Bi-weekly Seminar, every 2nd Friday at 2-3 pm PST, hosted by the University of California, Irvine, Department of Pathology & Laboratory Medicine, dedicated to everyone interested, artificial intelligence, pathology, medicine and beyond.

3D pathology + AI:
Towards enhanced patient prognostication

Friday, May 3rd, 2024 2-3 pm PST, Zoom: Please register Program

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Abstract: Human tissue, which is inherently three-dimensional (3D), is traditionally examined through standard-of-care histopathology as limited two-dimensional (2D) cross sections that can poorly represent the tissue due to sampling bias. To holistically characterize 3D histomorphology, 3D imaging modalities have been developed, but clinical translation is hampered by the complex and time-consuming requirements for manual evaluation, as well as the current lack of computational platforms to distill clinical insights from these large, high-resolution datasets. We present a deep learning model for processing tissue volumes and predicting patient outcomes with weak supervision. Recurrence risk-stratification models were trained with archived prostate cancer specimens imaged with open-top light-sheet microscopy or microcomputed tomography. By comprehensively capturing 3D morphologies, 3D block-based prognostication achieves superior performance to traditional 2D slice-based approaches, including existing clinical/histopathological baselines. Incorporating larger tissue volumes is shown to improve prognostic accuracy. This framework offers a promising direction for clinical decision support and 3D biomarker discovery, with the potential to further catalyze the growth of 3D spatial biology techniques for clinical applications.