New imaging information system could speed up prognosis for certain cancers

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Researchers at the University of Colorado Anschutz Medical Campus have found that a new imaging information system may ultimately provide a faster, more accurate prognosis for certain cancers.

The study will be presented September 18th at the Medical Image Computing and Computer-Assisted Intervention (MICCAI) conference and published in the proceedings of MICCAI 2022.

Oncologists have long used the Ki67 protein as a proliferation biomarker for human tumor cells. Yet the time, money and distribution method has challenged medical professionals.

Fuyong Xing, Ph.D., first author of the paper and an assistant professor in the department of biostatistics and informatics at the Colorado School of Public Health, is the principal investigator of the National Institutes of Health's (NIH) R21 Project.

The goal is to to develop a novel imaging information system that automates the process of scanning the Ki67 protein for gastrointestinal and pancreatic neuroendocrine tumors, eventually creating a Ki67 labeling index assessment method that can be shared between medical institutions around the world.

"The system will significantly improve the efficiency and objectivity of the biomarker computation, so that it can enable quick disease detection," said Xing. "This study (cell/nuclei detection) serves as the foundation of Ki67 labeling index assessment in our project, and it will provide a low-cost, efficient method for Ki67 scoring in different datasets."

Currently, oncologists often use "eyeball" estimation or manual counting of the number of these cells to determine the prognosis for patients with pancreatic, gastrointestinal and other cancers. The higher the Ki67 protein, the worse the prognosis.

Xing said the study is a key step in developing generalizable algorithms for the Ki67 labeling index assessment. It has also proven that the

imaging technology used shows significant improvement in the analysis.

"Compared with current 'eyeball' estimation and manual counting approaches to Ki67 assessment in clinical practice, this study holds a potential to significantly accelerate the procedure of Ki67 biomarker computation," Xing said. "In addition, it would release pathologists and researchers from daily, routine and tedious work so they can pay more attention to formulating high-level hypotheses and biological discovery."

Xing said the imaging informatics system could eventually serve as a place where results could be shared and accessed by medical facilities everywhere. Currently, there is no universal system for quantifying the labeling index in different datasets, which makes treatment more complicated for patients who are being seen at multiple medical facilities.

This part of the study looked at pancreatic[XF1] and gastrointestinal cancers. The index and imaging technology will continue to be tested in future studies to determine its long-term viability.

More information: Fuyong Xing et al, Low-Resource Adversarial Domain Adaptation for Cross-modality Nucleus Detection, *Medical Image Computing and Computer Assisted Intervention—MICCAI 2022* (2022). DOI: 10.1007/978-3-031-16449-1_61

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