

ABSTRACT

A chest radiograph, called a chest X-ray (CXR), or chest film, is a projection radiograph of the chest used to diagnose conditions affecting the chest, its contents, and nearby structures. The CXR dataset that is used in this system consists of details about 15 diseases. This project is implemented on the VinDr-CXR dataset and Shenzhen dataset, in which the former comprises of 18,000 X-Ray images with 14 different disease labels which was released in the year 2020 and the latter comprises of 660 X-Ray images for Tuberculosis classification. This system is defined to automatically detect 15 different types of thoracic lung diseases namely Aortic enlargement, Atelectasis, Calcification, Cardiomegaly, Consolidation, ILD(Interstitial Lung Disease), Infiltration, Lung Opacity, Nodule/Mass, Other lesion, Pleural effusion, Pleural thickening, Pneumothorax, Pulmonary fibrosis and Pulmonary Tuberculosis from CXR's by applying traditional deep convolutional neural network models. This system uses MobileNet, a 53- layer convolutional neural network that inputs a chest X-ray image and outputs the probability of various diseases. Here, MobileNet is extended to detect all 15 diseases in VinDr-CXR dataset and Shenzhen dataset, and achieve state of the art results on all 15 diseases. This system also proposes an explainable method aimed to automatically detect the areas of interest in the chest X-ray, symptomatic of these thoracic lung diseases. LIME algorithm is used in this system to explain the model's predictions. This automated system could accurately identify and localize findings on chest radiographs which would relieve the stress of busy doctors while also providing patients with a more accurate diagnosis which can be considered as a valuable second opinion for radiologists.

KEYWORDS:

Chest X-Rays (CXR's), Thoracic diseases, Deep convolutional neural network, MobileNet, LIME algorithm.