SHIFT: predicting biomarker distribution in medical images through speedy histopathological-to-immunofluorescent translation

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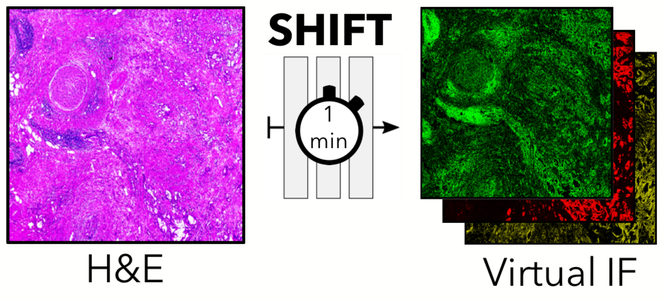
For pathologists in the diagnostic lab or the rural clinic, when time or resources are scarce, **SHIFT** enables **accurate** and **near real-time** biomarker prediction from images of hematoxylin and eosin-stained (H&E) tissue at a **fraction of the cost** of traditional immunofluorescence (IF).

Unmet Need

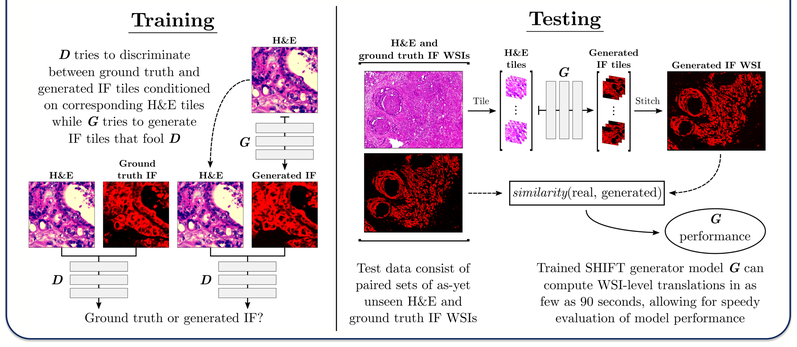
- Cancer incidence ↑, pathologist workforce ↓
- Multiplex imaging costs **time** and **$$$**
- **Deep learning** can help save **time**, **$$$** and **democratize** access to multiplex imaging

Research Overview

- Powered by state-of-the-art **deep learning** models, **SHIFT** predicts biomarker distribution based on low-cost and highly-standardized H&E imaging.

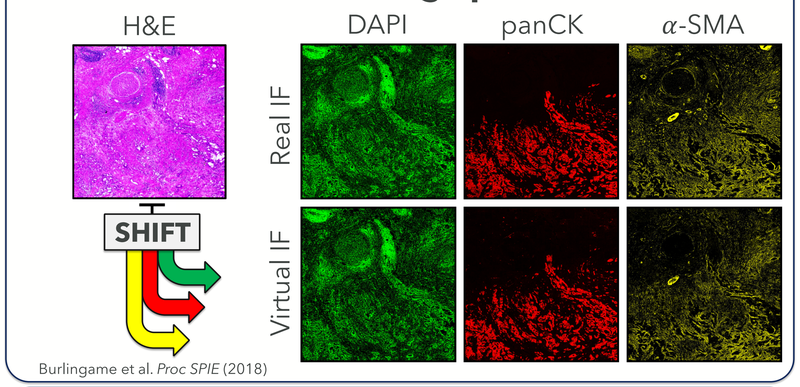


Technical overview of SHIFT modeling



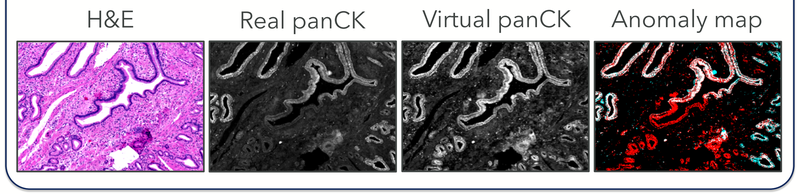
Key Results & Applications

Whole slide image prediction

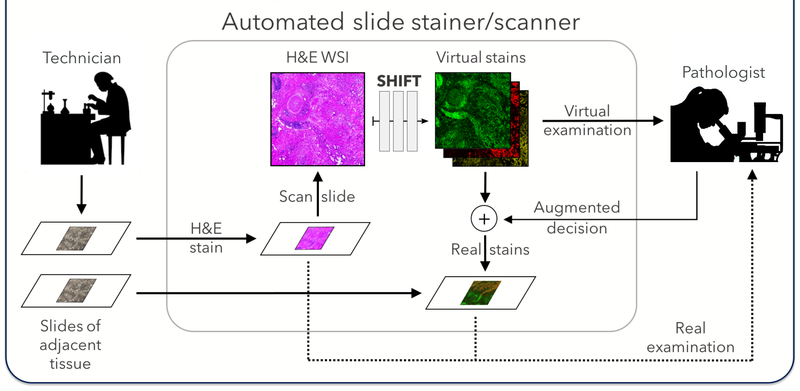


Burlingame et al. *Proc SPIE* (2018)

Stain QC and anomaly detection

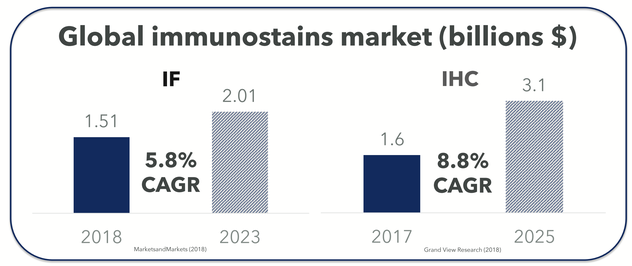


Prioritizing stains in the diagnostic lab



Commercial Potential

- **~17,000** diagnostic labs in the US today
- Market from Mayo Clinic's Immunostains Lab **alone** estimated at **$30 million/year**



- **SHIFT** is novel, patentable, and enabled
- Provisional application filed at end of 2018

Art	Biomarker prediction	Histopathological validation
in silico labeling (Google)	✓	✗
TissueMark (Philips)	✗	✓
SHIFT (ours)	✓	✓

Ongoing R&D

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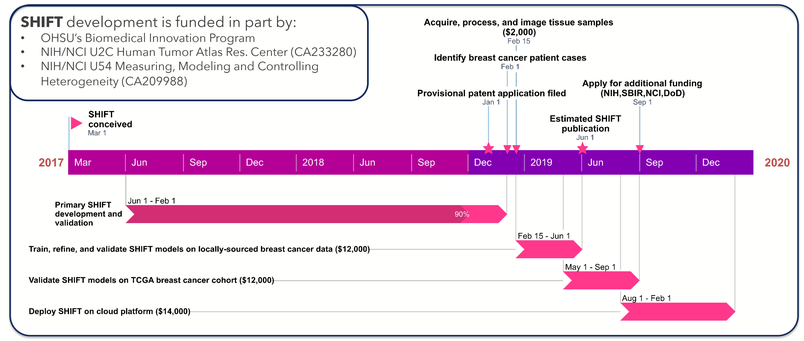
- NIH/NCI U54 Measuring, Modeling and Controlling Heterogeneity (CA209988)



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