MULTIMODAL DEEP LEARNING FRAMEWORK FOR MEDICAL DIAGNOSIS

ABSTRACT

Lung conditions, such as pneumonia, tuberculosis, COVID-19, are major causes of health hazards, endangering millions of individuals.This is causing serious sickness if diagnosed late or left untreated. Proper diagnosis at the right time is needed in preventing these risks. The conventional diagnostic methods normally depend on chest X-ray examination or analysis of clinical reports by doctors, which are time-consuming and may have some inaccuracies. In areas with limited availability of experienced doctors, this leads to delayed diagnosis or misdiagnosis.This scenario not only affects patients, but also clinicians and doctors, who need quick advice to analyse various cases efficiently. Although many advancements have been made in this area,majority of studies have been based on single modal structures which have either read chest X-ray images or process textual reports to predict diseases. While these works have shown success, they do not include the extra information like combination of both visual and textual data.While keeping all these disadvantages in mind, our team proposes a system for lung disease detection by combining chest X-ray images and related clinical reports simultaneously. This system combines convolutional neural networks to extract the visual features from X-rays, and natural language processing models interpret and analyse the text reports from the same patient to obtain relevant context.This combination of the two results in a more complete picture of patient health and higher predictive accuracy. Aside from its technical architecture, the system also focuses on a user-friendly interface. For patients, the system offers easily understandable risk estimates, helping them to make decisions. For doctors, the system provides detailed outputs such as graphs. Overall, this work demonstrates the potential of combining artificial intelligence, multimodal data fusion, and human-centered design to create a practical, impactful tool for lung disease detection that can benefit both medical professionals and patients.This is ultimately contributing to faster diagnosis, improved patient outcomes, and more efficient healthcare delivery.

Keywords: Multimodal Diagnosis; Lung Disease Detection; X-ray Analysis; NLP

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