Fuzzy Systems and Soft Computing
ISSN : 1819-4362

LUNG DISEASE DETECTION SYSTEM

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Abstract
Lung disease can be considered as a major health problem in people's life. A pneumothoraxis an impulsive life-threatening emergency caused by a collapsed lung. It is usually detected on a chest X-ray. Treatment depends on a timely review of X-rays. A chest x-ray (chest x-ray) is currently an effective, inexpensive and widely used medical imaging test. Radiologists made diagnoses mainly manually, without automatichelp. The proposed system would significantly improve the efficiency of radiologists, as their knowledge is used in the analysis of chest X-rays. This method uses a deep learning approach to predict pneumothorax lung disease based on chest X-rays. The input is receivedas a chest x-ray image and after preprocessing it is fed into a convolutional neural network model for disease prediction. The problem can be presented as a binary classificationproblem where the output is either pneumothorax or normal. The training model is \raw from a chest x-ray image containing 5856 chest x-rays. Keras andTensorflow are implementers.

I. INTRODUCTION

Chest X-ray gives a black and white picture of the organs in the chest. Tissues such as the lungs, which are composed of air, appear black, and bones, such as dense tissue, absorb X-rays, which appear white in the images. Gray appears as tissues. Some of the diseases diagnosed by chest X-ray are heart disease, pneumothorax, bronchitis, fractures, etc. Among them, pleurothorax is one critical condition that requires timely notification and immediate action. The presence of air in the pleural space causes a pneumothorax. The three clinical types are closed, open and tension pneumothorax. About 9% occur each year and are most common in tall, thin men between the ages of 20 and 40. One reason is smoking. radiologists detect a pneumothorax on a chest x-ray by checking the acre border of a collapsed lung. Figure 1.1 illustrates normal and pneumothorax images. A chest x-ray shows visible lung rim and no pulmonary signs peripherally. When X-rays are used, pneumothorax can be misclassified as other diseases, because pneumothorax appears curved and smooth areas against the chest wall appear dark. If not diagnosed and treated in time, it can lead to death. Early detection is critical and can occur secondary to injury or chest trauma or spontaneously or secondary to.ticket and pay whereas entering to the lobby. Digitalization is one of the foremost amazing results of innovation. It has given simple accessibly of all the resources available. Sitting around idly within the lines of motion picture theater has been ruled out due to online framework. Too, surveys can be effortlessly read online so that client can get a clearcut picture almost the motion picture. Online installment has too expanded E-Banking.

II. LITERATURE REVIEW

The literature on lung detection and classification using deep learning techniques shows significant progress in recent years. Ardila et al. (2019) demonstrated the effectiveness of comprehensive lung cancer screening using three-dimensional deep learning in low-dose chest computed tomography, highlighting the potential for early detection and diagnosis. Anthimopoulos et al. (2016) proposed a deep convolutional neural network (CNN) for lung pattern classification in interstitial lung diseases, which showed promising results in automated disease classification. Similarly, Lakhani and Sundaram (2017) used CNNs to automatically classify pulmonary tuberculosis based on lung X-ray images, illustrating the utility of deep learning in detecting infectious lung diseases. Litjens et al. (2017) conducted a comprehensive study on deep learning in medical image analysis, which summarized the latest techniques and applications in various medical imaging methods. In addition, publicly available datasets such as the Chest X-ray dataset (National Institutes of Health, 2021) and the Data Science Bowl 2017 dataset (National Institutes of Health, 2017) have facilitated the research and development of lung detection by providing comprehensive coverage. . annotated data for model training and evaluation. Together, these studies contribute to the growing knowledge of deep learning-based approaches to lung detection and provide insight into potential applications and challenges in this field..

III. PROPOSED SYSTEM

The proposed system aims to use deep learning techniques to develop an automatic lung detection and classification system that will provide significant advances in the field of medical image analysis. By integrating state-of-the-art Convolutional Neural Networks (CNN) with innovative methods, the system aims to improve the accuracy, efficiency and reliability of lung anomaly detection from lung X-ray and CT images.The core of the proposed system is a robust CNN architecture specifically designed for lung detection. The architecture includes multiple convolution and pooling layers that allow the model to extract hierarchical features from input images at different scales. In addition, the inclusion of residual links and stroke normalization techniques help reduce problems with vanishing gradients and speed up convergence during training. The proposed system aims to optimize model performance and generalization across different datasets and imaging modalities through extensive testing and hyperparameter tuning.One of the main aspects of the proposed system is its focus on real-time detection and classification of various lung abnormalities such as nodules, tumors, infiltrates and other pathological findings. Using large-scale annotated data sets and advanced data augmentation techniques, the system aims to improve the robustness and reliability of anomaly detection, thereby improving diagnostic accuracy and facilitating early intervention in clinical practice.In addition, the proposed system offers a user-friendly interface and seamless integration with existing healthcare systems, enabling easy implementation and deployment in clinical settings. Healthcare professionals can use the system as a decision aid to help them make accurate diagnoses and treatment plans based on the analysis of lung images. In addition, the system can be implemented in telemedicine platforms to provide remote diagnostic support, especially in underserved areas with limited access to health services.In summary, the proposed system represents a major advance in the field of medical imaging and provides a comprehensive solution for automatic lung detection and classification. With its innovative architecture, real-time capabilities and seamless integration, the system holds great promise for improving patient outcomes and transforming respiratory healthcare practices..

IV. DESIGN AND IMPLEMENTATION

The design and implementation of an automated lung detection and classification system has several key components and methods to achieve reliability, efficiency and scalability. At the heart of the system is a deep learning architecture specifically tailored to detect lung abnormalities from medical images such as chest X-rays or CT scans.The design phase begins with the selection and preprocessing of a diverse and representative dataset containing annotated lung images. This dataset is the basis for the training and evaluation of the deep learning model. Various preprocessing techniques, including resizing, normalization, and upscaling, are used to improve the quality and diversity of the dataset, ensuring optimal model performance under different imaging conditions and patient populations.Next, a suitable deep learning architecture is designed, taking into account the complexity of lung image analysis and the requirements of real clinical applications. The architecture typically consists of several layers of convolution and aggregation, followed by fully connected layers for classification. Residual connections, stroke normalization, and discontinuity correction can be added to improve model stability, convergence, and generalization.In the implementation phase, the proposed architecture is implemented using a deep learning framework such as TensorFlow or PyTorch. The dataset is divided into a training, validation, and test set, and the model is trained using gradient-based optimization algorithms such as stochastic gradient descent (SGD) or Adam. Hyperparameters, including learning rate, set size, and regularization strength, are refined by testing the validation set to optimize model performance and avoid overfitting.After the model is trained, it is evaluated on an extended test set using standard metrics such as accuracy, precision, recall, and F1 score. Performance analysis and visualization techniques are used to understand model behavior and identify areas for improvement.Finally, the trained model is implemented in real clinical settings, integrated into existing health systems, or available through telemedicine platforms. User interfaces and APIs have been developed to facilitate seamless interaction with the system, enabling healthcare professionals to download and analyze lung images, obtain automated diagnoses and make informed treatment decisions.In summary, the development and implementation of an automated lung detection and classification system uses a systematic approach that includes dataset preparation, model design, training, evaluation, and deployment. Through careful design choices and rigorous implementation, the system aims to provide accurate, efficient and accessible solutions for lung anomaly detection in clinical practice..

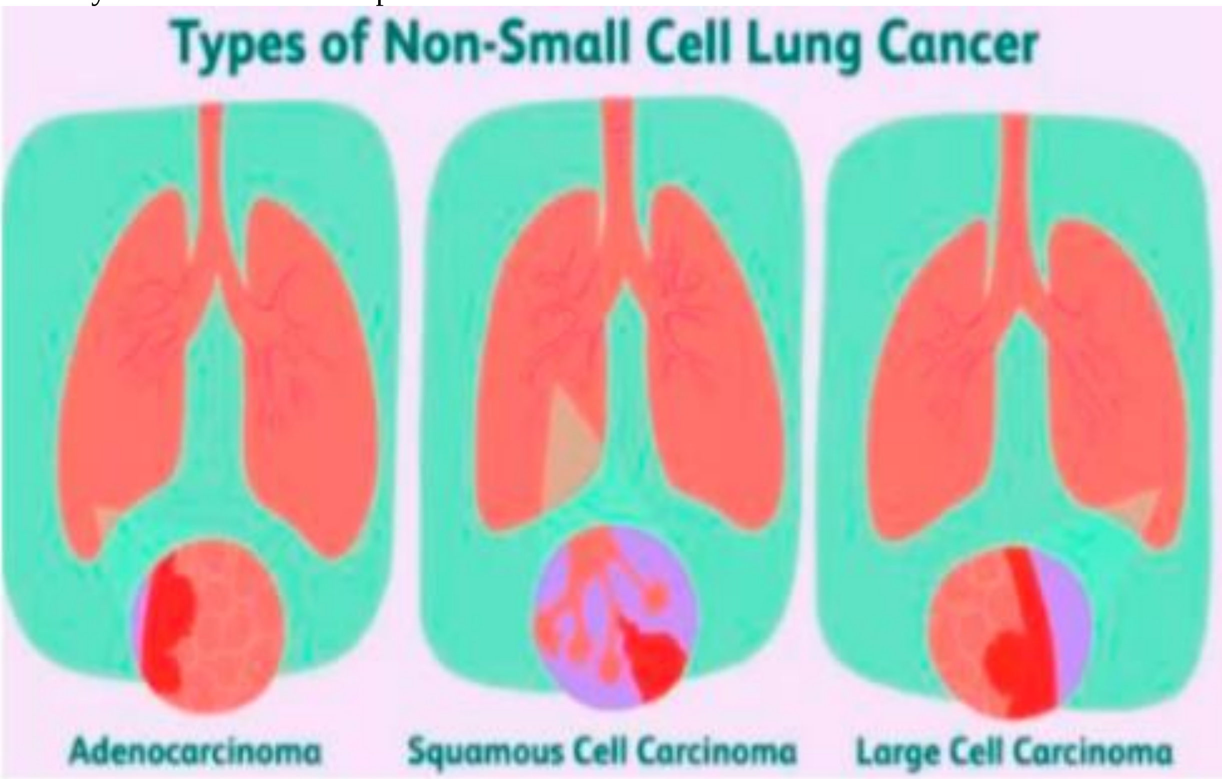
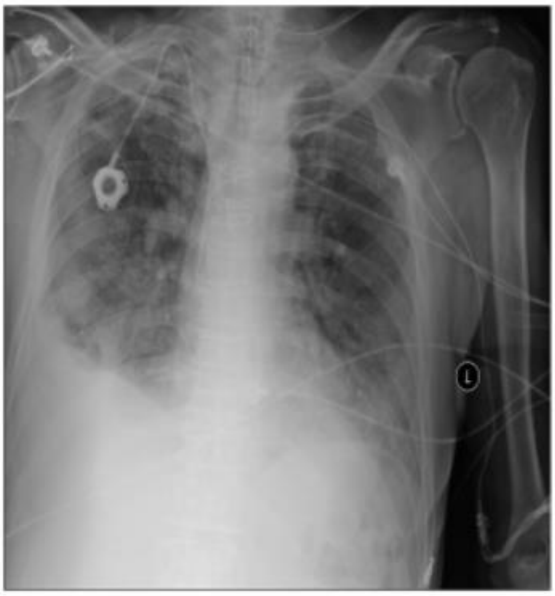
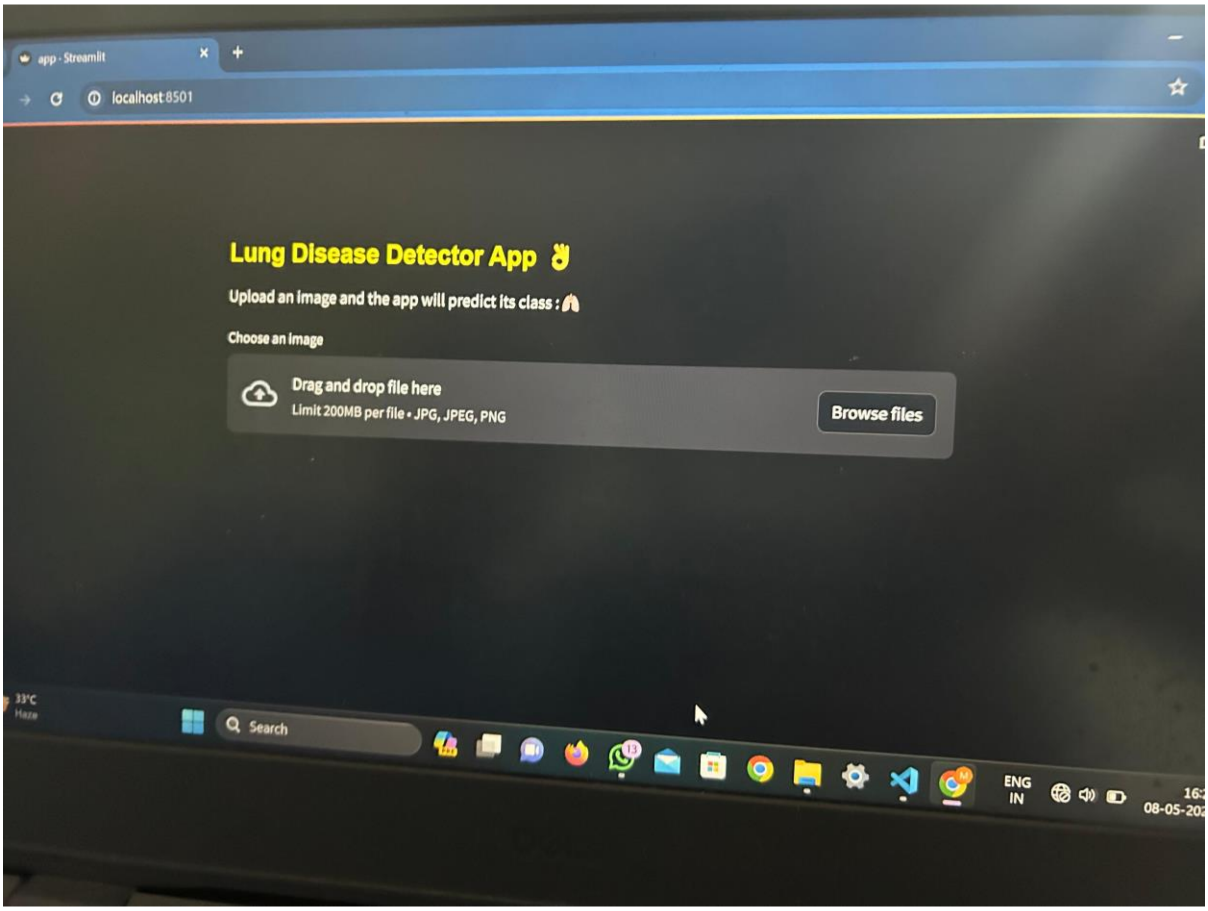


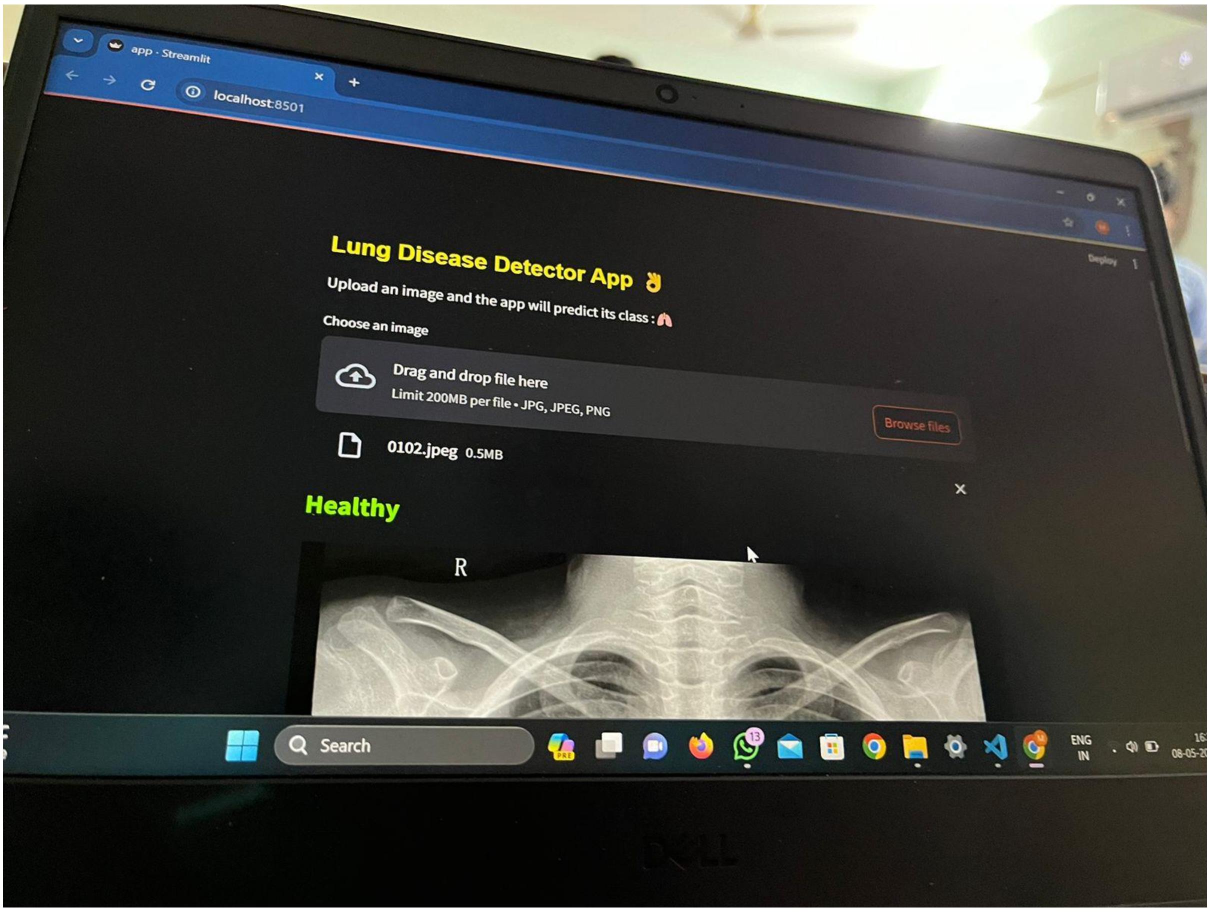
Fig: Stages of Lung cancer



V. DESIGN AND SCREENSHOT



Screenshot: 1



Screenshot: 2

VI. SCOPE AND FEATURES

The scope of the automated lung detection and classification system encompasses a wide range of applications within the field of medical imaging and healthcare. Its primary objective is to assist healthcare professionals in the early detection, diagnosis, and management of various lung abnormalities, including nodules, tumors, infiltrates, and other pathological findings. The system aims to streamline the diagnostic process, improve diagnostic accuracy, and enhance patient outcomes through timely intervention and treatment planning.

Key features of the system include:

[1] Automated Detection: The system employs deep learning techniques to automatically detect and classify lung abnormalities from medical images, reducing the reliance on manual interpretation and accelerating the diagnostic process.

[2] Real-time Analysis: The system offers real-time analysis of lung images, enabling rapid diagnosis and treatment decision-making in clinical settings.

[3] User-friendly Interface: The system provides a user-friendly interface for healthcare professionals to upload, analyze, and interpret lung images, facilitating seamless integration into existing clinical workflows.

[4] Integration with Healthcare Systems: The system can be integrated into electronic health record systems and telemedicine platforms, allowing for easy access and sharing of diagnostic results among healthcare providers.

[5] Scalability and Adaptability: The system is designed to be scalable and adaptable to different imaging modalities, patient populations, and clinical scenarios, ensuring its relevance and effectiveness across diverse healthcare settings.

VII. CONCLUSIONS

In conclusion, the development of an automated lung detection and classification system represents a significant advancement in the field of medical imaging, with profound implications for respiratory health and patient care. By leveraging state-of-the-art deep learning techniques, the system offers a reliable and efficient solution for the early detection and diagnosis of various lung abnormalities. Through its automated detection capabilities, real-time analysis, and user-friendly interface, the system streamlines the diagnostic process and empowers healthcare professionals to make informed treatment decisions promptly. Moreover, its integration with existing healthcare systems and scalability across diverse clinical settings ensure widespread adoption and accessibility. Overall, the automated lung detection and classification system holds great promise for improving diagnostic accuracy, enhancing patient outcomes, and revolutionizing the practice of respiratory medicine. As research and development in this field continue to progress, further advancements in technology and clinical implementation will undoubtedly contribute to the continued success and impact of automated lung detection systems in healthcare..

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