

DISTINGUISHING NON-TUBERCULOUS MYCOBACTERIA LUNG DISEASE AND TUBERCULOSIS USING DEEP LEARNING

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ABSTRACT

As the development of technologies in classifying non-tuberculous mycobacteria (NTM) lung disease from tuberculosis (TB), the rate of NTM in the entire lung disease increases gradually. However, the same kinds of abnormal lesions in TB and NTM such as atelectasis, cavities, and nodules make it difficult to distinguish between them in the early diagnosis. In this study, we propose a model that can aid the diagnosis of TB and NTM lung diseases by using deep learning techniques on chest X-ray images which is widely utilized. To find the best model, we conduct experiments on several Convolutional neural networks (CNNs) including DenseNet 201, ResNet 50, EfficientNet B4, EfficientNet B5 with or without transfer learning. The model, EfficientNet B4 with transfer learning pre-trained on Noisy Student, is chosen and the optimizer is adopted as Stochastic Gradient Descent (SGD) with a momentum value of 0.9 and the initial learning rate is 0.005. Our model classifies Normal, TB, and NTM lung disease with the highest accuracy 0.92 and the average accuracy 0.87 in 10-fold cross verification. Furthermore, it detects the localization of lesions in existing research levels.