

AI in Healthcare Advances Cancer Diagnosis

insight.tech/health/ai-in-healthcare-advances-cancer-diagnosis

September 22, 2022

September 22, 2022

Georganne Benesch



While studying advanced 3D imaging and AI at Taiwan’s National Tsing Hua University, researchers hit on an exciting potential application: helping pathologists diagnose cancer tumors with greater speed and precision. They obtained licenses from the university and formed a startup, JelloX Biotech Inc., but soon discovered hospitals were far from ready to adopt the technology.

Most pathologists still examine tissue samples by eye and take manual notes, a painstaking hours-long process. Few have made the switch to digital 2D or 3D image analysis, in part because it traditionally has required installing costly, complicated graphics equipment.

Computer Vision in Healthcare

Despite their highly trained eyes, doctors don’t always get important details right. Tumor samples are complex—each one contains 10 to 30 parameters that must be analyzed to determine whether the cells are cancerous, how fast they are dividing, and how healthy or unhealthy they look as compared with normal tissue, among other factors.

“Studies asking multiple pathologists to analyze the same tissue sample have found 20% to 30% disagreement among the diagnoses, says Jarvis Yu-Chieh Lin, Chief Technology Officer at JelloX. “This means that there is a chance that patients might receive incorrect information about their disease status, thus delaying proper treatment.”

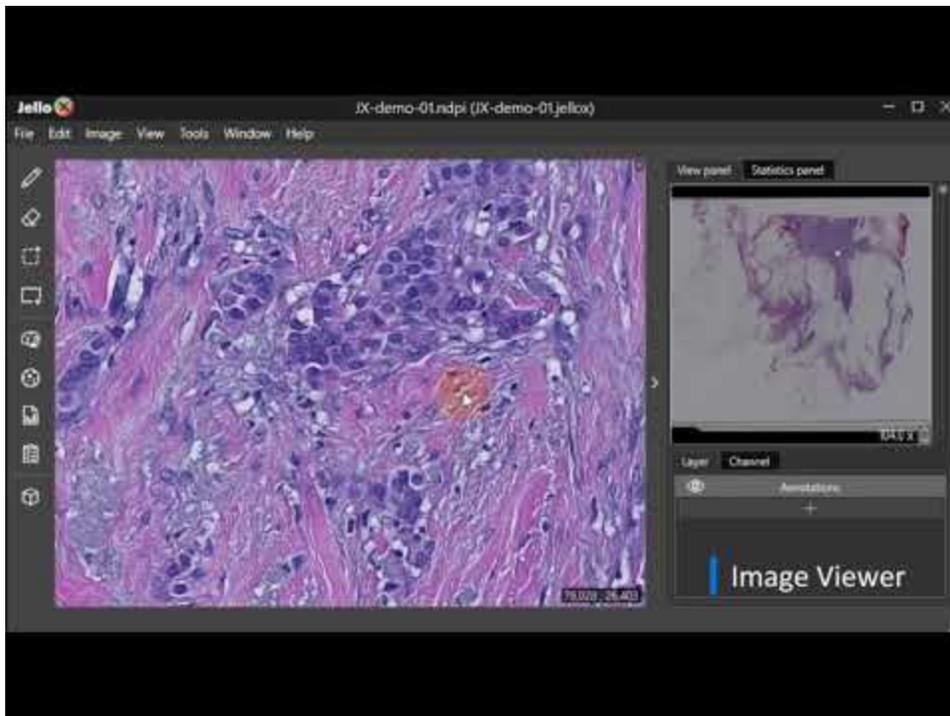
Misdiagnosis can be very painful for patients. They might miss a good chance to use the best drug for fighting their cancer earlier or undergo chemotherapy they may not need.

To improve diagnostic capabilities without breaking the bank, Lin and his colleagues set out to create an edge solution that could quickly uncover and digest far more information than pathologists can see—without the need for installing expensive graphics equipment.

“#AI insights could help doctors improve diagnostic accuracy and develop better #treatments.” – Jarvis Yu-Chieh Lin, JelloX Biotech Inc. via @insightdottech

Using AI 3D Imagery in Pathology

After three years of development, JelloX created a prototype, the MetaLite Digital Pathology Edge Solution, which can analyze each tissue sample parameter in one to two minutes, compared with an hour using a standard computer. The solution uses an edge computing device powered by Intel® processors and custom AI algorithms deployed through the Intel® OpenVINO™ Toolkit. Most hospital scanners can easily be configured to work with the software, which also allows doctors to add notes as they work (**Video 1**).



Watch Video At: <https://youtu.be/CiqcJ5sxbFk>

Video 1. The JelloX MetaLite Digital Pathology Edge Solution uses AI algorithms and edge processing to rapidly analyze 3D tissue samples in near-real time, and allows physicians to annotate results.

(Source: [JelloX Biotech](#))

Pathologists can choose to review some parameters in real time and save others for later. Data from the scans and edge device is sent to hospital servers, where hundreds of parameters can be analyzed with AI in detail overnight, with results ready to view the next morning.

AI models are trained on massive data sets accumulated from many sources. The amount of information they work with is too vast for humans to assimilate, but algorithms can quickly process it and use it to classify tissue samples and make inferences and predictions about the course of the disease.

“Some parameters are difficult for doctors to categorize conclusively. When AI does calculations, it gives doctors a scale or ruler to use as they judge the images,” Lin explains.

AI insights could help doctors improve diagnostic accuracy and develop better treatments, Lin believes, saying, “If we have good AI-assisted tools, maybe patient survival rates and survival duration will be enhanced.”

AI analysis is also valuable to medical researchers, allowing them to discover new features of cancer cells and better understand how they operate. “Algorithms can dig out more information from images and do the tough analysis, providing more information about morphology and protein biomarker features,” Lin says.

Currently, researchers at Taipei Veterans General Hospital and MacKay Memorial Hospital in Taiwan are using MetaLite to identify new biomarkers of cancerous tissue and calculate the area of tumors with greater precision. Once the platform receives approval from Taiwanese health authorities, the hospitals plan to use it as a diagnostic tool.

Pharmaceutical companies may also benefit from AI tissue analysis, using it to identify which patients stand the best chance of benefitting from medications set to undergo clinical trials.

Expanding AI in Healthcare with Federated Learning

As hospitals expand the use of AI in pathology, data they obtain will be used to train future AI models, increasing accuracy. And through a process known as federated learning, hospitals can now securely share image data with others while confining sensitive patient information to their own servers—a capability once considered an impossible dream. JelloX is developing a new version of its software that enables federation.

“With federated learning, data will accumulate much faster, improving the AI and increasing speed and data uniformity,” Lin says. “Using AI in pathology will drive precision medicine, helping doctors improve diagnosis and treatment, and allowing pharmaceutical companies to develop new drugs much faster.”

