Deep Learning-Based Point Scanning Super-Resolution Imaging

INVENTION: Investigators at Salk have developed a deep learning method to train software to reconstruct higher resolution images from lower resolution images, effectively increasing pixel resolution by a factor of 16x while reducing radiation dose by a similar factor of 16x. Their methodology ensures a robust ability for AI to handle novel data by training the AI on a large range of images with different features, and uses a strategy wherein one representative image of the novel dataset (e.g. a time-series, or multiple images of related structures acquired similarly) is acquired with full resolution to enhance reconstruction performance on the remaining images in the dataset. Unlike conventional compressed sensing systems, this approach allows faster imaging with lower laser dose and same resolution as slower higher-powered systems, but with a normal microscope without any customizations, minimal computational costs, and minimal systematic artifacts. This will improve any point-scanning imaging system including confocal microscopes and scanning electron microscopes. This method could also be used to improve resolution of live imaging, and adapted for use with non-microscope instrument platforms such as MRI, PET, CAT, and X-ray.

ADVANTAGES:

- Increases the spatiotemporal resolution of point scanning imaging systems to previously unattainable levels due to limitations imposed by sample damage or imaging speed
- Improve resolution of live imaging
- Adaptable to microscope and non-microscope instrumental platforms
- Minimal computational costs and systematic artifacts

INVENTORS: Uri Manor and Linjing Fang
https://www.salk.edu/scientist/uri-manor/

PATENT STATUS: Patent pending

PUBLICATIONS: https://www.biorxiv.org/content/10.1101/740548v2

CONTACT: Ha Nguyen, Ph.D., 858.453.4100 x1612, hnguyen@salk.edu

TECHNOLOGY ID: S2019-002