WILL ARTIFICIAL INTELLIGENCE
make its mark on agriculture?

Mehdi Siné: "In future, many apps will interact directly with farmers via conversational assistants: chatbots are becoming more widespread."

The digital era we are entering is seeing new tools and new approaches being developed, including some focusing on artificial intelligence. But will they be able to apprehend the complexity of the living world in agriculture? We put the question to Mehdi Siné, who is the head of IT Department at ACTA, and previously in charge of Arvalis's Information System Unit.

Perspectives Agricoles: **What is artificial intelligence?**
Mehdi Siné: Yann Lecun, Facebook AI Research director, defines artificial intelligence, or "AI", as techniques used to render machines able to accomplish tasks and resolve problems that are usually the preserve of humans. The tasks carried out by AI can seem simple, such as recognising and locating shapes in an image, or programming a robot's movements to grab an object. They require complex planning, to play chess, or Go game, for example, or an extensive knowledge and a lot of common sense to translate a text, or conduct a conversation. Over the last few years, artificial intelligence has been combined with learning capabilities, so that the machine improves its performance through experience. This is called "machine learning", and is widely used by Internet companies to sort or filter content. A more recent development is "deep learning", techniques that offer greater capabilities by organising successive processing layers. Those methods have developed as massive amounts of data have become available, and high calculation capabilities have become easily accessible.

P. A.: **How is AI changing practices, in particular in farming?**
M. S.: Besides the economic growth potential it offers, AI is a major source of technological, organisational and social innovation. AI experts reckon that we are just at the beginning. In the field of agronomic research, AI is already involved in a wide variety of fields, from object or living organism detection and recognition to climatic or biological phenomena modelling and decision support. The methods and tools used are also quite varied, including image, text and sensor data analysis. Those algorithms are now easily accessible online, mostly freely via open source "cloud" platforms. In the near future, a large number of applications based on those tools will be used daily by farmers, in obvious, or less visible ways. They will help them to drive farm machinery, to improve diagnoses and record data.

P. A.: **Are there concrete applications yet?**

M. S.: Arvalis successfully implemented this type of approach very recently, in particular for image analysis and plant organ recognition. By using the deep learning method involved in convolutional neural networks based on the way animals' visual cortex works, the CAPTE[(1)] Mixed Technology Unit team in Avignon (south-eastern France) managed to obtain a good match between the visually estimated wheat ear density and a detection algorithm used with photographs taken in the field. The results showed a very small error rate (20 ears/m²), which is within the expected accuracy window for a large number of uses. This work opens up a considerable range of possible applications, once the methodology has been consolidated and the processing tools have been produced on an industrial basis. Those tools are cloud-based and can be accessed remotely. In the future, they will be used for drone-captured images via smartphones, or even imaging systems, either mobile or on board farm machinery.

(1) http://www.acta.asso.fr/en/research-and-development/national-partnership/mixt-technological-unit/detail-umt/fi/fiche/detail/capte.html

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Interview by Benoît Moureaux - b.moureaux@perspectives-agricoles.com

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