

“Deep learning models for common disease detection and localization in chest X-ray images”

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Chest X-ray (CXR) images are widely used in the diagnosis of various respiratory and cardiovascular diseases. However, traditional manual identification methods are subjective and labor-intensive, leading to poor generalization performance and detection accuracy. In this project, we propose deep learning-based object detection approaches to automatically mark abnormal parts in CXR images and annotate possible chest diseases reflected by the abnormal parts. We will use CXR images with disease labels and location bounding boxes provided by the E-Da hospital for model building. Conventional deep learning-based object detectors depend on large supervised object detection datasets, which have over hundreds and thousands of annotated examples per object category and dense labeling of bounding boxes/masks for each object. However, labeling medical image data is expensive and time-consuming. Moreover, our CXR object detection faces challenges, as several disease categories have minimal training examples. To overcome these challenges, we will explore and apply few-shot object detection methods and self-supervised learning approaches in the project. The aim is to compare the performance of various deep learning methods, comprehending their strengths and weaknesses. Ultimately, we strive to integrate and adapt these methods to create an efficient and reliable solution for automating the annotation of chest diseases in CXR images.

Keywords: chest X-ray image, deep learning, few-shot object detection, self-supervised learning