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Peer Review

Review of: "Development of a Lung Cancer Detection System Using Residual Network 50 on Computed Tomography Scans"

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This is a well-structured preprint that addresses an important clinical need: improving early lung cancer detection through deep learning on CT scans. The authors demonstrate a practical pipeline from dataset curation and ResNet50 model training (transfer learning) to full deployment as a user-friendly web application (LUNNY). The reported performance (98.46% accuracy, 99.21% recall) is impressive, and the emphasis on a balanced, multi-source dataset and real-world deployment is a notable strength. The manuscript is generally clear, logically organised, and shows good awareness of the literature. It is suitable for publication after minor to moderate revisions.

Major Strengths

1. Practical Impact: Moving beyond pure research to deploy a functional web tool with authentication, patient record management, and Lung-RADS integration is a significant plus. This bridges the gap between academic models and clinical usability.

2. Dataset Handling: Combining three public datasets and carefully balancing them (50:50) to mitigate class imbalance is commendable.

3. Methodology: Appropriate use of transfer learning, freezing early layers, data augmentation, and early stopping. The theoretical explanations (residual blocks, loss functions) are accessible.

4. Results Presentation: A clean table and multiple screenshots of the interface make the work tangible.

5. Ethical & Reproducibility Notes: Public datasets, no competing interests, and documentation of deployment workflow are well handled.

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Areas for Improvement & Suggestions

1. Abstract & Introduction: The abstract is concise and effective but could be strengthened by explicitly stating the binary classification task (cancerous vs. non-cancerous) earlier and briefly mentioning the web application name ("LUNNY") and its key features.

Suggestion: Revise the abstract's performance sentence for precision: "achieving an accuracy of 98.46%, a recall of 99.21%, a precision of 97.69%, and an F1-score of 98.45% on the test set."

In the Introduction, some citations appear slightly mismatched or overly broad (e.g., general cancer statistics cited for lung cancer specifics). The "Review of Related Works" section is thorough but reads a bit like a list. Consider organising it into a summary table comparing key studies on dataset size, classes (binary vs. multi-class), accuracy, and deployment status. This would greatly improve readability.

2. Methods (Moderate Revisions Recommended)

- **Dataset Details**: Provide more transparency on how "cancerous" vs. "non-cancerous" labels were harmonised across the three datasets (IQ-OTH/NCCD, LIDC-IDRI, BIR). LIDC-IDRI is nodule-focused with malignancy ratings—how were these binarised? A brief supplementary table or description would help.
- **Data Splitting & Augmentation**: Confirm that the 70:15:15 split was stratified by class and dataset source. List specific augmentation parameters (e.g., rotation range, jitter values) more precisely.
- **Model Hyperparameters**: Add key details such as batch size, number of epochs (before early stopping), exact learning rate/scheduler, and dropout placement. Mention the hardware used for training (even if approximate).
- **Evaluation**: Include a confusion matrix (or at least true positives/negatives) and, ideally, ROC-AUC or PR-curve in the main text or supplementary material. This is standard for medical imaging papers.

3. Results & Discussion The performance is strong, but the Discussion could better contextualise results against the reviewed studies. For instance, highlight that your binary classification + deployment sets this work apart from many multi-class studies that remained prototypes.

Suggestions:

1. Acknowledge potential limitations more explicitly: domain shift between the three datasets, risk of overfitting despite augmentation/early stopping, and the need for external validation on truly independent clinical data.

2. Discuss generalizability (e.g., scanner types, patient demographics in source datasets).
3. In the web app section, mention any security measures (e.g., HIPAA-like considerations, image anonymization) and planned evaluation with clinicians (usability study).

4. Minor Technical & Editorial Issues

1. Figures: All screenshots are helpful, but ensure consistent quality and labeling. Figure 1 (architecture) is referenced well. Consider adding one example CT image (with model prediction overlay) for visual interest.

2. Equations: The equations are correctly presented but could use consistent numbering and slightly improved formatting for the softmax and loss functions in the final version.

3. Language & Typos (minor polishing needed):

1. Several instances of "proved fatal" → "were fatal"; "terms of tobacco use" → "in terms of".
2. "Lung-RADS (4B)" in screenshots—ensure consistency in text.
3. Some references have minor formatting issues or future dates that should be double-checked (e.g., 2025 papers).
4. **References**: Excellent breadth, but verify all DOIs and update any preprints to final publications if available.

5. Future Work The proposed directions (larger datasets, explainable AI, clinical testing) are appropriate. Consider adding exploration of model interpretability techniques (Grad-CAM, SHAP) to show which regions drive predictions—this would increase clinician trust.

Recommendation Accept with Minor Revisions. This work has clear value for the medical AI community. Addressing the dataset harmonization, adding a few more methodological details, and polishing the related work section into a comparative summary will make it significantly stronger. The deployed system is a genuine contribution that many similar papers lack.

In my view, with the above revisions incorporated, the work will become good enough for publishing and it need not be sent back to me again.

Declarations

Potential competing interests: No potential competing interests to declare.