Computer Science
Defense

Medical Image Analysis with Deep learning under Limited Supervision

Xiaoyuan Guo
Emory University

Abstract: Medical imaging plays a significant role in different clinical applications such as detection, monitoring, diagnosis, and treatment evaluation of various clinical conditions. Deep learning approach for medical image analysis emerged as a fast-growing research field and has been widely used to facilitate challenging image analysis tasks, for example, detecting the presence or absence of a particular abnormality, diagnosis of a particular tumor subtype. However, one important requisite is the large amount of annotated data for supervised training, which is often lacking in medicine due to the expensive and time-consuming expert-driven data curation process. Data insufficiency in medical images is also limited by healthcare data privacy requirements, which leads to barriers in the usage of deep learning methods across institutions.
This thesis focuses on facilitating the applications of deep learning approaches to solve automatic medical image analysis tasks efficiently under limited supervision. Three situations are in consideration: (1) no annotated data; (2) limited annotated data; (3) curation of additional annotated data with minimal human supervision. The research covers multiple medical image modalities starting from fluorescence microscopy images (FMI), histopathological microscopy images (HMI) to mammogram images (MG), computed tomography (CT), chest radiographs (X-ray). The researched tasks are diverse including image segmentation, Out-of-Distribution (OOD) identification and medical image retrieval. The diversity and concreteness of the thesis can be a guide to facilitate the efficient usage of deep learning approaches in future medical image analysis with minimal cost.

Wednesday, October 12, 2022, 12:00 pm
https://emory.zoom.us/j/99340675915?pwd=cmhjRS9EUGovWjhTenZ6VDlaM1YzZz09

Computer Science
Emory University