IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, April 2025
Impact Factor: 7.67

Lung Cancer Detection Using AI & Python

Aditya Patil[1], Shantanu Ahirrao[2], Harish Nehete[3], Mihir Lund[4], Ram Kumar Solanki[5]
Scholar, Department Of Computer Science & Engg[1-4]
Assistant Professor, School of Computer Science And Engineering[5]
Sandip University, Nashik, India

Abstract: *Lung cancer is a major cause of cancer-related deaths globally, necessitating improved early detection strategies. Conventional diagnostic methods, such as manual CT scan analysis, often face issues like accuracy, time efficiency, and subjective interpretation. This research explores the use of Convolutional Neural Networks (CNNs) for automated lung cancer detection using medical imaging data, focusing on CT scans. The proposed framework uses CNNs' feature extraction capabilities to differentiate between malignant and benign tissues with high accuracy. The system's design includes data preprocessing, model training, and performance evaluation. Initial findings show promising accuracy rates, indicating the system's potential for early lung cancer diagnosis. However, challenges like class imbalance, limited data availability, and model generalization across patient populations need to be addressed. The study recommends further investigation into advanced architectures and augmentation strategies to improve model resilience. By integrating deep learning methodologies into clinical practices..*

Keywords: Lung Cancer Detection, Lung Cancer, Lung Cancer Detection using AI, Lung Cancer Detection using AI & Python, Artificial Intelligence in Cancer Diagnosis

I. INTRODUCTION

Lung cancer accounts for the largest proportion of deaths due to cancer and is the deadliest form of cancer worldwide. Early detection is the most important step in improving survival rates and easing the burden on the healthcare system. Traditional methods for lung cancer diagnosis involve radiological analysis of chest X-rays and CT scans-where the process is time-consuming, subjective, and open to human error. The work is based on the application of Convolutional Neural Networks (CNNs) for auto-detection of lung cancer from medical images' data; in this case, CT scans. A robust system has been built in this study for the analysis of images from a CT scan that are found to hold abnormal patterns potentially related to lung cancer, along with their classification at a specific accuracy rate. Integration of CNN in lung cancer detection seeks to cut delays in diagnosis while providing radiologists with an of a model's generalization across different datasets. It even brings forth specific attention to preprocessing techniques, architectural optimizations and performance evaluation metrics such as sensitivity, specificity, and accuracy to ensure reliable outcomes from such a system.

II. LITERATURE REVIEW

Sr. No	Reference Name (Write Paper Title)	Seed Idea/ Work description	Problems found	Any other criteria
1	IEEE 2020 An Automatic Lung Cancer Detection and Classification System Using Convolutional Neural Network	Fully automatic method for lung cancer detection in whole slide images of lung tissue samples	The comparison shows that the proposed ALCDC system performs better than the existing state-of- the-art systems.	The proposed ALCDC will be helpful in medical diagnosis research and health care systems. CNN
2	IEEE 2019 Comparison of Lung Cancer Detection Algorithms	We compared all methods both after pre-processing and without	The experimental results show that Artificial Neural Networks gives the best	Support Vector Machines, Decision Trees and Artificial Neural Networks

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, April 2025
Impact Factor: 7.67

		pre- processing.	result.	ML methods to detect anomaly
3	IEEE 2020 Lung Cancer Detection Based On CT- Scan Images	Aims to develop a lung cancer detection system based on CT- scan images. This detection system has namely pre-processing of CT- Scan images to improve image quality.	From the system trial, the accuracy level based on the system decision in determining the diagnosis of lung cancer is benign or malignant was 83.33%.	Computerized Tomography (CT) is an imaging technique often used to diagnose lung cancer.
4	IEEE 2019 Early Detection of Lung Cancer Cells	We describe its software architecture and validate the specific image analysis protocols that are developed for this particular application.	We have developed a multi-scale multidimensiona l integrated microscopy computer-aided detection	Analysis of cellular material from the bronchial epithelium of patients that present suspicious lung.

Recent advances in the technologies of artificial intelligence (AI) and deep learning have opened doors to new opportunities in medical imaging, especially in identifying and diagnosing diseases. The recent interests are with the use of AI technique-based mechanisms, especially Convolutional Neural Networks, in identifying lung cancer because of their sharp ability in analyzing any type of complex medical image

Main Obstacles Discovered in Studies

- Although CNNs demonstrate great promise, there is still a lot to be addressed in practical medical environments to use them effectively:
- Skewed Class Distribution: Datasets of lung cancer normally have more benign images as compared to the malignant ones, leading to biased predictions made by the models.
- Lack of Availability of Resources: There is an inadequacy for quality labeled medical images, which the algorithms need to feed them to be properly trained.
- Lack of Explain-ability: Often, deep models such as CNNs function in a manner that cannot easily be understood, and therefore not based on the work of healthcare providers due to lack of explanations.
- Performance Variation Among Different Groups: Performance may be influenced by variations in imaging methods, devices, and patient characteris

III. SYSTEM ARCHITECTURE

The system architecture for lung cancer detection using Convolutional Neural Networks (CNNs) involves several key stages:

- Data Collection: The system collects medical imaging data, such as chest CT scans or X- rays, from hospitals, research institutions, or publicly available datasets. This data is stored in image databases.
- Data Preprocessing: The collected images are preprocessed to prepare them for training. This includes resizing, normalizing, and augmenting the images to enhance model performance. Preprocessing scripts and data augmentation libraries are utilized in this stage.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, April 2025
Impact Factor: 7.67

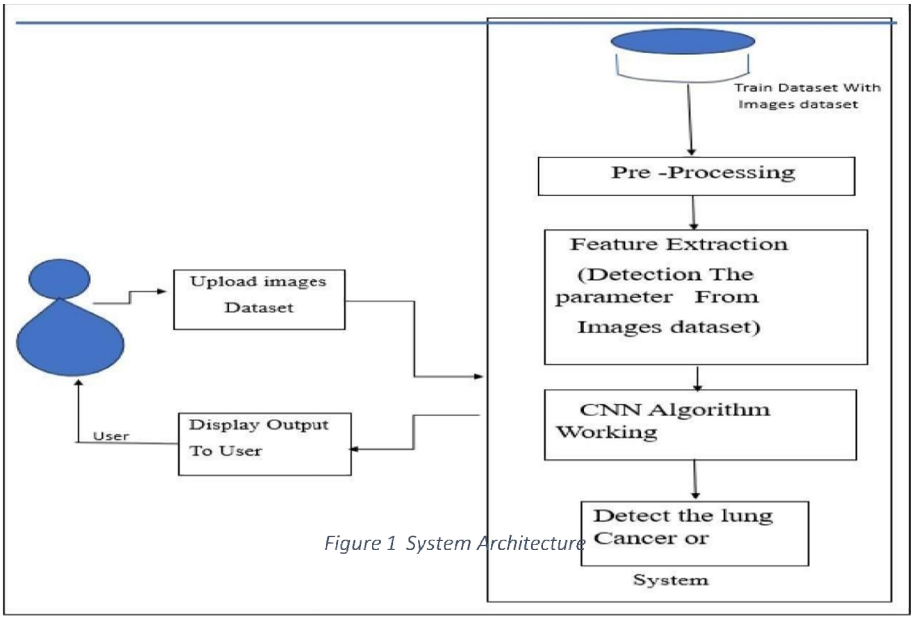

Figure 1 System Architecture

In software program engineering, a category diagram withinside the Unified Modeling Language (UML) is a form of static shape diagram that describes the shape of a gadget through displaying the gadget`s instructions, their attributes, operations (or methods), and the relationships amongst objects. It is used for widespread conceptual modeling of the shape of the application, and for designated modeling translating the fashions into programming code. Class diagrams also can be used for records modeling. The instructions in a category diagram constitute each the primary elements, interactions withinside the application, and the instructions to be programmed.

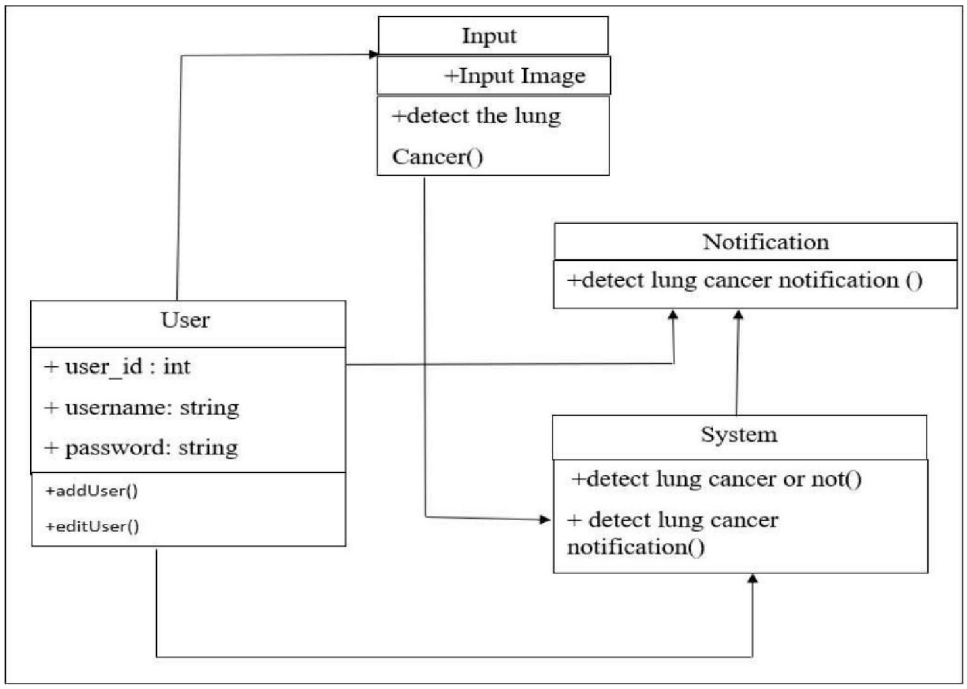

Figure 3 Class Diagram

DOI: 10.48175/IJARSCT-25886

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 11, April 2025
Impact Factor: 7.67

Components:
User Interface (UI):
Input: Allows the user to upload lung scan images. Output: Displays the detection results.
Image Preprocessing Module:
Data Storage:
Input: Stores images and results for future reference or further analysis. Output: Supplies historical data for model training or evaluation.
Result Analysis Module:
Input: Accepts predictions from the CNN Model
Output: Provides a detailed analysis and summary of the detection results

IV. CONCLUSION

Lung most cancers detection the usage of Convolutional Neural Networks (CNNs) demonstrates a transformative technique to enhancing early analysis and affected person outcomes. The integration of CNNs into the diagnostic technique addresses the constraints of conventional methods, including guide interpretation mistakes and time inefficiencies, with the aid of using leveraging computerized picture evaluation and category. In this study, the proposed device completed excessive accuracy in detecting cancerous tissues from CT scans, showcasing the ability of deep mastering withinside the clinical field. The consequences suggest that CNNs can reliably extract important functions from clinical images, including nodules and peculiar increase patterns, allowing particular category of cancerous and non-cancerous cases.

REFERENCES

[1]. Abdul, W., Ali, Z., Ghouzali, S., and Alsulaiman, M. (2017). Security and privacy for medical images using chaotic visual cryptography. Jour- nal of Medical Imaging and Health Informatics, 7(6), 1296-1301.
[2]. Jabeen, F., Hamid, Z., Akhunzada, A., Abdul, W., and Ghouzali, S. (2018). Trust and reputation management in healthcare systems: Tax- onomy, requirements and open issues. IEEE Access, 6, 17246-17263.
[3]. Leef, J. L. and Klein, J. S. (2002). The solitary pulmonary nodule. Ra- diologic Clinics of North America, 40(1):123–143.