

XAG leverages AI technology to transform agriculture

17 June 2019 | News

XAG explained in depth at AI for Good Global Summit



The 3rd AI for Good Global Summit, a leading United Nation platform for multilateral dialogue on Artificial Intelligence (AI), was kicked off in Geneva. As the only Chinese agri-tech company to join the Summit, XAG presented its innovative solutions of combining drones with AI and IoT technology to achieve precision agriculture and induce transformational changes to the food system.

Bringing together over 1,200 interdisciplinary participants from 200 countries, the AI for Good Global Summit connects AI innovators with problem owners to identify practical applications of AI to accelerate process towards the United Nations Sustainable Development Goals (SDGs). Speakers from industry giants such as Microsoft, Google, Mastercard, IBM, Airbus, Siemens, Danone and Roland Berger were present at the Summit.

"Zero Hunger" is one of the 17 UN SDGs expected to be achieved by 2030. According to the United Nations, up to 80% of food consumed in most developing countries is produced by smallholder farmers who, however, account for approximately 50% of the 815 million people suffering from hunger worldwide. At the Summit's session on AI and Agriculture, Justin Gong, Co-founder and Vice President of XAG, together with other panel experts from Microsoft, Tata Group and Connecterra has proposed projects and initiatives to exploit new possibilities of AI technology to improve food security and end hunger.

Make AI-driven Precision Agriculture Practical

Artificial Intelligence, through continuously analysing massive data related to climate, lands, crop growing, etc., while automatically designing and optimising algorithms for decision-making, can help farmers diagnose plant diseases, predict natural disasters and employ appropriate resources to close the yield gap. At XAG, AI-powered intelligent devices such as drones and sensors have been leveraged to establish digital farming infrastructure in rural areas and enable precision agriculture which, for example, accurately target pesticides, seeds, fertilisers and water to wherever it is needed.

"The diffusion of AI innovations is nonlinear," said Justin Gong. "Unlike releasing new drugs or medicine which would totally disrupt the market, AI technologies are learning from countless applications and gradually entering our daily life."

For the past five years, XAG has conducted UAS plant protection services on over 6 million hectares of farmlands, covering 255 crop varieties from rice and wheat to cotton and fruit trees. This has reduced more than 6000 tons of pesticides and fertilisers while conserving 1.4 million tons of agricultural water. In the meantime, the agriculture production data collected during the process will train XAG Agriculture Intelligence (XAI) to become smarter.

Besides, XAI has been developed to dig up the values behind field images and generate AI prescription map to assist high-precision operation. In the case of orchard management, farmers use XMission Multifunctional UAS mounted with a mapping camera to take high-definition images of the orchards. Based on the 1:500 HD field images, XAI can automatically identify the boundaries and obstacles as well as calculating the statistic of fruit trees in each orchard. The position of each fruit tree, including its centre and perimeter, can be accurately pinpointed, with the recall ratio and precision ratio reaching as high as 98.60% and 98.04% respectively. Thousands of fruit trees can be simultaneously located by XAI in only one second.

When analysing remote sensing images, XAI can go further to detect pests, weeds and diseases, recognise cotton boll opening rate as well as monitoring crop growth of a certain farmland. This enable AI prescription service which provides intelligent guidance for precision spraying.

Business Model Innovation Comes Along with AI and Drone

Through the development of Agriculture Intelligence, XAG has also driven collaboration between multi-stakeholders including farmers, service providers and traditional agriculture companies to promote a new business model that benefits all sides. As Gong presented, the cotton production business in Xinjiang, China has been disrupted by the diffusion of AI and drone technology. Compared to picking cotton by hand in the past, local farmers now primarily use large ground-based machines such as tractors to harvest cotton. Traditionally, in order to ensure a better-quality machine harvest, farmers tend to spray multiple times of defoliant to remove all the cotton leaves. This approach would cause overdosing that wastes a large amount of water and chemicals.

With four years' field experiments on deep learning, image segmentation and convolutional neural network, XAG has taken the lead in utilising drones and AI to reduce the use and of defoliant. A large-scale cotton defoliation operation has even been initiated in Xinjiang during autumn 2018. Specifically, XAI could predict the cotton opening time and determine the best time to conduct spraying, through the analysis of meteorological data and the cotton growing status. Then, the amount of defoliant needed for different patches of land would be calculated to form an AI prescription map and therefore enable precision spraying.

This has completely changed the game for agriculture production. In the past, due to information asymmetry and lack of professional farming knowledge, farmers heavily relied on chemical distributors to decide what to buy and how much should be applied to the crops. Now with new technologies bridging the gap, the traditional chemical distributors must transform themselves to providing more reliable, guaranteed service based on the AI prescription map. As for the big players, Bayer, one of the biggest agrochemical producers, has partnered with XAG in developing UAS-specialised chemicals and delivering safer, more cost-effective plant protection service to farmers.

AI-backed Digital Finance for Smallholders

Another problem that XAG is trying to solve is lack of financial resources in the rural regions of developing countries. Smallholder farmers are dedicated their lives to producing food for the world, but without financial support to adopt new tools and approaches, most of them can hardly make ends meet on their lands.

Now with information such as farming, crop growth and transactional records being digitalised and shared, AI can be harnessed to build individual credit risk scoring system for farmers. In China, XAG has established strategic cooperation with some of the biggest national financial institutions to offer farmers, even those without credit card or collateral, convenient, equal access to loans and claims. Based on their accumulated digital credits earned from Alipay mobile payment, farmers and service providers can even rent the P Series drone without any deposit. This is making new technologies available to a broader group of smallholders, while helping them obtain necessary resources to improve productivity and generate decent incomes.

AI is making an impact on agriculture, despite the legal and ethical challenges associated with its adoption. As Justin Gong said, there are huge opportunities for the world, especially the developing countries, to adopt flexible, nimble technologies such as AI and drones to grow food more sustainably.