

Machine Learning Brings AI to the Farm

Farmers are always looking for new ways to overcome challenges in their fields. One area that could help now and in the future is artificial intelligence (AI), specifically machine learning. Whether or not your customers are already using this technology, it's likely going to be part of farming's future, so it's worth talking about how it can help as well as its limitations.

Machine learning is a segment of AI where machines or systems learn from their experience or the data they gather to improve performance of a given task. It allows technology to recognize patterns in data and predict outcomes, then continue to update the pattern or its processes as it accumulates more data. In agriculture, this data might come from sensors that sample crops, soil, weather or by feeding information into its system, such as photos of crops and weeds. Using AI can help farmers synthesize large amounts of data to help determine what real-time actions to take in their fields, such as herbicide, fungicide or nitrogen applications. By gathering and interpreting large amounts of data, machine learning can help farmers make better decisions, increase efficiencies and reduce product use and waste.

All of this AI and machine learning technology is already big business in the agriculture sector. According to MarketsandMarkets, spending on AI in agriculture was \$1.7 billion in 2023 and is expected to nearly triple to \$4.7 billion by 2028.¹

Your customers may already be using machine learning on their farms. Drones have been used for a while to scout fields. Now they can be used to determine how much pesticide needs to be sprayed on a given area and more.

Corteva Agriscience has one of the largest drone fleets in agriculture and uses AI "computer vision" to characterize products in the R&D pipeline and to detect crop issues such as poor emergence in farmer fields. The company also has AI methods to detect crop health and other attributes from satellite imagery. Corteva has developed models to determine the optimal timing of fungicide spraying for corn, which have shown to increase corn yields by about 10 bu/a over untreated fields and about 4 bu/a over the grower standard timing of fungicide application. The company has input hundreds of thousands of crop, soil and weather data under various conditions — clear skies versus cloudy ones, different soils, etc. — to train the system to recognize the optimal fungicide application timing in multiple situations. But even this high-tech approach has its challenges. For example,

if a weather anomaly occurs the technology can have trouble deciding what to do, just like a farmer might. But the more data the company inputs, the more accurate the machine learning model becomes.

Machine learning could help your customer in several areas. Image processing can help determine which

crops are infested by diseases and pests by scanning images to find mold, rot, insects or other threats to crop health, then recommend a treatment plan. Sensor technology used with drones or other machines can be used for yield mapping and yield prediction. Farmers can look for patterns in order to anticipate yields and determine how to best allocate resources. You can encourage your customers to work with you to create a plan of action for using these types of technologies and determining necessary pesticide, herbicide and fungicide purchases.

As with any AI — from ChatGPT to a machine in the field — the data gathered is only as good as the inputs the machine receives. So, quality data will give you better outputs or recommendations. Machine learning and other AI technology can help you target problems and be more efficient in treatments, but it doesn't replace the agronomy insights, intuition or years of experience of a farmer. AI can provide great information, but it still requires grower oversight to determine what actions to take.

It's also important to consider the complexity and cost of machine learning technologies for the farm. While they can save money in the long term on labor and inputs, they can be complicated to develop and implement. Technologies will improve and barriers to implement will be lower, and we'll be watching to see how these revolutionary technologies evolve.

¹ Lenniy, Dmytro. "AI in Agriculture — The Future of Farming." Intellias. Accessed February 29/2024. <https://intellias.com/artificial-intelligence-in-agriculture/>.

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