Department of Biomedical Engineering
香港城市大學
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Research Student Seminar Series

Photoacoustic images enhancement using deep self-supervised network

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Supervisor: Prof. Lidai Wang

Date: 29 November 2024
Time: 9:00 am - 9:30 am
Venue: ZOOM Online

Abstract

As a high-resolution biomedical imaging technology, photoacoustic imaging is employed for the non-invasive detection of a wide variety of chromophores across multiple scales and depths. However, the signal-to-noise ratio of photoacoustic images may be undermined due to low chromophore concentration, weak signals in deep tissue, or diverse types of noises. Although hardware advancements have been made to tackle this issue, they have not been easily accessible. Conventional computational methods are limited by either extra data acquisition or slow computational speed. Deep neural network models have showed promising performance but require a large number of ground truth data for training. Here, we introduce a deep learning method to enhance the sensitivity of photoacoustic imaging using solely noisy data. Our method has the following innovations. First, since our method does not need any ground truth data for training, it can be readily implemented across scanning microscopic and computed tomographic data acquired with various photoacoustic imaging systems. Second, our method renders the vascular details that were previously completely submerged in noise clearly visible, increases the signal-to-noise ratio by up to 12 times and doubles the imaging depth. Third, by using our method, we achieve high-resolution anatomical and functional imaging, deep tumor imaging at extremely low laser energy. We are of the belief that this method can be readily applied to a multitude of preclinical and clinical applications.

Biography

Xu Tang is now pursuing a Ph.D. degree in Prof. Lidai Wang's group with the Department of Biomedical Engineering, City University of Hong Kong. His research interests include photoacoustic imaging and artificial Intelligence algorithms.

ALL are Welcome!