BIZCOMMUNITY

CGIAR wants to build a big data platform and innovate with startups to help smallholder farmers

CGIAR, one of the world's major agriculture research networks - met in Cali with a wide range of partners to look at how they could use their data using AI and big data to drive farming improvements in continents like Africa. Part of the convention was an Inspire Challenge to take these ideas out into the value chain through ag-tech startups. Russell Southwood and Kelly Wong look at how ideas like these might begin to transform the lives of smallholder farmers.

Image Source: Google Africa Blog, post by Paul Lee

On September 19-22 2017 the Consultative Group for International Agricultural Research (CGIAR) assembled over 200 researchers and partners at the International Center for Tropical Agriculture (CIAT) Research Center in Palmira, Colombia, for their first Big Data in Agriculture Convention. At the convention, CGIAR launched its Platform for Big Data in Agriculture. The platform aims to increase the impact of agricultural development by embracing big data and other digital technology approaches to solve agricultural development problems faster, better and at greater scale.

The platform will initially work across CGIAR's network, but the wider vision is that it can be extended more widely to those working in agriculture. By leveraging CGIAR expertise and that of external partners, CGIAR will broaden and deepen experience and capacity and position itself as an innovator and thought leader in the broader big data and ICT sphere. In this way, CGIAR aims to support the use of proven big data innovations to drive agricultural growth in developing countries.

The platform is designed around three activities: to organise data so it can be used in big data analytics, to make multiple and varied data sets holistically analysable (datasets are discoverable, accessible, and interoperable) and to develop a functional prototype big data platform that can, with this holistic data, conduct big data analytics; to convene data analysts, researchers and agricultural practitioners who will use holistic data, the Big Data Platform, and digital technologies to more efficiently and effectively impact agriculture; and to inspire the adoption of real-world innovative digital technology solutions by supporting the implementation of innovation startups that will to solve real-world development problems faster, cheaper, and more efficiently.

Agriculture has not kept up with digital transformation

CGIAR produces an enormous amount of research, yet is, as the agriculture sector as a whole, lagging behind the rapid changes in technology and data management. Machine learning and artificial intelligence may pass it by because its data is not systematised, accessible or discoverable.

The agriculture sector has also not kept up with other industries in terms of digital transformation. In the US, McKinsey ranks the agricultural sector 23rd out of 25 industries in sector digitalisation. Ideas about smart agriculture and precision farming have barely touched agriculture in low and middle-income countries.

Recent World Bank research on digital technology in Kenya, Senegal, South Africa, and Armenia found that mobile application ecosystem members in these countries perceived the agricultural sector to be the least impacted and well behind other sectors and that only five of 73 surveyed digital technology firms identified the agricultural sector as a source for their revenue streams. This trend is reflected in projects funded by USAID's Development Innovations Ventures, where at Stage One (startup phase) 25% of funded projects focused on agriculture, at Stage Two this number fell to 14%, and by the final Stage Three there were none.

Agtech VC funding dropped 30% from 2015 to $3.2bn in 2016. Much of that investment is made up of very large deals (for example, John Deere's acquisition of Blue River Technologies for $305m) and there is a fear that private capital may begin to define products and approaches that exclude poorer farmers. In regions like Africa, a number of initiatives have come out of startup ecosystems, but they have struggled to gain reach and find effective business models outside of donor and foundation funding.

A "defining point" for ag-tech

CIAT's Andy Jarvis described the current moment as potentially "a defining point" for ag-tech due to four big trends which are changing how data is collected: (1) widespread ownership and use of mobiles to both collect and send data; (2) wider range of improved satellite data (more competition, better spatial resolution and frequency rates, lower costs); (3) the Internet of Things - cheap remote collecting devices; and (4) better analytical capacity.

But how does big data in the world of highly connected, high input and mechanised agriculture read across to a smallholding farmer who farms with a hoe and can't afford fertiliser?

CGIAR has set up and run the Inspire Challenge for which there were 120 entrants. Out of twelve finalists, five winners were selected to receive grants of $100,000 over the next 12-18 months. The finalists are:

Dave Hodson, Real Time Diagnostics for Wheat Rust, CIMMYT, EIAR, and John Innes Centre

Wheat yellow rust is currently considered the most damaging disease of wheat globally (yield losses of >60%). Furthermore, in the last decade, new versions of yellow rust have emerged that are adapted to warmer temperatures, have expanded virulence profiles, and are more aggressive than previously characterised races leading to wide-scale epidemics.

It will develop and pilot an affordable, mobile in-field pathogenomics platform to revolutionise crop pathogen surveillance and diagnostics in real time. MinION mobile genome sequencer platform for crop pathogen diagnostics using wheat yellow rust as a test case and deployment assessed in situ in Ethiopia.

The implementation plan includes the placement of an Ethiopian scientist (EIAR) in the JIC, UK lab for a period of six to eight months, followed by full deployment and testing of the methodology in Ethiopia. A pilot MinION mobile genome sequencer platform with an open source analytical toolkit will then be tested in Ethiopia All PST isolate sequences generated will be stored in an open access data repository.

Alise Dykstra and David Guerena, IVR (Interactive Voice Response) Marketing Service, VOTO Mobile and CIMMYT

VOTO Mobile and CIMMYT propose to design and implement a crowdsourced IVR (Interactive Voice Response) marketing service, increasing linkages between individuals in the value chain, no matter their literacy level and language in Nepal (Voto also operates IVR services successfully in a number of countries across Africa). Farmers can report their harvest/needed services through their phone, no matter how basic. The farmer posts are populated into a web or app-based map that buyers can use to locate products and underemployed can use to find work.

If a person is interested in a post s(he) selects the post, automating an SMS to be sent to the farmer with contact information. The goal of the IVR market service is to help aggregate and formalise the value chain by (1) increasing farmers marketability and bargaining power, (2) ensuring farmers can find timely services, and (3) helping buyers locate available product.

Farmers will be able to take a more active role in marketing their product by posting their harvest information (crop and amount) via IVR or SMS on a toll-free number. When a buyer shows interest in the post, the farmer will receive an SMS with the buyer's contact information. The farmer then has the power on whether to contact the potential buyer and negotiate terms. A follow-up IVR call will be sent to the farmer to identify if the product was sold. If the product was sold, the farmer will be given the option to report the price and rate the transaction.

Adam Wills and Georgia Barri, Farm.ink and ILRI

The largest farming Facebook groups are all located in sub-Saharan Africa and the combined membership of the top four groups spans 100,000s of individuals. Inside these groups, there are 10,000s of historical posts on the topic of dairy farming and livestock. These posts often contain detailed reports of livestock disease as well as queries and comments about productivity and management concerns but as yet they remain unanalysed.

It proposes to combine social media data with ILRI data to create an open-source platform to analyse and visualise emerging livestock disease outbreaks and related issues in Kenya. Farm.ink currently broadcasts messages to thousands of farmers, including many livestock farmers, through its chatbot product. Information will be seamlessly integrated into this service to warn farmers of outbreaks, advise them on management and empower them with the information they need to protect their livestock.

Over the last two years Farm.ink has designed and built software tools to mine and analyse social farming feeds using some of the latest techniques in natural language processing and textual analysis. Combining this technology with ILRI's agronomic expertise, it will build an online system that identifies key livestock diseases in real-time and visualises this data in an online monitoring dashboard.

The Farm.ink chatbot was designed in partnership with IDEO.org and uses human-centred design to create a rich and intuitive platform for farmers to seek and share information. It sends a tailored daily feed of farming news to users and with ILRI's expertise with adding disease and other alerts to the platform. 40% of the farmers interact with the platform on a daily basis.

Farm.ink believes in rapid prototyping solutions and that by building on Farm.ink's existing analytical tools it will have built and be operating the first version of the dashboard as early as January 2018.

David Hughes, James Legg and Kelsee Baranowski, Pest and disease monitoring by

using artificial intelligence, CIAT, CIP, Bioversity International, Google, Penn State University and IITA

It is seeking to radically transform pest and disease monitory by using artificial intelligence, advanced sensor technology and crowdsourcing capable of connecting the global agricultural community to help smallholder farmers.

It will leverage three critical advances that will allow for a transformation in how knowledge is communicated at the farm level: 1) The democratisation of artificial intelligence via open access platforms like Google's Tensor Flow; 2) The miniaturisation of technology allowing affordable deployment and 3) The development of communication and money exchange platforms like MPesa that allow rural extension to scale as a viable economic model enabling last mile delivery in local languages.

It will use smartphones to carry out rapid diagnostics in the field and, using open code/open access, will make the diagnostics available to smallholder farmers and private and public extension agents. Using its partnership with Safaricom, it will deliver relevant alerts on crop diseases and pests to 350,000 farmers in Kenya with the Vodafone farmer platform DigiFarm.

The diagnostic tool will be based on 200,000 images of diseased crops that have been used to train AI algorithms. Work has been done on Google's TensorFlow that can automatically classify different types of diseases for different crops. The smartphone app is currently being field tested in Tanzania.

Berber Kramer, Smartphone camera data, ABI and IFPRI

Its goal is to pioneer testing whether smartphone camera data can strengthen agro-advice and share the resulting tools as public goods. It thinks that this might happen in four ways: 1) Visible crop characteristics provide more information, allowing agronomic experts to target messages more relevant to a farmer's individual situation; 2) Because pictures are more tangible, it will lead to greater take-up and ownership of the advice given; 3) The data gathered can be systematised in different ways to detect variable patterns of crop growth; and 4) there is a clear business case, as insurers have started using camera data for damage assessment and are interested in bundling insurance with advice on how to avoid crop damage.

Its implementation plan in the pilot phase will be carried out in Haryana, a state in northern India. CABI, through its flagship Direct2Farm (D2F), has developed tools that use various sources of information for a variety crops to reach farmers with personalised agricultural advice. D2F uses different modes of mobile communication, including text messages, IVR, short videos, and the ability to contact local experts for personalised advice. It will also offer crop insurance through a product that is offered by HDFC Ergo General Insurance Company in partnership with IFPRI.

Background Briefing - Agtech, Big Data and Africa

Andy Jarvis, CIAT on the 4 things making Big Data in agriculture possible in Africa

Jehiel Oliver, Hello Tractor on how his start-up pivoted from manufacturing to data collection

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