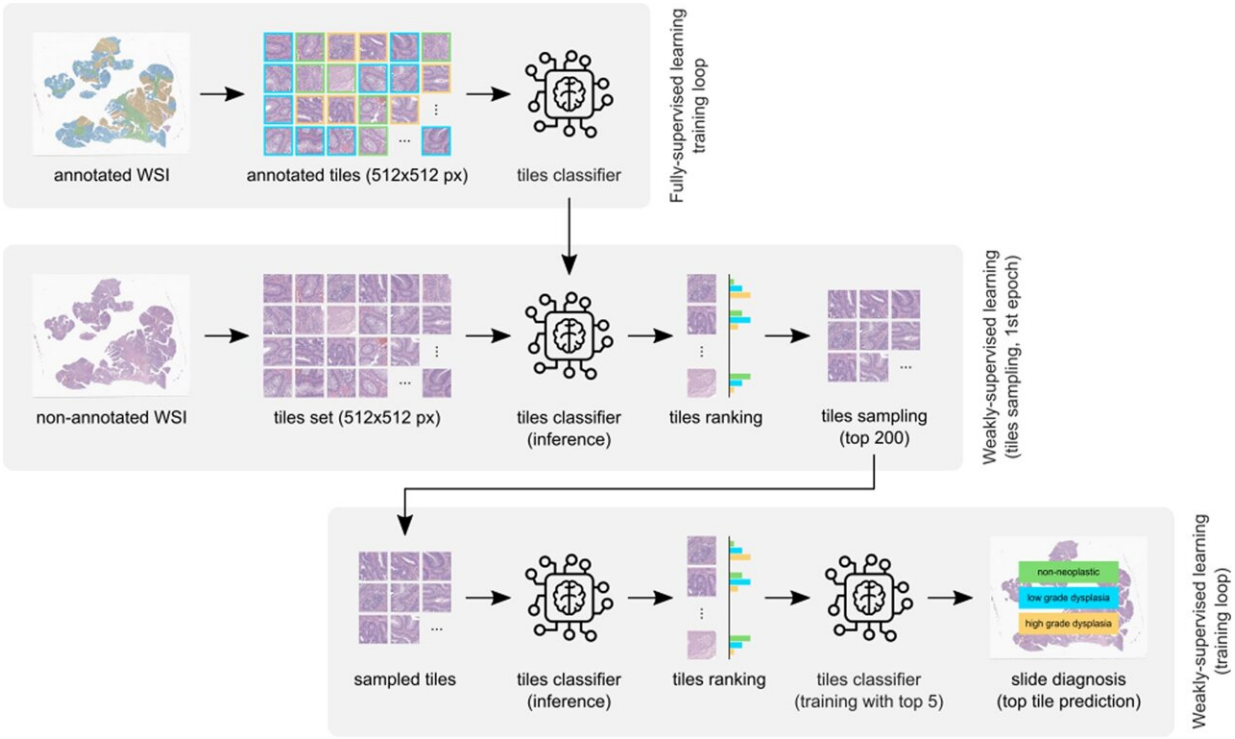
Portuguese researchers develop first prototype that applies AI to colorectal diagnosis

March 5 2024



Scheme for the proposed mixed precision workflow. Overall scheme of the proposed methodology containing the mix-supervision framework that is responsible for diagnosing colorectal samples from WSI. The top layer consists of the fully-supervised stage, the middle layer consists of the sampling strategy and the bottom layer represents the weakly supervised training stage. Credit: *npj Precision Oncology* (2024). DOI: 10.1038/s41698-024-00539-4

The first prototype that uses artificial intelligence for colorectal diagnosis has been developed by Portuguese researchers from the Institute for Systems and Computer Engineering, Technology and Science (INESC TEC), in Porto, and the IMP Diagnostics Molecular & Anatomic Pathology laboratory. The research is published in *npj Precision Oncology*.

This work focuses on improving a prototype that uses AI as a complementary tool to the diagnosis of colon and rectal biopsies, and the availability of the largest database of digital images of colorectal pathologies—which was made available today (March 5), with free access for the benefit of research and the advancement of knowledge in this area.

The researchers trained this new model using close to 10,000 images of tissues with colorectal pathology, thus achieving a diagnostic acuity of 93.44% and a sensitivity of 99.7% in the detection of high-risk lesions related to this type of cancer. More than half (5,300) of said images (close to 5 terabytes of data) are now available to the scientific community.

"The dissemination of digital images is part of the efforts of IMP Diagnostics and INESC TEC to promote science and the sharing of scientific knowledge, following the FAIR principles—a set of international guidelines that recommend that scientific data must be easily findable, accessible, interoperable and reusable," said Diana Montezuma Felizardo, pathologist at IMP Diagnostics.

Pedro Neto, researcher at INESC TEC, stated "Part of the images can be used to train other AI models, while the others will be used specifically for testing/benchmarking between AI tools—towards improving thoroughness and fairness when comparing said tools."

The prototype was developed based on a technical innovation, in which a new and more efficient training methodology was applied; it significantly reduces the number of images required to teach the AI model, without compromising its performance. These advances not only drive image analysis technology, but also contribute to the development of more effective solutions in the diagnosis of colorectal cancer.

More information: Pedro C. Neto et al, An interpretable machine learning system for colorectal cancer diagnosis from pathology slides, *npj Precision Oncology* (2024). DOI: 10.1038/s41698-024-00539-4

Provided by INESC Brussels HUB