Extended Abstract

AI-Driven Pneumonia Diagnosis from Chest X-Rays

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ABSTRACT

Pneumonia remains a significant global health issue, especially in areas with limited diagnostic resources. Traditional methods for diagnosing pneumonia from chest X-rays are slow and require expert radiologists. We developed an AI-powered pneumonia detection tool using convolutional neural networks (CNNs) with VGG16 and Inception models. These models were trained on chest X-ray datasets and achieved high accuracy in classifying pneumonia. Our app, built with Flask, allows healthcare professionals to upload X-rays and get real-time predictions with confidence scores. The system supports continuous learning through user feedback, improving its performance. This tool can potentially revolutionise pneumonia diagnosis, especially in low-resource settings.

Keywords: Chest X-rays, convolutional neural networks, deep learning, pneumonia diagnosis

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1.0 Introduction

Pneumonia remains a leading cause of mortality, especially in low-resource settings where timely diagnosis is challenging due to limited access to radiologists. Early detection is crucial for effective treatment and improving patient outcomes (1). Recent advancements in artificial intelligence (AI) and deep learning have revolutionised medical image recognition, enabling real-time automated diagnostic solutions (2), including detecting pneumonia from chest X-rays, offering faster and more accurate results while reducing the burden on healthcare professionals.

2.0 Innovation

The system uses pre-trained VGG16 and Inception models for image classification, which were fine-tuned for pneumonia detection. The AI model processes chest X-rays and gives clinicians confidence scores for pneumonia detection. The app interface allows real-time predictions, continuous feedback, and performance tracking. This innovative design ensures the system remains accurate and adaptable to real-world usage. Figure 1 illustrates the methodology used, while Figure 2 shows the interface of the pneumonia detection app.

3.0 Uniqueness

Our app integrates multiple models, dynamically switching between them based on feedback. The system learns continuously, enhancing accuracy without manual updates. Real-time performance tracking, including accuracy and precision, helps clinicians make informed decisions. These features make it a powerful tool for diagnosing pneumonia in various healthcare settings.

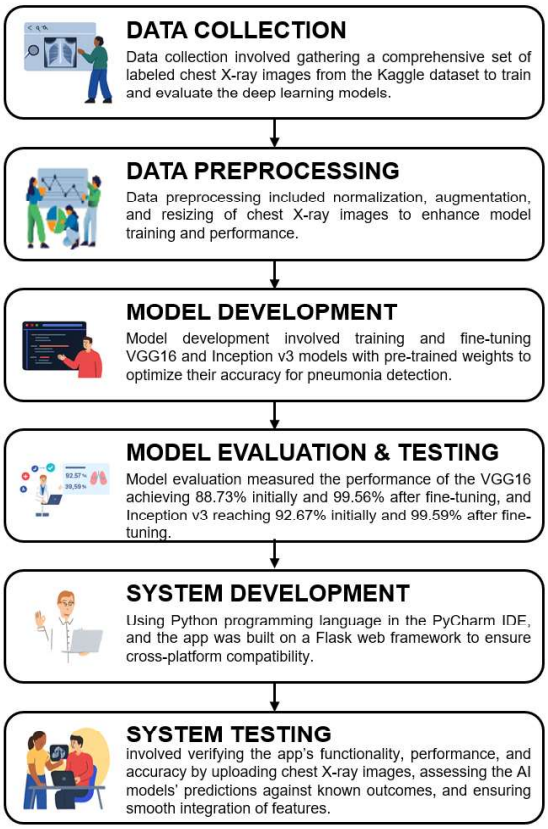

Figure 1: Overview of the six-step process for developing a deep learning-based pneumonia detection system using chest X-ray images.

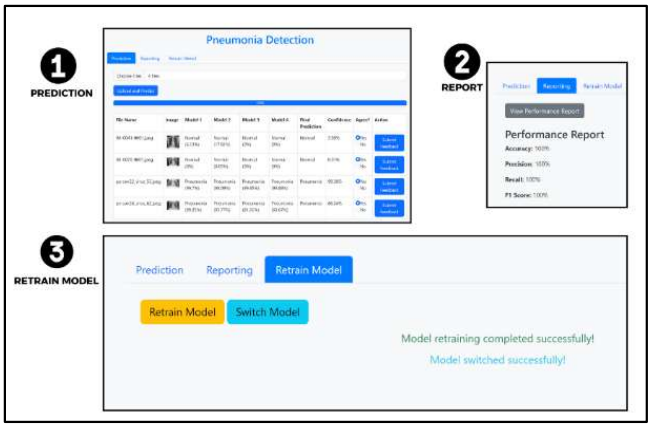

Figure 2: Interface of AI-Driven Pneumonia Diagnosis from Chest X-Rays.

4.0 Commercialisation Potential

There is a strong demand for AI diagnostic tools in healthcare. Our system is scalable and designed for ease of integration into

existing workflows, making it well-suited for hospitals, clinics, and telemedicine platforms. Its potential application in resource-limited settings and compatibility with healthcare systems globally, enhances its viability for commercialisation.

5.0 Impact on Quintuple Helix

The app's accessibility improves early pneumonia detection, particularly in underserved areas. It supports research and innovation in AI healthcare and contributes to sustainable practices by reducing reliance on physical diagnostics infrastructure.

6.0 Conclusion

Our AI-driven pneumonia diagnosis app offers an efficient, scalable, and continuously improving solution for healthcare professionals. Its adaptability and potential for commercialisation can transform pneumonia diagnosis, particularly in resource-limited environments.

Authorship contribution statement

SS: Data analysis, Methodology, Formal analysis, Writing–original draft. **MK**: Writing – review & editing, Draft corrections, Supervision, Funding acquisition.

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Conflict of Interest

The authors declared that they have no conflicts of interest to disclose.

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