it was able to correctly predict areas' economic and social wellbeing.

In their academic paper, 'Measuring social, environmental and health inequalities using deep learning and street imagery', Suel and colleagues write that "training in

one city can be transferred to predictions in other cities in the same country, especially when networks are fined-tuned with as little as 1% of target city images." The authors hypothesise that the algorithm detects visual signs such as pollution and signs of disrepair in urban locations. "Some features of cities and urban life, such as quality of housing and the living environment, have direct visual signals in the form of building materials and disrepair, sources of air and noise pollution and green space," they write. "Others, like poverty, may be visible because they influence or are related to features like housing and neighbourhood environment, the type of vehicles that people use, or even the type of shops."

The researchers found the application of deep learning to street imagery provided more accurate predictions of some measures of equality, such as income and living environment, than others – including crime and self-reported health. After their successful UK trial, the team now plans on using the technology in developing countries, where there is less up-to-date statistical data available to keep track of policies aimed at reducing inequality, *The New Scientist* reported.

https://www.globalgovernmentforum.com

NORTH AMERICA

USA

Blockchain protocol to fight counterfeit pharmaceuticals

Portland State University (PSU) researchers have made a blockchain protocol to prevent counterfeit pharmaceuticals from filling the market, according to a press release published on April 15. PSU researcher and professor of computer science at the Maseeh College of Engineering and Computer Science, Nirupama Bulusu, in collaboration with PSU computer science doctoral student Naif Alzahrani published a work dubbed "A new product anti-counterfeiting blockchain using a truly decentralized dynamic consensus protocol."

In the paper, the researchers described a new blockchain-based method to record transactionsgeared to facilitate the fight against fake pharmaceuticals by product checking and decentralization. The proposed solution represents a blockchain-based chain of information, with only users possessing a specific key to access or modify the stored data. Bulusu reportedly stated that the decision to create the protocol was due to the fact that the counterfeit pharmaceutical crisis harms the most vulnerable international populations. "This protocol could potentially disrupt and disable illicit supply networks," Bulusu said.

Blockchain technology has been widely adopted in order to fight counterfeiting in various industries. Recently, IBM and data storage firm Seagate announced a joint initiative to fight counterfeit hard drives using blockchain technology.

https://cointelegraph.com

Blockchain tech for safety of clinical research data

Researchers, including one of Indian origin, have developed a novel system based on blockchain technology for ensuring the integrity of clinical trials data. The system, described in the journal *Nature Communications*, creates an immutable audit trail that makes it easy to spot any tampering with results—such as making the treatment look more effective or diminishing side effects.

"Everyone is talking about how blockchain is going to revolutionise many of the data challenges in medicine, and here is one use that finally might make sense," said Atul Butte, a professor at the University of California-San Francisco (UCSF) in the US. "We think it could someday be useful for pharma companies running clinical trials," Butte said.

Blockchain technology utilises an old computer science technique known as hashing, which creates a unique digital signature for each so-called block of data. The hashes accumulate sequentially, as new data is entered or changed, with each block depending on the last. The resulting "blockchain" creates an audit trail for regulators that is easy to decipher and validate, even without looking at the actual data.

Daniel Wong, a PhD candidate at UCSF, built the system to operate through a web portal. Each time new data is entered on a given trial participant, the sender, receiver, timestamp, and file attachment containing the data, along with the hash of the previous block of data pertaining to that patient, is recorded onto a new block, with its own distinct signature.

While the prototype makes allowances for data entry or other errors to be corrected, new data can only be appended to the existing chain, without erasing what was there before. "It makes it really obvious when someone's changing something. You can see who put their hands on it, who made it, who changed it, and who received it," Wong said.

After entering the original data, he logged in as the trial sponsor and tried to erase adverse events that had been reported for two patients in their case report forms. Instead of deleting those reports, however, the system appended his changes to the original data, making it clear who had tried to corrupt the forms, when it was done, and what had been changed.

Wong also tried corrupting the data stored from an earlier point in the trial, when patients were assigned to different treatment arms -- drug or placebo -- to make it look as though they had been given a different medication plan. However, the blockchain ledger pinpointed exactly what had changed and when.

A prototype system like this reduces risks, but does not completely protect data from tampering. Even within a system enabled with this type of blockchain technology, the researchers said, it is still possible that those seeing patients at the point of care could enter wrong or incorrect data at the outset. However, blockchain technology could enable trials to be conducted under challenging conditions, or open doors to data exchanges that are more secure, more efficient, and more transparent for both researchers and the general public.

https://www.theweek.in