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REVIEWER'S REPORT

Manuscript No.: **IJAR- 53439** Date: 20-08-2025

Title: A Study on Advanced Image Processing Techniques for Detecting Brain Metastasis Tumors from Radiological Images

Recommendation:
Accept as it is .....
Accept after minor revision ...✓.....
Accept after major revision.....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality	✓			
Techn. Quality	✓			
Clarity		✓		
Significance	✓			

Reviewer Name: **Sudhanshu Sekhar Tripathy** **Date:** 20-08-2025

Reviewer's Comment for Publication.

(*To be published with the manuscript in the journal*)

The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewer's name.

Reviewer's Comment for Publication

The manuscript presents an important and timely contribution on applying advanced image processing and deep learning techniques for brain metastasis detection. By comparing CNN architectures such as ResNet-50, VGG-16, and Inception-V3 with traditional ML models, the study demonstrates significant improvements in accuracy and segmentation performance. The integration of clinical validation enhances the paper's impact, making it highly relevant for AI-driven medical diagnosis research and practice.

Detailed Reviewer's Report

Recommendation: **Accept after minor revision**

Comments & Suggestions for Improvement

1. Scope & Relevance:

- The paper addresses a critical issue in medical imaging: accurate and efficient detection of brain metastases.

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- The combination of classical feature extraction (wavelet, Gabor filters) with CNN-based models is innovative.
- Clinical validation makes the study highly relevant for real-world deployment in radiology**.**

2. Structure & Technical Presentation:

- The manuscript follows a clear structure (Abstract, Introduction, Literature Review, Methodology, Results, Conclusion).
- Results are well presented with quantitative metrics (accuracy, sensitivity, specificity, precision, F1-score, DSC, ROC-AUC).
- However, dataset details (size, diversity, modality balance) need more elaboration for reproducibility.
- Figures (1–3) are useful but captions should be more descriptive (e.g., "Comparison of Sensitivity and Precision across models").
- A flowchart of the proposed framework would further improve clarity.

Key Strengths:

- Demonstrated superiority of ResNet-50 with 94.2% accuracy.
- Effective tumor segmentation using U-Net (DSC = 0.89).
- Data augmentation improved generalization and robustness.
- Clinical integration reduced diagnostic time by 30%, proving practical utility.

Areas for Improvement:

- Provide dataset distribution details (number of cases, tumor vs. non-tumor samples).
- Expand discussion on model limitations (class imbalance, small/irregular tumor detection).
- Add Experimental Setup Details
- Highlight potential challenges in ethical and regulatory adoption of AI-based tools in healthcare.

Final Feedback to Author:

This is a strong and well-executed paper that makes a valuable contribution to AI-based medical imaging. Including clear experimental details (datasets, environment, Hyperparameter, and validation strategy) will significantly enhance reproducibility and credibility. A model workflow/flow chart should be added to illustrate the overall pipeline from preprocessing to classification and clinical integration. Addressing these minor revisions related to dataset detail, figure presentation, and discussion of limitations will improve clarity and impact.