Docket #: S19-118

Deep Learning Application of Optical Coherence Tomography for Non-Invasive Cancer Diagnosis

Stanford researchers at the de la Zerda Lab have developed an innovative alignment methodology using Optical Coherence Tomography (OCT) in conjunction with histopathology to diagnose cancer or determine tumor margins. High resolution alignment of OCT volumes and histology sections provides histological information alongside OCT structural and temporal information. This invention provides for the first time, a machine learning approach to directly predict histological images from a given OCT image, producing non-invasive histology-like images with high accuracy and interpretability.

The inventors are currently developing a robust AI dataset to predict histological images from an OCT image. Applying deep learning to transform difficult-to-read OCT images into Hematoxylin and Eosin (H&E) images, will enable fast, non-invasive diagnostics.
Augmenting capabilities of OCT-based diagnosis through machine learning has the potential to replace the traditional biopsy and can fundamentally improve the cosmetics, speed, and accuracy of diagnosis in multiple types of cancers.

Figure

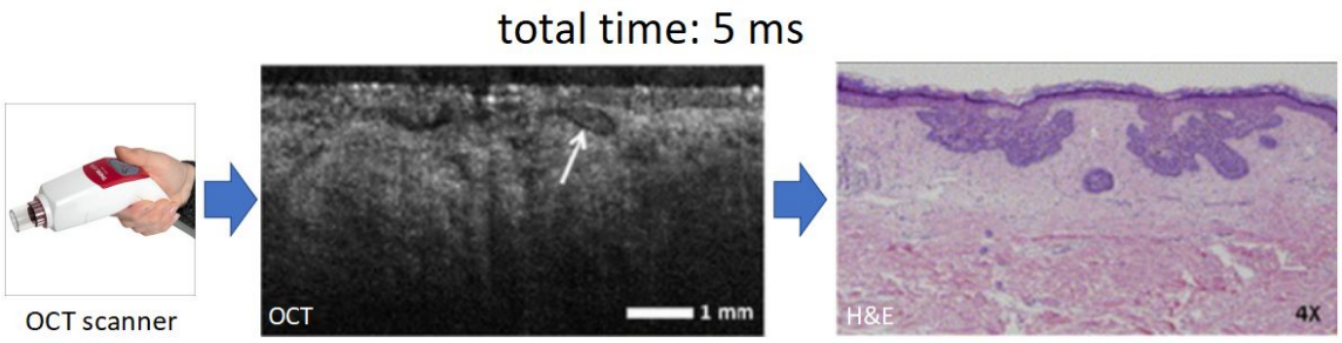

Figure description - Vision of Project:OCT images of skin abnormalities are taken non-invasively and transformed in real time by a neural network to a histology-like image. The epithelium and BCC nodules are clearly visible in the OCT image, but difficult to interpret for a pathologist who does not have extensive experience viewing OCT images of different skin conditions.

Stage of Development

- Prototype demonstrated

Applications

- **Research:**
  - Using machine learning, transform difficult-to-read OCT images into Hematoxylin and Eosin (H&E) images, the standard method for interpretation
  - Non-invasive in-vivo longitudinal imaging
- **Clinical cancer diagnostics** after further development

Advantages

- **Non-invasive**
- **Higher accuracy** - about 25-50X current standards (accuracy of about 10-20 microns vs. 500 microns currently)
- **Leverages AI,** enabling easier interpretation of OCT images
- **OCT also provides:**
  - 10-20X Resolution
  - 3D volume
  - Large scan area
- **New platform** for solid cancer diagnostics

Innovators

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