

# AI gives a helping hand to X-ray diagnoses

By Joe Caspermeyer, ASU News  
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Chest X-rays are the most common type of X-ray used in medicine — used to diagnose lung problems, heart issues, broken ribs and even certain gut conditions.

But sometimes they can be hard to interpret, or doctors may miss diagnosing rare conditions and emerging diseases, as was seen in the first year of the COVID-19 pandemic.

A new AI tool called Ark+ has the potential to help.

A team of Arizona State University researchers built the tool to help doctors read chest X-rays more accurately and improve health care outcomes.

In a proof-of-concept study, Ark+ demonstrated exceptional capability in diagnosis — from common lung diseases to rare and emerging ones.

It also was more accurate and outperformed proprietary software currently released by industry titans like Google and Microsoft.

“Our goal was to build a tool that not only performed well in our study but also can help democratize the technology to get it into the hands of potentially everyone,” said [Jianming “Jimmy” Liang](#), an ASU professor from the College of Health Solutions and lead author of [the study](#) recently published in the prestigious journal Nature.

“Ark+ is designed to be an open, reliable and ultimately useful tool in real-world health care systems,” he said. “Ultimately, we want AI to help doctors save lives.”

Though health care is now the [leading driver of the U.S. economy](#), the U.S. continues to rank lower than many countries in many health indicators, including 49th in life expectancy, [according to the World Bank](#).

Patients want to live healthier lives and have better outcomes. And doctors want to make sure to get the diagnosis right the first time for better patient care.

That’s when AI enters the waiting room.

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## Why this research matters

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## What makes Ark+ different

The Ark+ tool improves the process by using AI to reduce mistakes and speed up diagnosis.

AI works by training computer software on large datasets, or in the case of the Ark+ model, a total of more than 700,000 worldwide images from several publicly available X-ray datasets.

The key difference-maker for Ark+ was adding value and expertise from the human art of medicine. Liang's team included all the detailed doctors' notes compiled for every image.

"You learn more knowledge from experts," Liang said.

These expert physician notes were critical for Ark+ to learn and become more and more accurate as it was trained on each dataset.

"Ark+ is accruing and reusing knowledge," said Liang, explaining how the tool got its acronym. "That's how we train it. And pretty much, we were thinking of a new way to train AI models with numerous datasets via fully supervised learning.

"Because before this, if you wanted to train a large model using multiple datasets, people usually used self-supervised learning, or you train it on the disease model — the abnormal versus a normal X-ray.

"And so, that means you throw out the most valuable information from the datasets, these expert labels," he said. "We wanted AI to learn from expert knowledge, not only from the raw data."

Other key highlights from the pilot project include:

**Foundation model for X-rays:** Ark+ is trained on many different chest X-ray datasets from hospitals and institutions around the world. This makes it better at detecting a wide range of lung issues.

**Open and sharable:** The team has released the code and pretrained models. This means other researchers can improve it or adjust it for local clinics.

**Quick learning:** Ark+ can identify rare diseases even when only a few examples are available.

**Adapts to new tasks:** Ark+ can also be fine-tuned to spot new or unseen lung problems without needing full retraining.

**Resilient and fair:** Ark+ works well, even with uneven data, and fights against biases. It can also be used in private, secure ways.

## Putting AI into the hands of doctors

The software can be adapted for any kind of medical imaging diagnosis, including CTs and MRIs, thereby expanding its impact in the future.

Liang and his research team want Ark+ to become a foundation for future AI tools in medicine and hope to further commercialize the software for hospitals so that other researchers will use and build on their work.

By sharing everything openly, they want to help doctors in all countries, even rural places without big data resources.

Their goal is to make medical AI safer, smarter and more helpful for everyone.

“By making this model fully open, we’re inviting others to join us in making medical AI more fair, accurate and accessible,” Liang said. “We believe this will help save lives.”

*This story originally appeared on [ASU News](#).*

## **Main image**

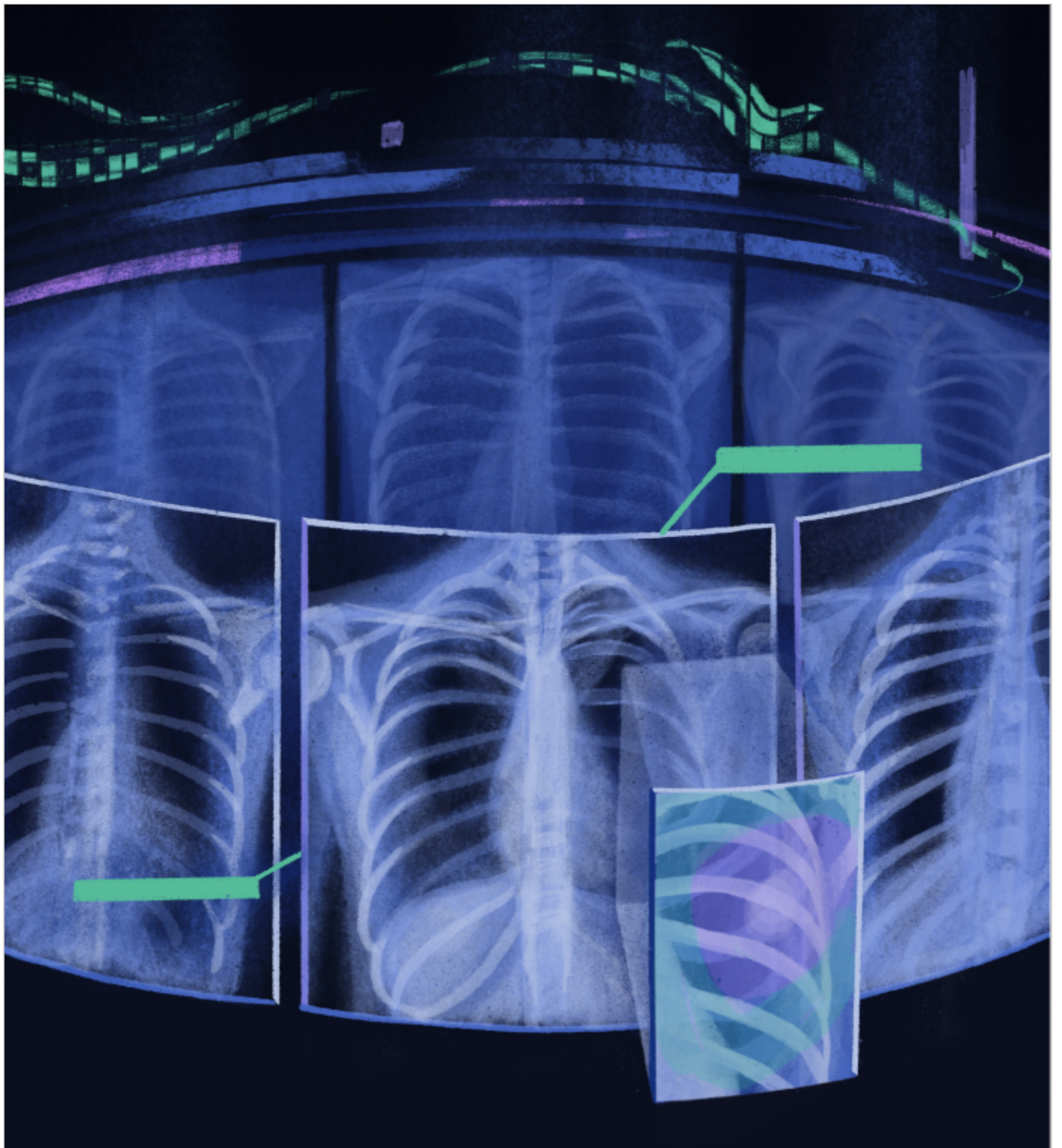


Image credit: Lan Julia P. Liang and Jianming Liang