Technology

Protecting biodiversity by monitoring the spread of invasive species

Trifork

With Lenovo ThinkEdge SE70, powered by the NVIDIA® Jetson™ platform, Trifork developed an AI application to identify invasive plant species, enabling the Nordic Road Directorate to take measures to protect native ecosystems.

Powered by

NVIDIA.

Lenovo

1

Who is Trifork?

Trifork is a listed global company that specializes in IT and AI, that develops innovative software solutions in collaboration with its customers. The company has more than 1,200 employees, across 73 business units, with offices in 15 countries in Europe and the USA, and works in six business areas: Digital Health, FinTech, Smart Building, Cloud Operations, Cyber Protection, and Smart Enterprise.
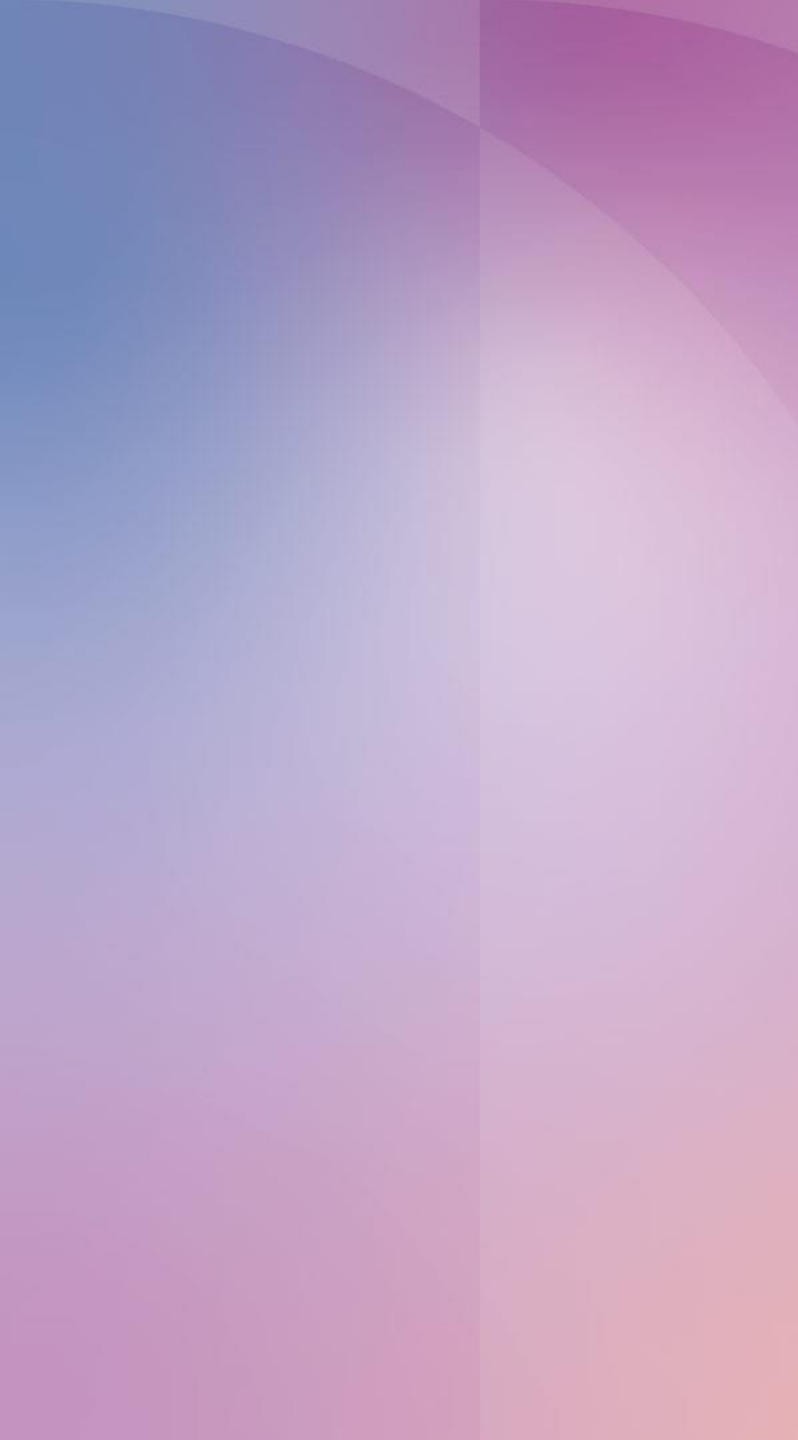
**TRIFORK.**

2

The
Challenge

Invasive plant species are one of the primary causes of biodiversity loss in the natural environment. As well as carrying pests and diseases, invasive species harm native plants by competing for space, light, and nutrients—and are very difficult to eradicate or control once established. One common way for invasive species to spread is along transport routes, as airflow from passing traffic disperses seeds and frequently disturbed soils at the roadside form an ideal habitat.

So, how can we counter the threat from invasive species on the roadside and protect our native ecosystems? That's the challenge for the Nordic Road Directorate (NordFoU), a partnership between the road authorities of Denmark, Sweden, Iceland, Norway, Finland, and the Faroe Islands.

Nordic road authorities trialed various strategies to monitor invasive species. In Norway, for example, biologists would drive around in service vehicles to spot non-native plants. But these manual methods weren't scalable enough to track invasive species over thousands of miles of roads.

NordFoU therefore asked Trifork to create a more effective way to combat invasive plants, using emerging technologies. This approach was inspired by another recent collaboration, where Trifork developed an AI-based solution to help NordFoU to monitor roadkill and identify sites where the introduction of wildlife crossings would reduce animal-vehicle collisions.
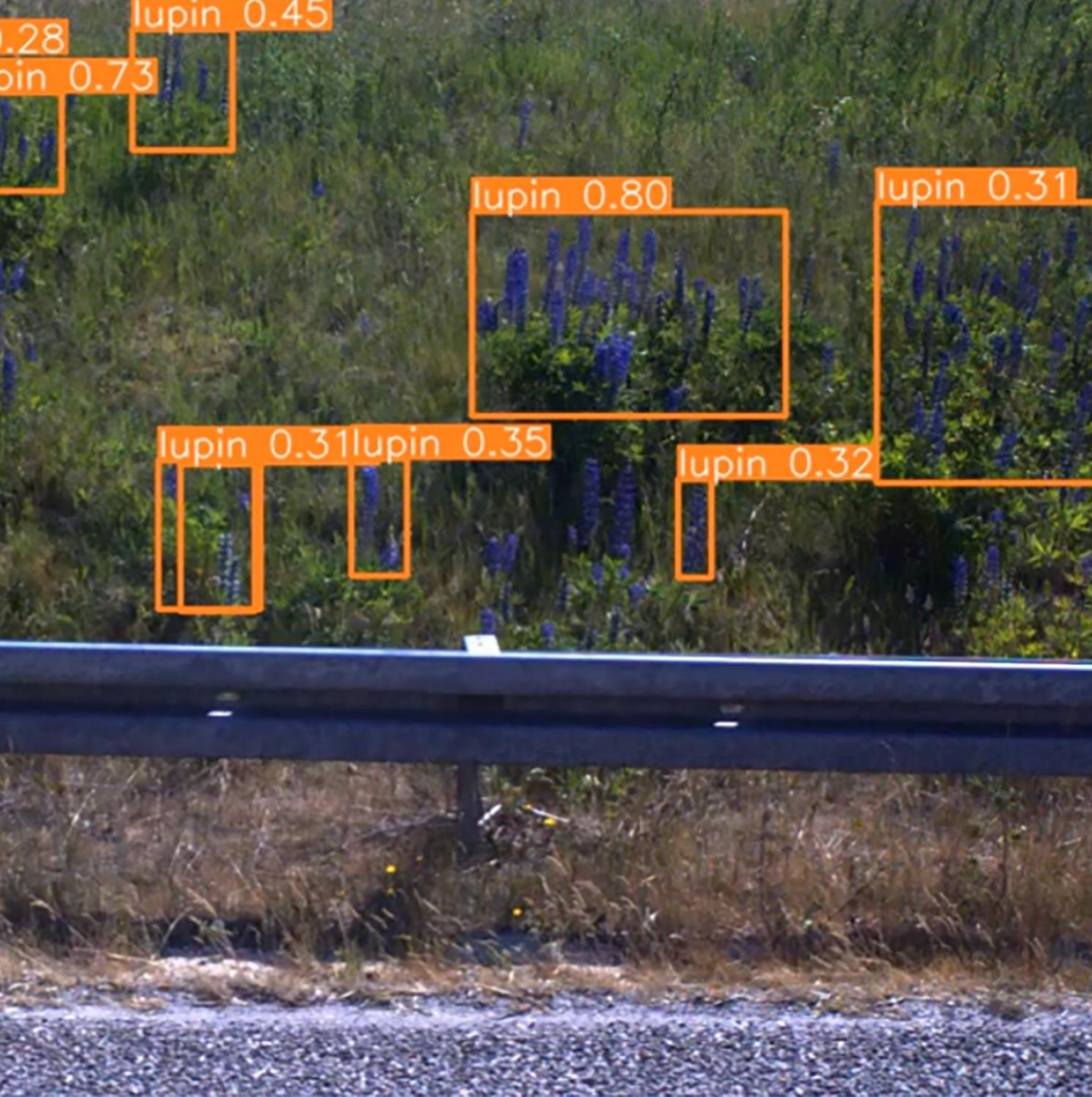
"AI offered exciting possibilities for analyzing the spread of invasive plants. To build the solution, we needed a robust, powerful infrastructure that NordFoU teams could use while on the road."

Nicholai Stålung
Vice President - Vision AI, Business Unit Leader, Trifork

Creating a **ThinkEdge AI** solution

After gathering requirements, Trifork designed and developed an automated system to detect invasive plants along the sides of roads. Mounted on a rack on the back of service vehicles, the solution combines high-resolution cameras with an AI application running on Lenovo ThinkEdge SE70 edge clients, powered by the NVIDIA® Jetson™ platform.

Nicholai Stålung, Vice President – Vision AI, Business Unit Leader, Trifork explains: "We have a lot of experience developing image and video analysis applications running on NVIDIA GPUs. Through our connection with NVIDIA, we learned about the Lenovo ThinkEdge SE70 platform, which offered the ideal combination of performance and robustness to support the roadside monitoring solution."

Hardware
Lenovo ThinkEdge SE70
NVIDIA® Jetson™

A Danish Road Directorate service vehicle with the Trifork solution mounted on the back.

Real-time analysis of roadside imagery

As road directorate employees drive across highways and small rural routes, two cameras take 20 photos per second of both sides of the road, before the AI model analyzes images in real time to identify invasive species. Whenever there is a positive identification, the system sends the images to the cloud, where NordFoU teams can track the location and spread of the invasive species.

"The solution runs autonomously," adds Nicholai Stålung. "The road directorate employees driving the vehicles are not biologists, so we ensured there was minimal intervention required from them to run the solution. As they drive, the AI application simply does its work and collects and analyzes imagery."

" **"Each day, road directorate teams are on the road for around eight hours, and the Lenovo and NVIDIA platform delivers the GPU resources to analyze countless images during that time."**

Nicholai Stålung
Vice President – Vision AI, Business Unit Leader, Trifork

3 Results

Building on the Lenovo ThinkEdge SE70 platform, Trifork has successfully delivered the invasive species detection solution to NordFoU. So far, the road directorates of Denmark and Sweden have adopted the solution, with Iceland and Finland set to soon follow suit. In Denmark, around 100 vehicles carry the solution and collect data from the entire national highway system within a week.

Nicholai Stålung adds: "With the AI solution, the Danish teams will be able to map the spread of invasive species across the whole country in a few months. Sweden and Norway will require a more regionalized approach to cover wider distances, but our technology-driven strategy has proved much more efficient and scalable than the previous manual approaches for roadside monitoring."

✓ Enables identification of invasive species

✓ Supports analysis of thousands of miles of roadside

✓ Helps authorities prevent spread of non-native plants

Enabling **effective action** against non-native plants

So far, NordFoU teams have harvested around four months of data from one blooming season for invasive species. As a result, the road directorates in Denmark and Sweden have access to granular-level insights on the types and locations of non-native roadside plants. And as NordFoU members collect more data, the accuracy of the AI model will continue to improve.

Nicholai Stålung concludes: "We have achieved extremely impressive results with the AI solution. With clear data on where invasive species are spreading, NordFoU members can plan and implement more effective, targeted measures to protect biodiversity and the natural environment."

> "With the ThinkEdge solution for NordFoU, we have demonstrated the value of AI for environmental protection. As organizations tackle more climate challenges, AI can help to build a more sustainable future."

Nicholai Stålung
Vice President - Vision AI, Business Unit Leader, Trifork

Why **Lenovo**?

When designing the vehicle-mounted roadside monitoring system, Trifork knew that a rugged platform was essential. The Lenovo ThinkEdge SE70 was the natural choice, capable of operating in all climates and withstanding extreme temperature, vibration, and shocks.

The integrated NVIDIA GPUs were a crucial factor in the selection too, providing the massive performance needed to run AI computer vision applications at the network edge.

Finally, the Lenovo edge platform was a tried-and-trusted solution, as Trifork also used it as the basis for the roadkill identification solution for NordFoU.

How can we protect natural ecosystems against invasive plant species?

Using Lenovo and NVIDIA® technology, Trifork developed an AI application to monitor the spread of non-native plants on roadsides.

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