micronuclAI: Automated quantification of micronuclei for assessment of chromosomal instability

Technology Offer

Ref. No.: 10-24

Category

Software, AI, Diagnosis

Keywords

Chromosomal instability, micronuclei

Development stage

Proof of concept

Seeking

The technology is available for out-licensing

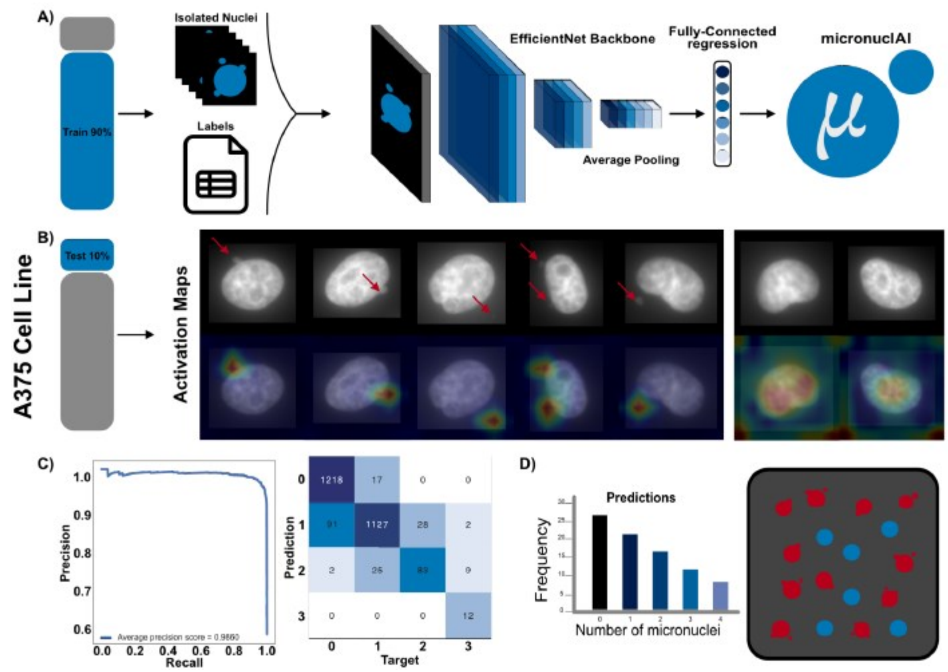

Figure 1: A) micronuclAI model was trained on the preprocessed and labeled isolated-nuclei from DAPI stained images of A375 cells. B) Activation maps show localized activation around MN in contrast to nuclei without CIN. C) With an average precision score of 0.9860 micronuclAI offers high accuracy for the detection of CIN. D) micronuclAI provides predictions for each detected nuclei and the location of such.

Background

Chromosomal instability (CIN) is a hallmark of cancer that drives metastasis, immune evasion and treatment resistance. CIN results from chromosome missegregation events during anaphase, and excessive chromatin is packaged in micronuclei (MN). Despite recent advancements in automations through computer vision and machine learning, the assessment of CIN remains a predominantly manual, time-consuming, and imprecise labour, which limits throughput and may result in interobserver variability.

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Technology

MicronuclAI, represents a novel pipeline for automated and reliable quantification of micronuclei of varying size, morphology and location from nuclei-stained images. The pipeline can be divided into 3 steps: 1) Segmentation, 2) nuclei isolation, and 3) quantification.

Benefits

- Enhances accuracy and reduces labour-intensive nature of CIN quantification

Applications

- micronuclAI is a robust tool for quantifying CIN across multiple contexts

Publications

- Ibarra-Arellano, M.A., Caprio, L.A., Hada, A. *et al.* micronuclAI enables automated quantification of micronuclei for assessment of chromosomal instability. *Commun Biol* **8**, 361 (2025). https://doi.org/10.1038/s42003-025-07796-4
- Tagore, S., Caprio, L., Amin, A.D. *et al.* Single-cell and spatial genomic landscape of non-small cell lung cancer brain metastases. *Nat Med* (2025). https://doi.org/10.1038/s41591-025-03530-z

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