



Automated Radiology Report Generation On Chest Xray

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Abstract

The growing need for timely and accurate medical diagnoses has emphasized the importance of automation in radiology. This project focuses on streamlining the diagnosis of pneumonia, tuberculosis, and COVID-19 through AI. Using deep learning, it analyzes chest X-rays to detect abnormalities and generate structured radiology reports, reducing diagnostic time and enhancing accuracy.

Introduction

Automated radiology report generation is a transformative application of AI in healthcare, designed to address challenges in medical diagnostics. Chest X-rays are crucial tools for identifying respiratory diseases, but manual interpretation is time-consuming and prone to human error.

Our project focuses on automating this process by developing a system capable of detecting pneumonia, tuberculosis, and COVID-19 in chest X-rays and generating comprehensive radiology reports. The solution employs advanced deep learning models and integrates seamlessly into clinical workflows, providing radiologists with accurate and consistent insights. By automating repetitive tasks, the project contributes to faster and more efficient healthcare delivery.

Problem Statement

The manual process of generating radiology reports for medical imaging data is time-consuming, leading to delays in patient care. Human error and variability in report creation can impact diagnosis accuracy. The need for an efficient and standardized approach to radiology reporting is critical in modern healthcare settings.

Aim & Objectives

Aim :

To Implement a system that automatically generates detailed and accurate Chest X-ray reports.

Objectives:

Data Collection: To compile a dataset of chest X-rays for selected diseases.

Data preprocessing: To extract significant features from the X-ray images.

Model Training: To train the model to identify the diseases accurately.

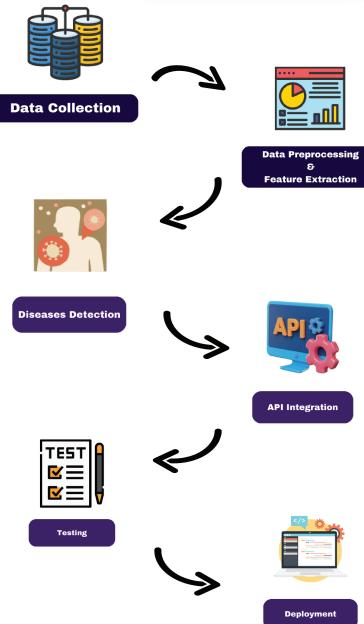
Integration: To integrate the disease identification with a OpenAI API for report generation.

Testing: To evaluate the overall performance of the system.

Tools & Technologies

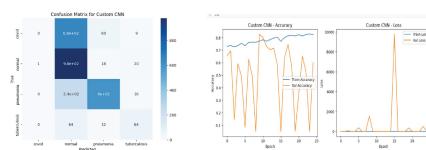


Methodology

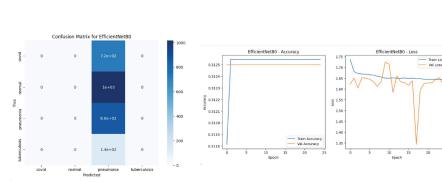


Results

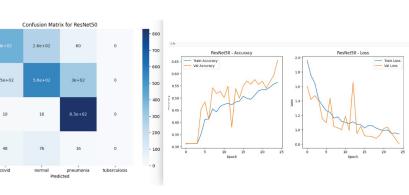
Custom CNN Model



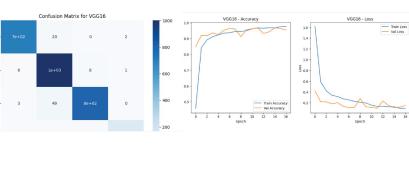
EfficientNetB0 CNN Model



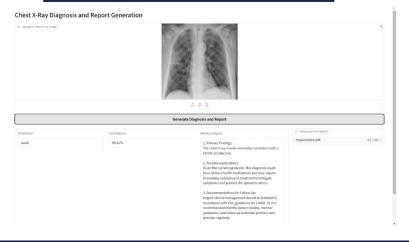
ResNet50 CNN Model



VGG16 CNN Model



Models	Accuracy
VGG16	97.3%
ResNet50	65.4%
EfficientNetB0	31.2%
Custom CNN	60.0%



Conclusion

The "Automated Radiology Report Generation on Chest X-rays" project demonstrates the potential of AI in revolutionizing medical diagnostics. By automating the analysis of chest X-rays and the generation of radiology reports, the system reduces the burden on radiologists, improves diagnostic precision, and accelerates decision-making. This innovation holds significant promise for resource-limited healthcare settings where access to expert radiologists is limited. With further refinement and validation, the project can pave the way for widespread adoption of AI-driven solutions in radiology, ultimately improving patient outcomes and healthcare efficiency.

References

- J. Bustos, A. Pertusa, J. Salinas, and M. de la Iglesia-Vayá, "PadChest: A large chest x-ray image dataset with multi-label annotated reports," ScienceDirect, Jun. 2020.
- S. M. Liang and W. K. Mak, "Attention-based automated radiology report generation using CNN and LSTM," Journal of Biomedical Informatics, Jan. 6, 2022.
- L. Yin, J. Wang, and C. Li, "Automated radiology report generation using conditioned transformers," Mar. 26, 2021.
- P. Mooney, "Chest X-ray Pneumonia Dataset," Kaggle.
- T. Rahman, "Tuberculosis (TB) Chest X-ray Dataset," Kaggle.
- T. Rahman, "COVID-19 Radiography Database," Kaggle.