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Pulmonary Disease Identification Using Machine Learning and Deep Learning Techniques

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Abstract : Early detection and accurate diagnosis of lung diseases play a crucial role in improving patient prognosis. However, conventional diagnostic methods heavily rely on subjective symptom assessments and medical imaging, often causing delays in diagnosis and treatment. To overcome this challenge, we propose a novel lung disease prediction system that integrates patient symptoms and X-ray images to provide a comprehensive and reliable diagnosis.In this project, develop a mobile application specifically designed for detecting lung diseases. Our application leverages both patient symptoms and X-ray images to facilitate diagnosis. By combining these two sources of information, our application delivers a more accurate and comprehensive assessment of the patient's condition, minimizing the risk of misdiagnosis. Our primary aim is to create a user-friendly and accessible tool, particularly important given the current circumstances where many patients face limitations in visiting healthcare facilities. To achieve this, we employ several state-of-the-art algorithms. Firstly, the Decision Tree algorithm is utilized for efficient symptom-based classification. It analyzes patient symptoms and creates a tree-like model to predict the presence of specific lung diseases. Secondly, we employ the Random Forest algorithm, which enhances predictive power by aggregating multiple decision trees. This ensemble technique improves the accuracy and robustness of the diagnosis. Furthermore, we incorporate a deep learning model using Convolutional Neural Network (CNN) with the RestNet50 pre-trained model. CNNs are well-suited for image analysis and feature extraction. By training CNN on a large dataset of X-ray images, it learns to identify patterns and features indicative of lung diseases. The RestNet50 architecture, known for its excellent performance in image recognition tasks, enhances the efficiency and accuracy of our deep learning model. By combining the outputs of the decision tree-based algorithms and the deep learning model, our mobile application generates a comprehensive lung disease prediction. The application provides users with an intuitive interface to input their symptoms and upload X-ray images for analysis. The prediction generated by the system offers valuable insights into the likelihood of various lung diseases, enabling individuals to take appropriate actions and seek timely medical attention. Our proposed mobile application has significant potential to address the rising prevalence of lung diseases, particularly among young individuals with smoking addictions. By providing a quick and user-friendly approach to assessing lung health, our application empowers individuals to monitor their well-being conveniently. This solution also offers immense value in the context of limited access to healthcare facilities, enabling timely detection and intervention. In conclusion, our research presents a comprehensive lung disease prediction system that combines patient symptoms and X-ray images using advanced algorithms. By developing a mobile application, we provide an accessible tool for individuals to assess their lung health conveniently. This solution has the potential to make a significant impact on the early detection and management of lung diseases, benefiting both patients and healthcare providers.

Keywords : CNN, random forest, decision tree, machine learning, deep learning
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