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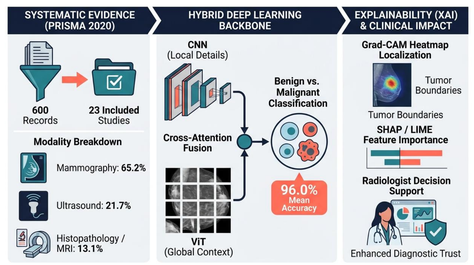
Explainable AI (XAI) and Hybrid Deep Learning Frameworks for Breast Cancer Image Segmentation and Classification: A Systematic Review



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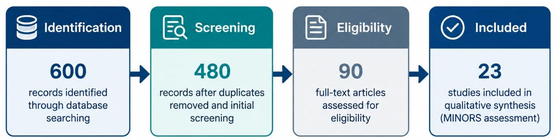
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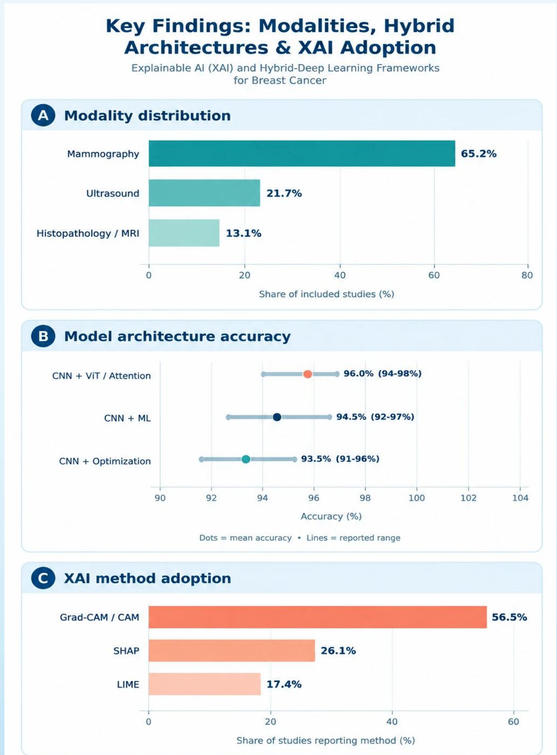
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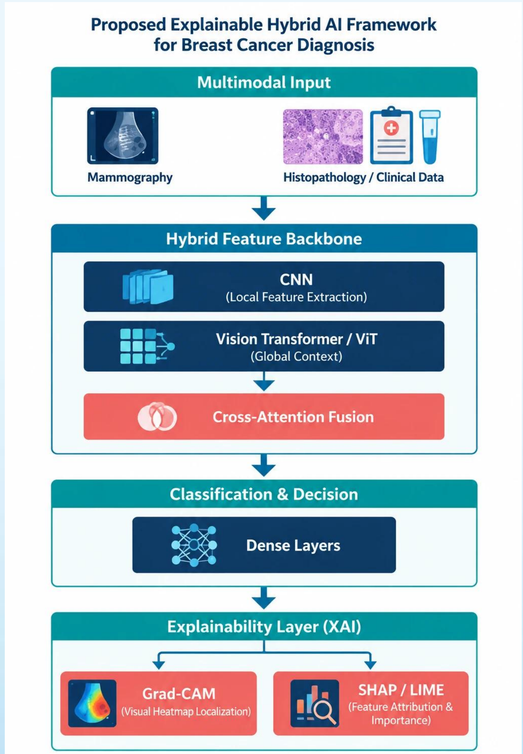
- **Clinical Significance of Early Detection:** Breast cancer remains a leading cause of cancer-related mortality globally. While diagnostic imaging such as mammography, ultrasound, and histopathology is essential, the increasing workload for radiologists necessitates the integration of automated diagnostic tools.
- **The "Black-Box" Challenge:** Deep Learning (DL) models, particularly Convolutional Neural Networks (CNNs), have demonstrated superior predictive performance in medical image classification and segmentation. However, their opaque, "black-box" nature remains a critical barrier to clinical adoption. The lack of interpretability prevents medical professionals from understanding the reasoning behind algorithmic decisions, thereby limiting clinical trust and regulatory compliance.
- **The Shift Toward Hybrid Frameworks:** To address the limitations of standalone architectures, researchers are increasingly adopting Hybrid Deep Learning frameworks. By integrating CNNs with attention mechanisms (e.g., Vision Transformers) or ensemble classifiers, these models achieve higher robustness and accuracy by capturing both local textures and global spatial relationships.

Methods

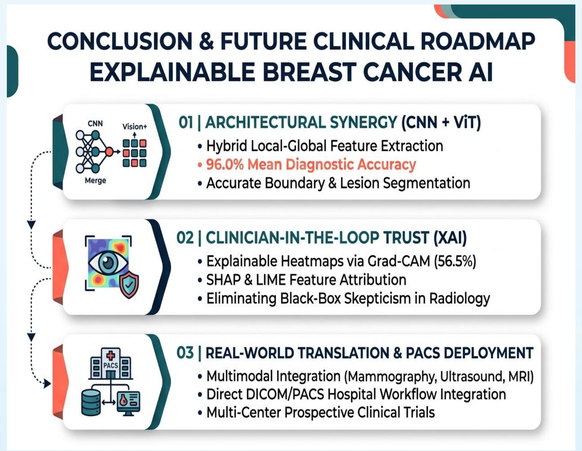


Findings





Conclusion



References

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