Customer story

Advancing precision and resilient agriculture with AI

DigiFarm drives farming efficiency by using neural network models and supercomputing, reducing costs and boosting crop yields

Norway's DigiFarm is transforming global agriculture with automated field boundary detection and optimized resource allocation. Using high-resolution satellite data and AI powered by supercomputing, the tech startup precisely identifies field borders and seeded areas, empowering farmers and agricultural enterprises to enhance efficiency, increase yields, and reduce costs by up to 10%. This breakthrough promotes environmentally responsible farming practices while ensuring a resilient and sustainable future for agriculture.

DigiFarm CSC

Customer: DigiFarm
Industry: Agriculture
Country: Norway

Modernizing a 500-year-old farm

When Nils Helset took over his family's farm as the 15th-generation owner, he had to uphold centuries of farming legacy while modernizing operations for greater efficiency and productivity.

The property in Hamar, Norway has been in Helset's family for more than 500 years, producing mainly spring crops and raising free-range hens for egg production. But like many farms, it relied on outdated practices and didn't have a clear view of its land, including changes in where crops could grow due to soil erosion and flooding. This made it difficult to manage fields effectively and get the most out of production.

"When we look at the agricultural space in general, there's a significant lack of automation and data integration," says Helset. "There are many different systems that don't talk to each other, and that prohibits digitizing, cost optimization, or scaling up."

The fragmented nature of farming technologies complicates the establishment of accurate field boundaries crucial for precision agriculture, a practice that optimizes farming inputs for increased productivity and yields. To address this challenge on his family farm, Helset created technology that delivers precise field boundary data. His efforts eventually led to the founding of DigiFarm, a startup that uses high-resolution satellite data and artificial intelligence (AI) powered by supercomputing to accurately identify field boundaries and seeded areas.

"Our goal was to establish a foundational data layer that supports ecosystem stakeholders so they can deliver better services without the inefficiencies of manual mapping of field boundaries," says Helset, CEO of DigiFarm.

"The immediate effect of working on the LUMI supercomputer wasn't only the ability to develop better-performing models but also to significantly shorten the time frame from training and R&D to product iteration and commercialization. These two factors have been really, really significant for us."

Nils Helset, Co-founder and CEO, DigiFarm

The company's technology now enhances crop management for farmers, increasing yields by as much as 10% and reducing costs by up to 10%. Agricultural enterprises also benefit from improved resource allocation and productivity through data-driven decisions. This ultimately supports sustainable farming practices.

Vision
Transform agriculture to promote modern farming practices and increase productivity

Strategy
Develop AI-driven intelligence tools for precision and resilient agriculture

Outcomes

- Improves crop yield forecasting, reducing seed costs by 5% to 10% and increasing yields by up to 10%
- Enhances farming efficiency and cuts government farm subsidy monitoring costs by 25% through precise field boundary data
- Optimizes resource allocation and promotes sustainable farming practices, ensuring compliance with deforestation regulations

"Our solution removes a lot of friction for farmers, other growers, and agronomists to actually build and deliver services."

Nils Helset, Co-founder and CEO, DigiFarm

Achieving precision in mapping

Helset's team initially relied on maps and manual methods to digitize boundaries, using old orthophoto images updated every two to three years. This often led to inaccuracies due to changing boundaries throughout the year.

To tackle this challenge, the team developed an AI model based on deep neural networks to automatically detect field boundaries and various features within a field, such as crops, water bodies, windmills, urban structures, and trees, among others. They trained the model using 4.3 million hectares of satellite data from 57 countries, which made it large, complex, and significantly more time-consuming. "Delays in training affected our ability to iterate, optimize, and commercialize our products efficiently," says Helset.

Leveraging the LUMI supercomputer powered by HPE Cray, DigiFarm accelerated its model development. It reduced the time required to bring its product to market by about six months and notably increased the model's accuracy by 4.2% in just a few months. By upscaling satellite imagery from 10-meter to 1-meter resolution, the model enables more precise mapping and analysis, automatically detecting boundaries and features across diverse agricultural landscapes.

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Owned by the EuroHPC Joint Undertaking, LUMI is located at the CSC — IT Center for Science data center in Finland and is hosted by an 11-country consortium. Norway participates as a member through its national digital infrastructure provider, Sigma2, through which DigiFarm received compute time. The company was also recently awarded more time on the LUMI supercomputer through a EuroHPC Joint Undertaking call for AI and data-intensive applications.

Improved farming efficiency and productivity

DigiFarm's innovation not only reduces operational hurdles and boosts production for farmers but also empowers agricultural enterprises to optimize resource allocation and improve productivity. By automatically detecting field boundaries, its technology ensures farmers can precisely apply crop inputs such as seeds, crop protection chemicals, and fertilizers. This contributes to better yield forecasting and farming efficiency in the long run.

As Helset notes, "Our solution removes a lot of friction for farmers and other growers and agronomists to actually build and deliver services."

More than 55 agricultural enterprises and government agencies across Europe, Latin America, North America, Canada, and India have adopted DigiFarm's technology. These clients integrate field boundary and seeded area data into their digital platforms for internal use or distribute it to farmers through farm management software.

"Most users are farmers or growers, but they're not usually the direct payers," explains Helset. "It's the enterprise clients who buy and integrate the data, both externally and internally, for analytics."

Increased productivity with automated zoning

Accurate data from DigiFarm supports detailed analysis and decision-making. In Germany, for example, the company uses satellite imagery to create red and green zones based on biomass, helping clients improve their field management. Red zones denote low yield potential while green zones indicate high yield potential.

According to Helset, this zoning process was traditionally done manually, making it time-consuming and costly. "You manually draw the boundaries and then select all the seasonal images. For soil conductivity testing, you go to the field and probe to establish these zones."

DigiFarm's technology automates the process of acquiring field boundary and biomass data. Farmers use this data to adjust seed quantities across different zones to improve seeding efficiency and reduce overall costs.

"You'll put this data into your farm machinery, which then applies different quantities of seed depending on the region and crop," explains Helset. "You can save maybe 5–10% on seeds and increase yield by 5–10%, depending on the field and region."

Reducing monitoring costs

Access to precise field boundary data has reduced monitoring costs for European government agencies overseeing farm subsidies by 25%. For example, in Lithuania, this translates to annual savings of about €4.5 million.

Having an independent source for field boundaries and seeded acres helps streamline the subsidy declaration process. This way, farmers don't have to draw boundaries themselves, which is often inaccurate and leads to penalties and errors.

"Currently, we're working with seven European governments to provide this data," shares Helset. "The ability to reduce monitoring costs and improve accuracy in subsidy declarations is a big advantage for these agencies."

Reduced emissions with precise data

Accurate field boundary data also benefits the environment by reducing Scope 3 emissions, which are indirect emissions from activities related to an organization but originate from other sources.

Previously, government agencies in Europe inspected 100% of applications for farm subsidies by driving to fields to verify crops and seeded areas. With data from DigiFarm, they inspect only 5% to 10% of applications, reducing the number of trips and cutting emissions associated with travel.

"We also provide actionable data to other clients, such as detailed field boundaries with specified management zones," says Helset. "For agricultural companies, using this data for variable rate seeding helps farmers reduce seed costs by 5–10% and increase yields by 5%."

Enhancing sustainability in agricultural sourcing

More recently, DigiFarm has started working with clients that require detailed reporting on whether their products originate from deforested areas. Companies further down the supply chain, particularly in food and beverage retail, often lack transparency in their sourcing practices due to reliance on third-party suppliers and intermediaries. This complicates their ability to track product origins accurately.

"In Brazil, for example, there's a legal obligation to report on products sourced from deforested areas after December 2020. For us, this means defining property boundaries from 2021 to 2024 and monitoring changes, such as tree removal," says Helset.

DigiFarm also collaborates with European agricultural authorities to meet the European Union's stricter reporting requirements, ensuring farmers adopt sustainable practices, such as biodiversity and vegetation management. These practices contribute to environmental preservation by improving soil health and maintaining wildlife habitats.

Advancing sustainable agriculture with technology

Looking ahead, DigiFarm plans to advance its capabilities in land cover classification and sustainable agriculture using AI and supercomputing. This includes enhancing traceability in product sourcing to comply with deforestation regulations.

The company is committed to delivering cost-effective solutions, particularly in smaller markets, using open-source data and satellite technology.

"Expanding our capabilities allows us to drive meaningful change in agriculture while promoting sustainability and ensuring regulatory compliance for clients," says Helset.

“For agricultural companies, using detailed field boundaries with specified management zones for variable rate seeding helps farmers reduce seed costs by 5–10% and increase yields by 5%.”

Nils Helset, Co-founder and CEO, DigiFarm

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