PURDUE INNOVATES | Office of Technology Commercialization

High-Throughput Mass Spectrometry Imaging with Dynamic Sparse Sampling

A deep learning algorithm enhances mass spectrometry imaging by prioritizing molecularly informative tissues, significantly reducing data acquisition time and accelerating molecular insights.

Researchers at Purdue University have developed a method for mass spectrometry imaging that utilizes an artificial intelligence algorithm to prioritize and extract results from the most molecularly informative tissues. This Deep Learning Approach for Dynamic Sampling (DLADS) reduces the number of measurements needed and reconstructs molecular images with high fidelity. While others in mass spectrometry imaging have focused on improving spatial resolution, this approach continues to actively learn based on known/existing data, resulting in less overall experimental time.

Technology Validation: When DLADS was paired with nanospray desorption electrospray ionization (nano-DESI) MSI, the data acquisition time reduced by a factor of 3. DLADS also effectively reconstructed mouse kidney images, after training with mouse uterine images.

Advantages:

- Less experimental time

- Deeper data insights

Applications:

- Molecular imaging

- Artificial intelligence

TRL: 4

Intellectual Property:

Technology ID

2022-LASK-69833

Category

Artificial Intelligence & Machine Learning/Computer Vision & Image Recognition

Artificial Intelligence & Machine Learning/AI-Integrated Imaging Systems & Industrial Vision and Inspection

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Authors

David Steven Helminiak

Hang Hu

Julia Laskin

Dong Ye

Further information

Dipak Narula

dnarula@prf.org

View online

Provisional-Patent, 2022-06-08, United States | PCT-Patent, 2023-06-03, WO | NATL-Patent, 2024-11-09, United States

Keywords: mass spectrometry imaging, artificial intelligence algorithm, molecularly informative tissues, Deep Learning Approach for Dynamic Sampling, DLADS, data acquisition time reduced, molecular imaging, nanospray desorption electrospray ionization, nano-DESI MSI, deeper data insights, Biotechnology, Computer Technology, Deep Learning Models, Entropy Reduction, Mass Spectrometry