NEW BEREAKTHROUGH: These algorithms have outperformed the best existing methods reported in scientific literature by a large margin

IIT-I takes AI route to detect early cases of breast, cervical cancers

Our staff reporter

INDORE

In a significant step toward strengthening cancer diagnosis in India, researchers at IIT Indore have developed advanced Artificial Intelligence (AI) algorithms that can automatically detect and locate breast and cervical cancers in medical images with very high accuracy.

These algorithms have outperformed the best existing methods reported in scientific literature by a large margin. The research has been led by Prof Kapil Ahuja and his team at the Math of Data Science and Simulation (MODSS) Lab in the Department of Computer Science and Engineering (CSE) at IIT Indore. The team includes current PhD student Saurabh Saini, former postdoctoral candidate Dr Deepti Tamrakar and former PhD student Dr Aditya A Shastri.

THE LOGISTICS

For breast cancer detection, the team designed a novel Histogram of Oriented Texture (HOT) descriptor algorithm that analyzes fine texture patterns and their directional variations in mammogram images. Since cancerous tissues often distort these patterns, the algorithm can effectively distinguish between

healthy and affected tissues, even in cases of dense breast tissue.

In cervical cancer screening, where colposcopy images require evaluation of both detailed features such as color and edges and abstract features like shapes and structures, the researchers developed a deep learning model named Block-Fused Attention-Driven Adaptively-Pooled ResNet (BF-AD-APResNet). This approach captures both micro-level and high-level features simultaneously, enabling precise detection.

IIT Indore director Prof Suhas Joshi said, This research reflects the institute s commitment to developing technology-driven solutions for critical national healthcare challenges. The team also ensured that these AI systems clearly explain how they arrive at their decisions. This transparency has helped doctors understand and trust the results.

The models were tested on four international datasets and consistently achieved accuracy levels in the mid-to-late nineties, significantly surpassing existing methods.

Ahuja said, Our AI Algorithms have been trained on global datasets predominantly from patients with European ancestry. We are currently working on developing a prototype that would be trained (and subsequently used) on Indian patients. For this, we have teamed up with Dr Renu Dubey Sharma, a senior oncologist at HCG Cancer Hospital Indore. DRISHTI Cyber Physical Systems Foundation at IITI has provided funding for this Lab-to-Market initiative.

He added, We are planning to extend this approach to several other major cancers, including thyroid, lung, oral, colorectal, and esophageal cancers, which are among the top ten causes of cancer deaths in India.