Model Teachers: Startups Make Schools Smarter With Machine Learning

SimInsights and Photomath show some of the ways startups are enhancing education with NVIDIA AI.

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Like two valedictorians, SimInsights and Photomath tell stories worth hearing about how AI is advancing education.

SimInsights in Irvine, Calif., uses NVIDIA conversational AI to make virtual and augmented reality classes lifelike for college students and employee training.

Photomath — founded in Zagreb, Croatia and based in San Mateo, Calif. — created an app using computer vision and natural language processing to help students and their parents brush up on everything from arithmetic to calculus.

Both companies are a part of NVIDIA Inception , a free, global program that nurtures cutting-edge startups.

Rajesh Jha loved simulations since he developed a physics simulation engine for mechanical parts in college, more than 25 years ago. “So, I put sim in the name when I started my own company in 2009,” he said.

SimInsights originally developed web and mobile training simulations. When AR and VR platforms became available, Jha secured a grant to develop HyperSkill. Now the company’s main product, it’s a cloud-based, AI-powered 3D simulation authoring and analytics tool that makes training immersive.

The software helped UCLA’s medical center build a virtual clinic to train students. But they complained about the low accuracy of its rules-based conversational AI, so Jha took data from the first class and trained a deep neural network using NVIDIA Riva , GPU-accelerated software for building speech AI applications.

“There was a quick uptick in the quality, and they say it’s the most realistic training they’ve used,” said Jha.

Now, UCLA wants to apply the technology to train thousands of nurses on dealing with infectious diseases.

“There’s a huge role for conversational AI in education and training because it personalizes the experience,” he said. “And a lot of research shows if you can do that, people learn more and retain it longer.”

Because SimInsights is an NVIDIA Inception member, it got early access to Riva and NVIDIA TAO , a toolkit that accelerates evaluating and training AI models with transfer learning. They’ve become standard parts of the company’s workflow.

As for Riva, “it’s a powerful piece of software, and our team really appreciates working with NVIDIA to brainstorm our next steps,” Jha said.

Specifically, SimInsights aims to develop larger conversational AI models with more functions, such as question answering so students can point to objects in a scene and ask about them.

“As Riva gives us more capabilities, we’ll incorporate them into HyperSkill to make digital learning as good as working with an expert — it will take a while, but this is the way to get there,” he said.

In Zagreb, Damir Sabol got stuck trying to help his eldest son understand a math problem in his homework. It sparked the idea for Photomath, an app that's been downloaded more than 300 million times since its 2015 release.

The app detects an equation in a smartphone picture, then shows step-by-step solutions to it in formats that support different learning styles.

"At peak times, we get thousands of requests a second, so we need to be really fast," said Ivan Jurin, who leads the startup's AI projects.

Some teachers have students open the app as an alternative to working on the blackboard. It's the kind of anecdote that makes Jurin's day.

"We want to make education more accessible," he said. "The free version of Photomath can help people who lack resources understand math almost as well as someone who can afford a tutor."

Under the hood, one large neural network does most of the work, detecting and parsing equations. It's a mix of a convolutional network and a transformer model that packs about 100 million parameters.

It's trained on local servers with NVIDIA RTX A6000 GPUs . For a cost-sensitive startup, "training in the cloud didn't motivate us to experiment with larger datasets and more complex models, but with local servers we can queue up experiments as we see fit," said Vedran Veki■, a senior machine learning engineer at the company.

Once trained, the service runs in the cloud on NVIDIA T4 Tensor Core GPUs , which he described as "very cost effective."

The startup is migrating to a full stack of NVIDIA AI software to accelerate inference. It includes NVIDIA Triton Inference Server for maximum throughput, the TensorRT software development kit to minimize latency and NVIDIA DALI , a library for processing images fast.

"We were using the open-source TorchServe, but it wasn't as efficient as we hoped," Veki■ said. NVIDIA software "gets 100% GPU utilization, so we're using it on our smaller models and converting our large model to it, too."

It's a technical challenge that NVIDIA experts can help address, one of the benefits of being in Inception.

SimInsights and Photomath are among hundreds of startups — out of NVIDIA Inception's total 10,000+ members — that are making education smarter with machine learning.

To learn more, check out these GTC sessions on NVIDIA Riva , NVIDIA Tao and NVIDIA Triton and TensorRT .

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