Startup's Vision AI Software Trains Itself — in One Hour — to Detect Manufacturing Defects in Real Time

NVIDIA Metropolis member Covision creates GPU-accelerated software that reduces false-negative rates for defect detection in manufacturing by up to 90% compared with traditional methods.

Author: Angie Lee

Cameras have been deployed in factories for over a decade — so why, Franz Tschimben wondered, hasn't automated visual inspection yet become the worldwide standard?

This question motivated Tschimben and his colleagues to found Covision Quality , an AI-based visual-inspection software startup that uses NVIDIA technology to transform end-of-line defect detection for the manufacturing industry.

"The simple answer is that these systems are hard to scale," said Tschimben, the northern Italy-based company's CEO. "Material defects, like burrs, holes or scratches, have varying geometric shapes and colors that make identifying them cumbersome. That meant quality-control specialists had to program inspection systems by hand to fine-tune their defect parameters."

Covision's software allows users to train AI models for visual inspection without needing to code. It quadruples accuracy for defect detection and reduces false-negative rates by up to 90% compared with traditional rule-based methods, according to Tschimben.

The software relies on unsupervised machine learning that's trained on NVIDIA RTX A5000 GPUs . This technique allows the AI in just one hour to teach itself, based on hundreds of example images, what qualifies as a defect for a specific customer. It removes the extensive labeling of thousands of images that's typically required for a supervised learning pipeline.

The startup is a member of NVIDIA Metropolis — a partner ecosystem centered on vision AI that includes a suite of GPU-accelerated software development kits, pretrained models and the TAO toolkit to supercharge a range of automation applications. Covision is also part of NVIDIA Inception , a free, global program that nurtures cutting-edge startups.

In June, Covision was chosen from hundreds of emerging companies as the winner of a startup award at Automate, a flagship conference on all things automation.

In manufacturing, the pseudo-scrap rate — or the frequency at which products are falsely identified as defective — is a key indicator of a visual-inspection system's efficiency.

Covision's software, which is hardware agnostic, reduces pseudo-scrap rates by up to 90%, according to Tschimben.

As an item passes through a production line, a camera captures an image of it. Then, Covision's real-time AI model analyzes it. Finally, it sends the information to a simple user interface that displays image frames: green for good pieces and red for defective ones.

For GKN Powder Metallurgy, a global producer of 13 million metal parts each day, the above steps can occur in as quick as 200 milliseconds per piece — enabled by Covision software and NVIDIA GPUs deployed at the production line.

Two to six cameras usually inspect one production line at a factory, Tschimben said. And one NVIDIA A5000 GPU on premises can process the images from four production lines in real time.

"NVIDIA GPUs are robust and reliable," he added. "The TensorRT SDK and CUDA toolkit enable our developers to use the latest resources to build our platform, and the Metropolis program helps us with

go-to-market strategy — NVIDIA is a one-stop solution for us."

Plus, being an Inception member gives Covision access to free credits for NVIDIA Deep Learning Institute courses, which Tschimben said are "very helpful hands-on resources" for the company's engineers to stay up to date on the latest NVIDIA tech.

In addition to identifying defective pieces at production lines, Covision software offers a management panel that displays AI-based data analyses of improvements in a production site's quality of outputs over time — and more.

"It can show, for example, which site out of a company's many across the world is producing the best metal pieces with the highest production-line uptime, or which production line within a factory needs attention at a given moment," Tschimben said.

This feature can help managers make high-level decisions to optimize factory efficiency, globally.

"There's also a sustainability factor," Tschimben said. "Companies want to reduce waste. Our software reduces production inefficiencies, increasing sustainability and making the work more streamlined."

Reducing pseudo-scrap rates using Covision software means that companies can produce materials at higher efficiency and profitability levels, and ultimately waste less.

Covision software is deployed at production sites across the U.S. and Europe for customers including Alupress Group and Aluflexpack, in addition to GKN Powder Metallurgy.

Learn more about NVIDIA Metropolis and apply to join NVIDIA Inception .

Attend NVIDIA GTC , running online Sept.19-22, to discover how vision AI and other groundbreaking technologies are shaping the world.

Original URL: https://blogs.nvidia.com/blog/2022/08/18/covision-visual-inspection-for-manufacturing/