"Deep learning based medical image analysis"
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Medical imaging plays an essential role in the detection and diagnosis of numerous diseases. There has been a variety of research in computer-aided diagnosis of medical images to improve diagnostic efficiency and ensure high accuracy. The medical images containing huge amounts of physiological information are exactly what the data-hungry deep learning paradigms need to build valuable intelligent auxiliary systems. Applying deep learning methods to medical image analysis is very promising. However, the main limitations that stall the further advancement of deep learning medical image analysis lie in the lack of large-scale medical image datasets and the class imbalance problem. Through the collaboration with the E-Da Hospital, I-Shou University, Taiwan, this project aims to analyze different types of medical imaging and use them for the application of image classification and object detection and segmentation. The state-of-the-art deep learning approaches along with techniques to overcome the problems of small sample sizes and class imbalance will be studied and applied in the project. This project will also compare the performance of various deep learning, multivariate statistical and machine learning methods, hoping to understand the pros and cons of different methods and to combine/modify them for better new approaches in analyzing medical images.

Keywords: class imbalance; deep learning; image augmentation; image classification; medical image; medical object detection; transfer learning