



AI-Based Cough Sound Analysis System for Preliminary Respiratory Disease Screening.
(Cough Sense AI)

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Abstract

Respiratory diseases are among the leading causes of illness and mortality worldwide, making early screening essential for timely medical intervention. This study presents Cough Sense AI, an artificial intelligence-based cough sound analysis system developed for the preliminary screening of respiratory diseases. The proposed system employs Mel-Frequency Cepstral Coefficients (MFCCs) to extract acoustic features from cough recordings and utilizes a Convolutional Neural Network (CNN) for disease classification. Three CNN architectures, including a standard CNN, CNN with Dropout, and CNN with Global Average Pooling, were evaluated to determine the optimal model. Experimental results demonstrated that the CNN with Global Average Pooling architecture achieved the best performance, with an Accuracy of 83.22% and an F1-score of 79.71%, while showing strong classification performance for Healthy, Asthma, and Chronic Obstructive Pulmonary Disease (COPD). A web-based application was also developed, allowing users to upload or record cough sounds and receive real-time screening results together with a confidence score through an intuitive interface compatible with desktop and mobile devices. The proposed system provides a low-cost, non-invasive, and accessible approach to preliminary respiratory disease screening without requiring specialized medical equipment. Although it is intended as a screening tool rather than a clinical diagnostic system, the results demonstrate the potential of AI-assisted cough sound analysis to support early respiratory disease detection and improve access to healthcare, particularly in resource-limited communities.

keywords : Cough Sound Analysis, Respiratory Disease Screening, Mel Frequency Cepstral Coefficients, Convolutional Neural Network, Decision Support System